



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION I
2100 RENAISSANCE BOULEVARD, SUITE 100
KING OF PRUSSIA, PENNSYLVANIA 19406-2713

November 3, 2021

Mr. Brad Berryman
Senior Vice President and Chief Nuclear Officer
Susquehanna Nuclear, LLC
769 Salem Blvd., NUCSB3
Berwick, PA 18603

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2 –
INTEGRATED INSPECTION REPORT 05000387/2021003 AND
05000388/2021003

Dear Mr. Berryman:

On September 30, 2021, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Susquehanna Steam Electric Station, Units 1 and 2. On October 28, 2021, the NRC inspectors discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

Two findings of very low safety significance (Green) are documented in this report. One of these findings involved a violation of NRC requirements. We are treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest the violation or the significance or severity of the violation documented in this inspection 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, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement; and the NRC Resident Inspector at Susquehanna Steam Electric Station, Units 1 and 2.

If you disagree with a cross-cutting aspect assignment or a finding not associated with a regulatory requirement in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; and the NRC Resident Inspector at Susquehanna Steam Electric Station, Units 1 and 2.

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

Sincerely,

Jonathan E. Greives, Chief
Reactor Projects Branch 4
Division of Operating Reactor Safety

Docket Nos. 05000387 and 05000388
License Nos. NPF-14 and NPF-22

Enclosure:
As stated

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SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2 –
 INTEGRATED INSPECTION REPORT 05000387/2021003 AND
 05000388/2021003 DATED NOVEMBER 3, 2021

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**U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report**

Docket Numbers: 05000387 and 05000388

License Numbers: NPF-14 and NPF-22

Report Numbers: 05000387/2021003 and 05000388/2021003

Enterprise Identifier: I-2021-003-0017

Licensee: Susquehanna Nuclear, LLC

Facility: Susquehanna Steam Electric Station, Units 1 and 2

Location: 769 Salem Blvd., Berwick, PA

Inspection Dates: July 1, 2021, to September 30, 2021

Inspectors: C. Highley, Senior Resident Inspector
M. Rossi, Resident Inspector
H. Anagnostopoulos, Senior Health Physicist
J. DeBoer, Reactor Inspector
B. Edwards, Health Physicist
N. Floyd, Senior Reactor Inspector
M. Henrion, Health Physicist
A. Turilin, Reactor Inspector

Approved By: Jonathan E. Greives, Chief
Reactor Projects Branch 4
Division of Operating Reactor Safety

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting an integrated inspection at Susquehanna Steam Electric Station, Units 1 and 2, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to <https://www.nrc.gov/reactors/operating/oversight.html> for more information.

List of Findings and Violations

Failure to Perform an Appropriate Critique to Ensure an Incorrect Emergency Action Level Classification Was Corrected			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Emergency Preparedness	Green NCV 05000387,05000388/2021003-01 Open/Closed	[H.9] - Training	71111.05
The inspectors identified a Green non-cited violation (NCV) of 10 CFR 50.54(q)(2) when the licensee failed to follow and maintain an emergency plan that meets the requirements of 10 CFR Part 50, Appendix E, and the planning standards of 10 CFR 50.47(b). Specifically, the licensee failed to identify and correct a weakness when performing emergency classifications during a fire drill as required by 10 CFR 50.47(b)(14).			

Electrohydraulic Control System Leak Due to Improper Maintenance			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green FIN 05000387/2021003-02 Open/Closed	[H.12] - Avoid Complacency	71111.12
The inspectors identified a finding (FIN) of very low significance (Green) when plant maintenance personnel failed to properly torque the tie rods that hold the bottom plate on the 'D' main turbine steam bypass valve which resulted in a leak on the electrohydraulic control (EHC) system.			

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
LER	05000388/2020-001-01	LER 2020-001-01 for Susquehanna, Unit 2, Manual Scram Due to Rising Main Condenser Backpressure Caused by Failure of an Offgas Recombiner Inlet Valve	71153	Closed

PLANT STATUS

Unit 1 began the inspection period at rated thermal power. On July 21, 2021, the unit was shut down due to a scram. The unit was returned to rated thermal power on August 2, 2021. On August 13, 2021, the unit was down powered to 87 percent for a rod pattern adjustment. The unit was returned to rated thermal power on August 14, 2021. On September 1, 2021, the unit was down powered to 85 percent for turbine valve testing and rod pattern adjustment. The unit was restored to rated thermal power on September 2, 2021. On September 14, 2021, the unit was down powered to 85 percent for a rod pattern adjustment. The unit was returned to 100 percent on September 14, 2021. On September 21, 2021, the unit was down powered to 94 percent for a rod pattern adjustment. The unit was returned to rated thermal power on September 22, 2021. On September 24, 2021, the unit was down powered to 92 percent for control rod friction testing. The unit was returned to rated thermal power on September 25, 2021, and remained at or near rated thermal power for the remainder of the inspection period.

Unit 2 began the inspection period at rated thermal power. On July 9, 2021, the unit was down powered to 60 percent for a rod sequence exchange. The unit was returned to rated thermal power on July 12, 2021. On July 13, 2021, the unit was down powered to 93.8 percent. The unit was returned to rated thermal power on July 14, 2021, and remained at or near rated thermal power for the remainder of the inspection period.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html>. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

Starting on March 20, 2020, in response to the National Emergency declared by the President of the United States on the public health risks of the coronavirus (COVID-19), resident and regional inspectors were directed to begin telework and to remotely access licensee information using available technology. During this time, the resident inspectors performed periodic site visits each week, increasing the amount of time on-site as local COVID-19 conditions permitted. As part of their on-site activities, resident inspectors conducted plant status activities as described in IMC 2515, Appendix D, "Plant Status"; conducted routine reviews using IP 71152, "Problem Identification and Resolution"; observed risk significant activities; and completed on-site portions of IPs. In addition, resident and regional baseline inspections were evaluated to determine if all or a portion of the objectives and requirements stated in the IP could be performed remotely. If the inspections could be performed remotely, they were conducted per the applicable IP. In some cases, portions of an IP were completed remotely and on-site. The inspections documented below met the objectives and requirements for completion of the IP.

REACTOR SAFETY

71111.01 - Adverse Weather Protection

External Flooding (IP Section 03.03) (1 Sample)

- (1) The inspectors evaluated that flood protection barriers, mitigation plans, procedures, and equipment are consistent with the licensee's design requirements and risk analysis assumptions for coping with external flooding on September 1, 2021.

71111.04 - Equipment Alignment

Partial Walkdown (IP Section 03.01) (2 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

- (1) Unit 1, division II emergency core cooling systems while 'B' loop residual heat removal in shutdown cooling mode on July 23, 2021
- (2) Unit 1, 1B core spray during 1A core spray system outage window on September 27, 2021

71111.05 - Fire Protection

Fire Area Walkdown and Inspection (IP Section 03.01) (6 Samples)

The inspectors evaluated the implementation of the fire protection program by conducting a walkdown and performing a review to verify program compliance, equipment functionality, material condition, and operational readiness of the following fire areas:

- (1) Unit Common, 'A' emergency diesel bay, 660-foot to 710-foot elevation (FZ 0-41A), on July 23, 2021
- (2) Unit 1, core spray pump room and high-pressure coolant injection pump room, 645-foot elevation (FZ 1-1B and 1-1C), on August 4, 2021
- (3) Unit 1, equipment access area, 683-foot elevation (FZ 1-3C, N, W, and S), on August 18, 2021
- (4) Unit 2, divisions I and II equipment rooms, 771-foot elevation (FZ 0-28A-I and 0-28A-II), on August 27, 2021
- (5) Unit 1, control structure battery rooms, 771-foot elevation (FZ 0-28B-I, M, N, and J), on September 15, 2021
- (6) Unit 2, reactor coolant isolation cooling pump room, 645-foot to 670-foot elevation, residual heat removal 'B' pump room, 645-foot to 670-foot elevation, sump pump room, 645-foot elevation (FZ 2-1D, 2-1E, 2-1G), on September 21, 2021

Fire Brigade Drill Performance (IP Section 03.02) (2 Samples)

- (1) The inspectors evaluated the onsite fire brigade training and performance during an unannounced fire drill on July 9, 2021.
- (2) The inspectors evaluated the onsite fire brigade training and performance during an announced fire drill with off-site personnel participation on September 15, 2021.

71111.06 - Flood Protection Measures

Cable Degradation (IP Section 03.02) (1 Sample)

The inspectors evaluated cable submergence protection in:

- (1) Manholes 31 and 32 on September 14, 2021

71111.11Q - Licensed Operator Regualification Program and Licensed Operator Performance

Licensed Operator Performance in the Actual Plant/Main Control Room (IP Section 03.01) (1 Sample)

- (1) The inspectors observed and evaluated licensed operator performance in the control room during a Unit 2 rod sequence exchange on July 9, 2021.

Licensed Operator Regualification Training/Examinations (IP Section 03.02) (1 Sample)

- (1) Unit Common, the inspectors observed and evaluated operator performance in the simulator during performance of licensed operator regualification exam that included reactor scram, seismic event, loss of emergency core cooling equipment, and various pump and valve failures to include emergency action level (EAL) classifications on September 14, 2021.

71111.12 - Maintenance Effectiveness

Maintenance Effectiveness (IP Section 03.01) (2 Samples)

The inspectors evaluated the effectiveness of maintenance to ensure the following structures, systems, and components remain capable of performing their intended function:

- (1) Unit Common, review of AZZ-NLI breakers impending change from (a)(1) status under the maintenance rule program on August 19, 2021
- (2) Unit 1, bypass valve maintenance practices and work order discrepancies on September 8, 2021.

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management (IP Section 03.01) (5 Samples)

The inspectors evaluated the accuracy and completeness of risk assessments for the following planned and emergent work activities to ensure configuration changes and appropriate work controls were addressed:

- (1) Unit 1, yellow risk due to automatic depressurization system permissive and timer sequence testing on July 6, 2021
- (2) Unit 1, protected equipment scheme during forced outage with 'B' loop shutdown cooling in service on July 23, 2021

- (3) Unit Common, yellow risk window for the relay replacement on division I residual heat removal service water and diagnostic testing of division I emergency service water HV10943A2 on August 25, 2021
- (4) Unit 2, scram discharge and vent/drain valve (SV-247F009A) solenoid replacement on August 26, 2021
- (5) Unit Common, elevated risk for spray pond header cleaning of A1 spray nozzles on September 29, 2021

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (9 Samples)

The inspectors evaluated the licensee's justifications and actions associated with the following operability determinations and functionality assessments:

- (1) Unit 2, emergency service water to turbine building closed loop cooling water crossover through-wall leak as documented in CR-2021-09529 on July 7, 2021
- (2) Unit Common, degraded fire wrap on conduit in 'A' emergency diesel bay as documented in CR-2021-11107 on August 16, 2021
- (3) Unit 1, reactor core isolation cooling pump high oil level as documented in CR-2021-09559 on August 17, 2021
- (4) Unit Common, divisions I and II emergency service water and residual heat removal service water control power cable tray corrosion in manholes 27 and 28 (MH27 and MH28) as documented in CR-2021-12561 and CR-2021-12566 on August 24, 2021
- (5) Units 1 and 2, operability of steam bypass valves with tie rods being under torqued as documented in CR-2021-12659 on August 26, 2021
- (6) Unit Common, control building heating, ventilation, and air conditioning surveillance failure which Engineering reperformed the calculation to remove some margin to pass the surveillance as documented in CR-2021-12739 on August 26, 2021
- (7) Unit 1, spring cans identified to be bottom limit position as documented in CR-2021-11076 on September 1, 2021
- (8) Unit 2, residual heat removal service water pump discharge pressure in alert range as documented in CR-2021-09456 on September 2, 2021
- (9) Unit 2, residual heat removal heat exchanger outlet valve (HV21215A) overload trips on restoration as documented in CR-2021-13814 on September 22, 2021

71111.17T - Evaluations of Changes, Tests, and Experiments

Sample Selection (IP Section 02.01) (38 Samples)

The inspectors reviewed the following evaluations, screenings, and/or applicability determinations for 10 CFR 50.59 from September 20 to 23, 2021:

- (1) 50.59 SE 00031, Evaluation of Framatome Computer Code Version Changes on U2C21 Analyses, Revision 0
- (2) 50.59 SE 00032, Decrease in Turbine Valve Testing Frequency, Revision 0
- (3) 50.59 SD 01502, Install Higher Head Pumps in Place of 0P511, 0P512, and 0P592, Revision 4
- (4) 50.59 SD 02184, Check Valve Hinge Pin Material Change, Revision 0
- (5) 50.59 SD 02188, Alternate Proprietary Concrete, Revision 0

- (6) 50.59 SD 02194, Removing Seismic Sensor VT05704 and Its Recorder VRS05704, Revision 0
- (7) 50.59 SD 02198, Add a Hydraulic Booster to the EDG E Governor, Revision 0
- (8) 50.59 SD 02205, Nuclear Engineering Specification for Replacement of HRC (ESW and RHRSW) and JRD (Service Water) Piping or Repair of HRC (ESW and RHRSW) Piping, Revision 1
- (9) 50.59 SD 02206, A-D Diesel Generator Exhaust Outlet Heat Shield, Revision 0
- (10) 50.59 SD 02208, Replace 480V LC Transformers Per EC 2206354, Revision 0
- (11) 50.59 SD 02235, Clearance Order with Valves Out of Position Greater Than 90 Days, Revision 0
- (12) 50.59 SD 02240, NDAP-QA-0742, Revision 6
- (13) 50.59 SD 02242, Stainless Steel Piping for Mitigation of FAC and Mechanical Erosion, Revision 3
- (14) 50.59 SD 02257, Temporary Leak Repairs, Revision 1
- (15) 50.59 SD 02259, Determ Control Valve Test Switch (CVTS-3) to Allow for Routine Testing of Circuit for Failed Limit Switch, Revision 0
- (16) 50.59 SD 02261, Local Leak Rate Testing Scope Reduction for SSES Units 1 and 2, Revision 1
- (17) 50.59 SD 02266, Add a Hydraulic Booster to the EDG A, B, C, D Mechanical Governor, Revision 0
- (18) 50.59 SD 02277, Security SIEM Replacement, Revision 0
- (19) 50.59 SD 02278, Revise FSAR Section 9.5.2.2.2 per EC 2217021, Revision 0
- (20) 50.59 SD 02289, Replace U1 Standby Liquid Control Tank Ultrasonic Level Monitoring Equipment, Revision 0
- (21) 50.59 SD 02291, Maintaining Door 571 R in the Open Position, Revision 0
- (22) 50.59 SD 02297, Fuel Pool Cooling FD Flow Controller FIC-25444 Caution Tagged in Manual Control, Revision 0
- (23) 50.59 SD 02333, TDC 2308928 Temporary Bypass Battery Cell #120 on Battery 2D660, 250VDC Battery Bank B, Revision 0
- (24) 50.59 SD 02340, Caution Tag CO 24-001-2301047-0 Applied to A Diesel Generator Aux Fuel Oil Booster Pump 0P538A Handswitch HS-03483A for Greater Than 60 Days, Revision 0
- (25) 50.59 SD 02341, Leakage Rate Assignment to MSIV Penetrations No. X-7A, B, C, D, Revision 0
- (26) 50.59 SD 02349, SCT Applied to Remove Power to Cathodic Protection Circuit R10A and R10B (Breaker 0LP4-22), Revision 0
- (27) 50.59 SD 02352, Issuance, Revision, or Deletion of the License Renewal System Walkdown Program, Revision 0
- (28) 50.59 SD 02361, ESW Flow Balance Throttle Valve Adjustments, Revision 0
- (29) 50.59 SD 02376, Replacement Pressure Switch for Core Spray and LPCI Permissive Pressure Switches, Revision 0
- (30) 50.59 SD 02392, Evaluate Compensatory Measure Support POD ACT-01-CR-2020-10890, Revision 0
- (31) 50.59 SD 02405, Compensatory Measure for POD ACT-01-CR-2020-13332, Revision 0
- (32) 50.59 SD 02420, FSAR Section 3.14.2.28, and FSAR Table 3.14-1, Item 48: Addition of Lubricating Oil Analysis Program Exception for the Diesel Engine Driven Fire Pumps, Revision 0
- (33) 50.59 SD 02440, Pandemic Response, Revision 1

- (34) 50.59 SD 02446, Unit 2 500KV Tie-In for Commercial Customer Load Center, Revision 1
- (35) 50.59 SD 02460, DBD 024 DBDCN for Circulating Water Pump Suct/Disch Valve Replacement, Revision 0
- (36) 50.59 SD 02461, Generic 50.59 Screen for Polyethylene Foam from TN-B1 Shipping Container Lost in Reactor Vessel, Revision 0
- (37) 50.59 SD 02473, 0K112A Hight Bearing Temp Trip Temp Bypass, Revision 0
- (38) 50.59 SD 02500, Housekeeping Patch Installed Over Pinhole Leak on HRC205-2 ESW Piping, Revision 0

71111.19 - Post-Maintenance Testing

Post-Maintenance Test (IP Section 03.01) (3 Samples)

The inspectors evaluated the following post-maintenance test activities to verify system operability and functionality:

- (1) Unit 1, bypass valve 'D' O-ring replacement during forced outage on August 2, 2021
- (2) Unit 2, residual heat removal flow verification after breaker motor cut out switch replacement on August 12, 2021
- (3) Unit Common, 'C' emergency diesel generator 5-year overhaul on August 30, 2021

71111.20 - Refueling and Other Outage Activities

Refueling/Other Outage (IP Section 03.01) (1 Sample)

- (1) The inspectors evaluated Unit 1 forced outage, scram due to turbine trip from an electrical short in the C phase of the Isophase ducting, activities from July 21 to July 27, 2021.

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

Inservice Testing (IP Section 03.01) (1 Sample)

- (1) Unit Common, 'A' loop emergency service water comprehensive flow surveillance on August 23, 2021

71114.06 - Drill Evaluation

Select Emergency Preparedness Drills and/or Training for Observation (IP Section 03.01) (1 Sample)

- (1) Full participation emergency planning practice drill on August 5, 2021

RADIATION SAFETY

71124.08 - Radioactive Solid Waste Processing and Radioactive Material Handling, Storage, and Transportation

Radioactive Material Storage (IP Section 03.01) (2 Samples)

The inspectors evaluated the licensee's performance in controlling, labelling, and securing radioactive materials as follows:

- (1) Low-level radwaste storage facility
- (2) 660-foot elevation of the radwaste facility

Radioactive Waste System Walkdown (IP Section 03.02) (2 Samples)

The inspectors walked down accessible portions of the solid radioactive waste systems and evaluated system configuration and functionality, including:

- (1) Spent resin tank room and associated equipment
- (2) Filter disposal in the radwaste liner processing area

Waste Characterization and Classification (IP Section 03.03) (2 Samples)

The inspectors evaluated the licensee's characterization and classification of radioactive waste, including:

- (1) Results of the 10 CFR, Part 61, characterization of dry active waste taken in 2019
- (2) Results of the 10 CFR, Part 61, characterization of control rod drive mechanisms taken in 2021

Shipment Preparation (IP Section 03.04) (1 Sample)

Complete – opportunity to apply full procedure not available in accordance with IMC 0306.

- (1) There were no shipments of radioactive material during the inspection period.

Shipping Records (IP Section 03.05) (4 Samples)

The inspectors evaluated the following non-excepted radioactive material shipments through a record review:

- (1) 20-009
- (2) 20-063
- (3) 21-006
- (4) 21-023

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

MS05: Safety System Functional Failures (IP Section 02.04) (2 Samples)

- (1) Unit 1 (July 1, 2020, through June 30, 2021)
- (2) Unit 2 (July 1, 2020, through June 30, 2021)

71152 - Problem Identification and Resolution

Annual Follow-up of Selected Issues (IP Section 02.03) (1 Sample)

The inspectors reviewed the licensee’s implementation of its corrective action program related to the following issues:

- (1) Wall thinning in the Unit 2 reactor vessel bottom head drain piping

71153 - Follow Up of Events and Notices of Enforcement Discretion

Event Report (IP Section 03.02) (1 Sample)

The inspectors evaluated the following licensee event reports (LERs):

- (1) LER 05000388/2020-001-01, Manual Scram Due to Rising Main Condenser Backpressure Caused by Failure of an Offgas Recombiner Inlet Valve (ADAMS Accession No. ML20310A258). The inspectors determined that the cause of the condition described in the LER was not reasonably within the licensee’s ability to foresee and correct and therefore was not reasonably preventable. No performance deficiency nor violation of NRC requirements was identified.

INSPECTION RESULTS

Failure to Perform an Appropriate Critique to Ensure an Incorrect Emergency Action Level Classification Was Corrected			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Emergency Preparedness	Green NCV 05000387,05000388/2021003-01 Open/Closed	[H.9] - Training	71111.05
The inspectors identified a Green NCV of 10 CFR 50.54(q)(2) when the licensee failed to follow and maintain an emergency plan that meets the requirements of 10 CFR Part 50, Appendix E, and the planning standards of 10 CFR 50.47(b). Specifically, the licensee failed to identify and correct a weakness when performing emergency classifications during a fire drill as required by 10 CFR 50.47(b)(14).			
<u>Description:</u> During the performance of an announced fire drill, scenario 18A, on June 23, 2021, in which the non-safety-related engineered safeguards system transformer (OX211) was simulated as on fire, the shift manager and shift technical assistant made an EAL			

classification of SA8.1 hazardous event affecting safety systems needed for the current operating mode (mode 1, 2, or 3). The shift manager based the call on any occurrence of table S-4 event (fire), and the event damage has caused indications of degraded performance of at least one train of safety system needed for the current operating mode or the event has caused visible damage to a safety system component or structure needed for the current operating mode. Specifically, the crew made the declaration based on their misunderstanding that the transformer was safety related. A critique at the conclusion of the fire drill, which was observed by the resident inspectors, determined that the EAL classification was correct and the critique writeup documented the EAL classification as satisfactory with no comments. Inspectors reviewed the critique package and determined that this was incorrect because, as previously stated, the transformer is non-safety-related and the EAL criteria was not met. In review of inspectors concerns and following benchmarking of five other licensees, the licensee concluded that the EAL classification that was made by the crew was incorrect and the weakness had not been appropriately critiqued. A review was conducted of the number of times this drill was performed from 2015 to 2021. The licensee determined that scenario 18A had been performed 14 times, of which the EAL classification was evaluated as being satisfactory 10 times and not being observed 4 times.

Corrective Actions: The licensee entered the issue into the corrective action program and identified corrective actions to conduct operator training regarding the review of safety-related versus non-safety-related classification of systems.

Corrective Action References: CR-2021-09708, CR-2021-10886, and AR 2021-09730

Performance Assessment:

Performance Deficiency: The inspectors determined that the failure to critique an incorrect EAL classification during a training evolution was a performance deficiency that was within the licensee's ability to foresee and correct and should have been prevented. Specifically, 10 CFR 50.54(q)(2) requires a licensee to follow and maintain an emergency plan that meets the requirements of 10 CFR Part 50, Appendix E; and the planning standards of 10 CFR 50.47(b) require a licensee to identify and correct weaknesses.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Emergency Response Organization Performance attribute of the Emergency Preparedness cornerstone and adversely affected the cornerstone objective to ensure that the licensee is capable of implementing adequate measures to protect the health and safety of the public in the event of a radiological emergency. Specifically, because the licensee did not effectively identify and critique an emergency preparedness drill performance weakness during an announced fire drill, this caused a missed opportunity to identify and correct a drill-related performance deficiency. Failing to identify and correct operators' understanding of the applicability of the EAL could result in an incorrect implementation of the emergency plan in an actual emergency.

Significance: The inspectors assessed the significance of the finding using Appendix B, "Emergency Preparedness Significance Determination Process." The inspectors evaluated the finding using IMC 0609, Attachment 4, "Initial Characterization of Findings," issued December 20, 2019. The attachment instructs the inspectors to utilize IMC 0609, Appendix B, "Emergency Preparedness Significance Determination Process," issued September 22, 2015, when the finding is in the licensee's Emergency Preparedness cornerstone. The inspectors determined that this finding was a critique finding related to

planning standard 10 CFR 50.47(b)(14) where the critique process did not identify a classification weakness during a limited facility interaction drill (fire drill) in which there is a limited team of evaluators. Therefore, using Figure 5.14-1, "Significance Determination for Critique Findings," the inspectors determined the finding was of very low safety significance (Green).

Cross-Cutting Aspect: H.9 - Training: The organization provides training and ensures knowledge transfer to maintain a knowledgeable, technically competent workforce and instill nuclear safety values. Specifically, the licensee did not show an adequate understanding of component designation by having the drill guide provide the incorrect classification; and the deficiency was not identified during the critique of the training fire drill on 10 separate occasions.

Enforcement:

Violation: 10 CFR 50.54(q)(2) requires, in part, that the licensee shall follow and maintain the effectiveness of an emergency plan that meets the requirements in Appendix E to this part and the planning standards of 10 CFR 50.47(b). 10 CFR 50.47(b)(14) requires, in part, that periodic drills are conducted to develop and maintain key skills, and that deficiencies identified as a result of exercises are corrected. Section IV.F.2.g of Appendix E to 10 CFR Part 50 requires that all exercises, drills, and training that provide performance opportunities must provide for formal critiques in order to identify weak or deficient areas that need correction. Any weaknesses or deficiencies that are identified in a critique must be corrected. Contrary to the above, the licensee failed to identify and correct a performance weakness during the critique of the June 23, 2021, fire drill. Specifically, the licensee did not identify that the incorrect EAL determination was made by the shift manager. In review of the issue, it was identified that the violation had occurred on 10 other occasions as far back as September 23, 2015.

Enforcement Action: This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy.

Electrohydraulic Control System Leak Due to Improper Maintenance			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green FIN 05000387/2021003-02 Open/Closed	[H.12] - Avoid Complacency	71111.12
The inspectors identified a finding (FIN) of very low significance (Green) when plant maintenance personnel failed to properly torque the tie rods that hold the bottom plate on the 'D' main turbine steam bypass valve which resulted in a leak on the EHC system.			
<u>Description:</u> The main turbine steam bypass system is designed to control steam pressure when reactor steam generation exceeds turbine requirements during unit startup, sudden load reduction, and cooldown. It allows excess steam flow from the reactor to the condenser without going through the turbine. The full bypass capacity of the system is approximately 22 percent of the nuclear steam supply system rated steam flow. The main turbine bypass system fast opening and pressure regulation modes are required to be operable to limit the pressure increase in the main steam lines and reactor pressure vessel during transients that cause a pressurization so that the safety limit minimum critical power ratio and linear heat generation rate are not exceeded. Licensing analyses credit an operable main turbine bypass system as having both the bypass valve fast opening mode and pressure regulation			

mode. The fast-opening mode is required for transients initiated by a turbine control valve or turbine stop valve closure. The pressure regulation mode is required for transients where the power increase exceeds the capability of the turbine control valves.

The tie rods on the bypass valves provide proper support for the bottom plate of the bypass valves. These tie rods are pressure-retaining components used to ensure that the bypass valves are available to control pressure during post-scrum recovery under normal circumstances. High-pressure EHC fluid is supplied to the bypass valve to position the valve in either the open or closed position depending on the system demand. The tie rods maintain the integrity of the EHC pressure boundary during normal valve operation.

On June 12, 2021, the licensee identified an adverse trend in EHC reservoir levels, indicating a potential leak. Subsequently, while investigating on June 17, 2021, the operators identified a leak on bypass valve 'D'. On June 26, 2021, station personnel made entry to effect repairs, documenting in CR-2021-09661, that of the four tie rods, one was on the scaffolding, one was extremely loose and near falling out, and the two remaining tie rods were not torqued. As part of the repair plan, station personnel reinstalled the missing tie rod and torqued the remaining tie rods. In addition, it was identified during planning that the 'D' and 'E' bypass valves were the two most recently worked valves during the prior refueling outage in the spring of 2020, and performed an extent of condition, noting that the tie rods on 'E' bypass valve were torqued, with torque paint applied.

The NRC inspectors reviewed work orders from the Unit 1 refueling outage in 2020 and discovered that both 'D' and 'E' bypass valves were marked torqued to 250 ft.-lbs. However, from comparison to the work performed on June 17, 2021, the torque values were listed as 550 ft.-lbs. The inspectors requested clarification from the licensee on the correct torque values for the tie rods, which was later determined to be 750 ft.-lbs. (CR-2021-12291). The licensee performed an extent of condition based on this inspection effort and discovered that 8 of the 10 bypass valves were not torqued to the design value of 750 ft.-lbs., and the remaining two bypass valves did not have torque values listed in their prior work orders. The licensee performed a prompt operability determination (CR-2021-12659) and concluded that at 250 ft.-lbs., the lowest currently installed torque value, the bypass valve would remain in the operable-degraded state until the deficiency could be corrected at the next outage.

Corrective Actions: The licensee maintenance personnel reinstalled the missing tie rod, returned all bolts to the torqued condition, performed an extent of condition for remaining bypass valves, and a prompt operability determination to ensure that the other bypass valves would remain operable until deficient torque values could be corrected at the next opportunity.

Corrective Action References: CR-2021-09661, CR-2021-12291, and CR-2021-12659

Performance Assessment:

Performance Deficiency: Susquehanna Work Order ERPM 2190209, Work Instruction M8758-04, Section 6.5, specifies installing and torquing tie rods in accordance with Torqueing Guidelines, MT-GM-015, during reassembly of the bypass valve. Contrary to the above, the licensee did not install and torque tie rods in accordance with procedural requirements on April 22, 2020, which resulted in the subsequent EHC leak.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Equipment Performance attribute of the Mitigating

Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, failure to appropriately torque the tie rods on the 'D' bypass valve resulted in a significant EHC fluid leak from the valve and challenged the reliability of it to operate.

Significance: The inspectors assessed the significance of the finding using Appendix A, "The Significance Determination Process for Findings At-Power." This finding was screened to Green using the Mitigating Systems screening questions because it did not involve a design deficiency, did not represent the loss of a train of technical specification equipment for longer than its allowed outage time, and did not represent loss of a probabilistic risk analysis system or function.

Cross-Cutting Aspect: H.12 - Avoid Complacency: Individuals recognize and plan for the possibility of mistakes, latent issues, and inherent risk, even while expecting successful outcomes. Individuals implement appropriate error reduction tools. Specifically, during review of the bypass valve work orders, the NRC inspectors noted that the instructions to complete the installation and torquing of the tie rods was marked as complete; however, the tie rods were not torqued. The NRC inspectors determined that individual contributors did not perform a thorough review of the planned activity to ensure a successful outcome and did not use an appropriate error reduction tool, such as peer checking the as-left torque settings, that would have prevented this event from occurring.

Enforcement: Inspectors did not identify a violation of regulatory requirements associated with this finding.

<p>Observation: Wall Thinning in the Unit 2 Reactor Vessel Bottom Head Drain Piping</p>	<p>71152</p>
<p>The NRC inspectors performed a detailed review of the licensee's root cause analysis and corrective actions associated with condition report CR-2021-04937 for wall thinning identified in the Unit 2 reactor pressure vessel bottom head drain line during the spring 2021 refueling outage. Specifically, the licensee performed an ultrasonic thickness examination of a 2-inch x 4-inch expander (Component ID DBA-221-1-9625-X) located in the bottom head drain line. Near the weld on the 2-inch side of the pipe expander, the licensee discovered the lowest measured wall thickness (0.125 inches) was less than the minimum allowable wall thickness (0.139 inches). As part of the review, the inspectors conducted in-person interviews with the responsible licensee staff to discuss the results of the root cause investigation, the extent of condition for similar components in Unit 1, and the corrective action activities to address this condition.</p> <p>The licensee completed a root cause analysis in accordance with their procedures and determined the direct cause of the wall thinning was due to flow accelerated corrosion (FAC) in the expander and adjacent bottom head drain piping. The licensee completed a Failure Analysis-Support/Refute Matrix, Equipment Failure Checklist, Barrier Analysis, and Organizational and Programmatic Worksheet from their corrective action procedures to evaluate the problem. The licensee concluded the root cause was "the bridging strategy to manage station FAC risk over-relied on industry guidance and Checworks when monitoring wear rates for the bottom head drain piping." The licensee documented the supporting basis that degradation of the expander would have been identified prior to approaching the minimum wall thickness if the station had taken a more proactive approach to inspect the expander. In response to the root cause, the licensee revised their procedure</p>	

NEPM-QA-1172, "Guidelines for Flow-Accelerated Corrosion Program Activities," to include a decision tree with requirements for additional risk mitigation actions if there is a high difficulty and/or uncertainty when performing the ultrasonic thickness exams. The licensee also developed a contingency plan for Unit 1 to ultrasonically examine the bottom head drain line components during the next scheduled outage and replace the expander, if necessary. The inspectors noted there was no indication of similar wall thinning in Unit 1 based on a review of past thickness data.

In response to the identified wall thinned condition on the pipe expander, the licensee performed immediate corrective actions to evaluate the as-found condition to applicable ASME Code Section III design requirements for this ASME class 1 component and found the expander met design requirements. The licensee's evaluation also assessed the as-found condition for one additional cycle of operation, including conservative assumptions regarding fatigue cycles, to justify continued operation of Unit 2. The licensee staff performed valve line-up changes via their modification process to isolate flow through the Unit 2 bottom head drain line to prevent further wear from FAC. The licensee also considered other potential degradation mechanisms (pitting and crevice corrosion) as a result of the modification and concluded the expander met design requirements for an additional operating cycle.

The NRC inspectors reviewed the analysis and modification and documented the results in the Susquehanna Steam Electric Station, Units 1 and 2 – Integrated Inspection Report 05000387/2021002 and 05000388/2021002 (ML21216A077). The inspectors determined that the licensee planned corrective actions to replace the Unit 2 degraded expander with non-susceptible material during the next refueling outage, conduct metallurgical examinations and analysis of the removed expander, and update the root cause report based on the results of the failure analysis.

The inspectors further reviewed the root cause report, the associated Checworks model, ultrasonic thickness examination history, FAC procedures, industry guidance documents, extended power uprate analysis, and original fabrication records. The inspectors noted the flow through the bottom head drain line was initially designed for 63 GPM and was increased up to an average of 240 GPM due to various modifications and power uprates. While this flow is high compared to the diameter of piping, the inspectors verified that the licensee appropriately accounted for the flow in their FAC susceptibility analyses and had entered this flowrate into their Checworks model for predicting wear. The inspectors further noted that the extent of the FAC wear was localized to the 2-inch x 4-inch expander and that limited wear was measured on the upstream elbow, which was unexpected given the conditions for FAC susceptibility increases in elbows due to geometrically induced flow disturbances.

The inspectors noted the root cause analysis investigation effort did not appear to include retrieval of original fabrication pre-service weld examinations and fit-up of the expander. In requesting and reviewing these documents, the inspectors noted that three weld repairs, including two that reopened the weld root, were performed on the 2-inch side of the expander at the time of construction which is the area of interest for wall thinning. The inspectors viewed these repairs as potential contributors to the localized FAC wear given the potential for geometric discontinuities on the inner diameter from "weld root drop-through" which could cause flow disturbances that increase FAC wear, or "weld undercut" which could show itself as a thinned area. The inspectors noted the causes of the accelerated wear at this location cannot be determined with accuracy until the component is cut-out from the system and examined.

The inspectors determined the licensee's overall response to the issue was commensurate with the safety significance, was timely, and included appropriate corrective actions that were focused to correct the problem. However, the inspectors' review of the root cause report identified the licensee did not thoroughly consider the potential for a fabrication induced geometric discontinuity contributing to the localized FAC at the expander. Further, the inspectors requested a copy of the radiography films referenced in the fabrication records and discovered that the licensee had lost the films in 2012 when a box containing the films for these welds was removed from the storage vault and not returned. The licensee previously identified the loss of these quality assurance records in 2019 and captured the issue in their corrective action program as condition reports CR-2020-03141 and CR-2020-09118. The inspectors determined this issue was of minor safety significance using IMC 0612, Appendix B, more-than-minor screening questions, because there was quality assurance documentation (other than the radiography film) showing satisfactory completion of the pre-service welding. This failure to retain quality assurance records constitutes a minor violation that is not subject to enforcement action in accordance with the NRC's Enforcement Policy.

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

- On August 25, 2021, the inspectors presented the Unit 2 bottom head drain inspection results to Ms. Melisa Krick, Regulatory Assurance Manager, and other members of the licensee staff.
- On August 26, 2021, the inspectors presented the radwaste and shipping inspection results to Mr. Kevin Cimorelli, Site Vice President, and other members of the licensee staff.
- On September 23, 2021, the inspectors presented the evaluations of changes, tests, and experiments inspection results to Mr. Kevin Cimorelli, Site Vice President, and other members of the licensee staff.
- On October 28, 2021, the inspectors presented the integrated inspection results to Mr. Brad Berryman, Chief Nuclear Officer, and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.01	Procedures	NDAP-00-0030	Severe Weather/Natural Disaster Preparation	Revision 17
71111.04	Drawings	E105952	Unit 2 P&ID Core Spray	Revision 31
71111.05	Corrective Action Documents Resulting from Inspection		CR-2021-12398, CR-2021-12404	
	Fire Plans	FP-013-169	Equipment and Battery Rooms Unit 1 East Side El. 771'	Revision 4
		FP-013-170	Equipment and Battery Rooms Unit 2 West Side El. 771'	Revision 5
		FP-013-171	Equipment and Battery Rooms Unit 2 East Side El. 771'	Revision 4
		FP-013-189	Diesel Generator Bay 'A', FZ 0-41A	Revision 4
		FP-113-112	Unit 1, Equipment Area, FZ 1-3C-N, S, W	Revision 5
		FP-213-239	RCIC Pump Room Elevation 645'	Revision 7
		FP-213-240	RHR Pump Room Elevation 645'	Revision 5
		FP-213-242	Sump Pump Room Elevation 645'	Revision 6
Miscellaneous	U1CRFWP	Fire-Unit 1 "C" Reactor Feedwater Pump with Extension into the Oil Sump Area, 656'	09/14/2021	
71111.11Q	Procedures	JIT-OP-2106	Plant Startup JITT	Revision 0
71111.12	Corrective Action Documents		CR-2020-06582, CR-2020-10072, CR-2021-09255, CR-2021-09661, CR-2021-09818	
	Corrective Action Documents Resulting from Inspection		CR-2021-12291	
	Work Orders		ERPM 2190209, ERPM 2190210, ERPM 2448047, RTPM 2203693	
71111.13	Miscellaneous		Risk Mitigating Actions for Yellow PRA Risk	08/24/2021
	Procedures	SO-016-002	Quarterly Common RHRSW/ESW (ESW Spray Pond Valve)	Revision 23
		SO-054-004	Unit 1, Quarterly ESW/TBCCW and ESW/RBCCW Isolation Valve Exercising	Revision 25
Work Orders		PCWO 2457034-0		

71111.15	Corrective Action Documents		CR-2021-09456, CR-2021-09559, CR-2021-12739, CR-2021-13814	
71111.15	Corrective Action Documents Resulting from Inspection		AR-EWR-2021-09552, CR-2021-09529, CR-2021-11076, CR-2021-11107	
71111.15	Drawings		C-1761 Sheet 6, M-2111 Sheet 1	
71111.15	Operability Evaluations		ACT-01-CR-2021-12561; ACT-01-CR-2021-12566, ACT-01-CR-2021-12659	
71111.17T	Corrective Action Documents Resulting from Inspection		CR-2021-13922	
71111.17T	Procedures	NDAP-QA-0726	10 CFR 50.59 and 10 CFR 72.48 Implementation	Revision 24
71111.19	Procedures	SO-249-B02	Quarterly RHR System Flow Verification DIV II	Revision 29
71111.19	Work Orders		ERPM 2300392, ERPM 2349219, PCSO 2400204, PCWO 2263093, PCWO 2274272, PCWO 2359055, PCWO 2402167-24, PCWO 2439539-1, PCWO 2439539-2, PCWO 2439539-3, PCWO 2452510-0, RACT 2146835, RTSV 2274269	
71111.22	Procedures	SO-054-A08	Comprehensive ESW Flow Verification Loop A	Revision 14
71153	Corrective Action Documents		CR-2021-02351	02/14/2021