



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

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

November 12, 2019

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

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2 – DESIGN  
BASIS ASSURANCE INSPECTION (TEAMS) INSPECTION REPORT  
05000387/2019011 AND 05000388/2019011

Dear Mr. Berryman:

On October 10, 2019, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Susquehanna Steam Electric Station, Units 1 and 2 and discussed the results of this inspection with Mr. Kevin Cimorelli, Site Vice President and other members of your staff. The results of this inspection are documented in the enclosed report.

The NRC inspectors did not identify any finding or violation of more than minor significance.

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

Sincerely,

*/RA/*

Mel Gray, Chief  
Engineering Branch 1  
Division of Reactor Safety

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

Enclosure:  
As stated

cc w/ encl: Distribution via LISTSERV®

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2 – DESIGN BASIS ASSURANCE INSPECTION (TEAMS) INSPECTION REPORT 05000387/2019011 AND 05000388/2019011 DATED NOVEMBER 12, 2019

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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: 05000387/2019011 and 05000388/2019011

Enterprise Identifier: I-2019-011-0023

Licensee: Susquehanna Nuclear, LLC

Facility: Susquehanna Steam Electric Station, Units 1 and 2

Location: Berwick, PA

Inspection Dates: September 15, 2019 to October 5, 2019

Inspectors: E. Burket, Senior Reactor Inspector  
J. Kulp, Senior Reactor Inspector  
M. Orr, Reactor Inspector  
S. Pindale, Senior Reactor Inspector  
M. Yeminy, NRC Mechanical Contractor  
W. Hopf, NRC Electrical Contractor

Approved By: Mel Gray, Chief  
Engineering Branch 1  
Division of Reactor Safety

## **SUMMARY**

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting a design basis assurance inspection (teams) 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**

No findings or violations of more than minor significance were identified.

### **Additional Tracking Items**

None.

## 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.

## REACTOR SAFETY

### 71111.21M - Design Bases Assurance Inspection (Teams)

The inspectors evaluated the following components and listed applicable attributes, permanent modifications, and operating experience during the weeks of September 16, 2019, and September 30, 2019.

For the components, the team reviewed the attributes listed in IP 71111.21M, Appendix A, *Component Review Attributes*, such as those listed below. Specifically, the team evaluated these attributes as per 71111.21M, Appendix B, *Component Design Review Considerations* and 71111.21M, Appendix C, *Component Walkdown Considerations*.

### Design Review - Risk-Significant/Low Design Margin Components (IP Section 02.02) (4 Samples)

- (1) 125 Vdc Load Center, 1D622 (EP-BS-1D622)
  - Material condition and configuration (reviewed periodic inspection results)
  - Normal, abnormal, and emergency operating procedures
  - Environmental qualification classification
  - Protection against seismic events
  - Surveillance testing and recent results
  - Maintenance effectiveness
  - Consistency between station documentation (e.g., procedures) and vendor specifications
  - Translation of vendor specifications
  - Electrical design calculations
  - System health report and operational history
  - Component health, corrective maintenance records, and corrective action history

The team used Appendix B guidance for *Valves, Instrumentation, Electric Loads, and As-Built System*

- (2) 'A' Emergency Diesel Generator (Electrical), 0G501A
  - Material condition and installed configuration (e.g., visual inspection/walkdown)
  - Normal, abnormal, and emergency operating procedures

- Consistency among design and licensing bases and other documents and procedures
- System health report, maintenance effectiveness and records, and corrective action history
- Control logic
- Design calculations
- Surveillance testing and recent test results
- Adequacy of electrical power supply for motor and controls
- Protection coordination; Load in-rush and full load current
- Range, accuracy, and setpoint of installed instrumentation
- Equipment protection from fire, flood, and water intrusion or spray
- Heat removal cooling water and ventilation
- Energy sources, fuel and air (e.g., engine start, operation, and control)
- Contactor and fuse ratings; Component adequacy for minimum voltage

The team used Appendix B guidance for *Valves, Instrumentation, Electric Loads, and As-Built System*.

- (3) B Emergency Service Water Pump, 0P504B
- Material condition and installed configuration (e.g., visual inspection/walkdown)
  - Normal, abnormal, and emergency operating procedures
  - Consistency among design and licensing bases and other documents and procedures
  - System health report, maintenance effectiveness and records, and corrective action history
  - Control logic
  - Equipment/environmental controls and qualification
  - Operator actions
  - Design calculations
  - Surveillance testing and recent test results
  - Range, accuracy, and setpoint of installed instrumentation
  - Equipment protection from fire, flood, and water intrusion or spray
  - Heat removal cooling water and ventilation Pump Net positive Suction Head and Vortex considerations
  - Pump interaction with sister pumps

The team used Appendix B guidance for *Valves, Instrumentation, Electric Loads, and As-Built System*.

- (4) Unit 1 Reactor Core Isolation Cooling Pump and Turbine
- Material condition and installed configuration (e.g., visual inspection/walkdown)
  - Normal, abnormal, and emergency operating procedures
  - Consistency among design and licensing bases and other documents and procedures
  - System health report, maintenance effectiveness and records, and corrective action history
  - Equipment/environmental controls and qualification

- Operator actions
- Design calculations
- Surveillance testing and recent test results
- Range, accuracy, and setpoint of installed instrumentation
- Equipment protection from fire, flood, and water intrusion or spray
- Heat removal cooling water and ventilation
- Energy sources, fuel and air (e.g., engine start, operation, and control)

The team used Appendix B guidance for *Valves, Instrumentation, Electric Loads, and As-Built System*.

Design Review - Large Early Release Frequency (LERFs) (IP Section 02.02) (2 Samples)

- (1) Unit 1 Tie Bus 0A106
- Material condition and configuration (review periodic inspection results)
  - Normal, abnormal, and emergency operating procedures
  - Environmental qualification classification
  - Surveillance testing and recent results
  - Maintenance effectiveness
  - Consistency between station documentation (e.g., procedures) and vendor specifications
  - Translation of vendor specifications
  - Electrical design calculations
  - System health report and operational history
  - Component health, corrective maintenance records, and corrective action history

The team used Appendix B guidance for *Valves, Instrumentation, Electric Loads, and As-Built System*.

- (2) Unit 1 Residual Heat Removal Suppression Pooling Cooling/Test Control Valve, HV151F024A
- Material condition and installed configuration (e.g., visual inspection/walkdown)
  - Normal, abnormal, and emergency operating procedures
  - Consistency among design and licensing bases and other documents and procedures
  - System health report, maintenance effectiveness and records, and corrective action history
  - Control logic
  - Equipment/environmental controls and qualification
  - Operator actions
  - Design calculations
  - Surveillance testing and recent test results
  - Range, accuracy, and setpoint of installed instrumentation
  - Equipment protection from fire, flood, and water intrusion or spray
  - Heat removal cooling water and ventilation

The team used Appendix B guidance for *Valves, Instrumentation, Electric Loads, and As-Built System*.

Modification Review - Permanent Mods (IP Section 02.03) (4 Samples)

- (1) EC 1923863, Replace Unit 1 Service Water Valves, HV11024A3 and HV11024B3
- (2) EC 2002457, Instrument Air Design Pressure Increase
- (3) EC 1865356, 2x210 ESS Load Center Transformer Replacement
- (4) EC-023-1007, Fuel Oil Consumption Rates for 'A' - 'D' and 'E' Emergency Diesel Generators

Review of Operating Experience Issues (IP Section 02.06) (2 Samples)

- (1) OpESS 2007/02, Revision 3, Analysis of Flooding Vulnerabilities
- (2) OpESS 2008-01, Negative Trend and Recurring Events involving Emergency Diesel Generators

**INSPECTION RESULTS**

No findings were identified.

**EXIT MEETINGS AND DEBRIEFS**

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

- On October 4, 2019, the team presented the preliminary results of the Design Bases Assurance Inspection to Mr. Kevin Cimorelli, Site Vice President, and other members of the licensee staff. After further in-office review, the final results of this inspection were presented to Mr. Cimorelli and other licensee staff via telephone on October 10, 2019.



**DOCUMENTS REVIEWED**

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.21M	Calculations	EC-023-1012	Evaluate Impact of Use of Biodiesel (B5) and Ultra-Low Sulfur Diesel Fuel on the Diesel Generator Fuel Oil Storage and Transfer System	Revision 3
		EC-024-0012	Modify Emergency Diesel Generator Over-Voltage Relays EM1,	Revision 0
		EC-024-0629	SSES FSAR 8.3 Diesel Generator Loading Tables Updates	Revision 18
		EC-024-1029	Evaluation of EDG Frequency Response During Design Basis LOOP/LOCA Transient Loading with Replacement Woodward 2301A Governor	Revision 0
		EC-028-0010	ESW Pump Structure Heat Gain	Revision 2
		EC-054-0538	NPSH Calculation for ESW Pumps	Revision 0
		EC-FLOD-0001	Internal Flooding Evaluations for Moderate Energy Pipe Cracks and Sprinkler System Actuations	Revision 0
		EC-FLOD-0001	Internal Flooding Evaluations for Moderate Energy Pipe Cracks and Sprinkler System Actuations	Revision 3
		EC-FLOD-0001	Internal Flooding Evaluations for Moderate Energy Pipe Cracks and Sprinkler System Actuations	Revision 4
		EC-FLOD-0001	Internal Flooding Evaluations for Moderate Energy Pipe Cracks and Sprinkler System Actuations	Revision 5
		EC-PUPC-20309	EPU Task Report T0309, Reactor Core Isolation Cooling System	Revision 0
		EC-SOPC-0597	Relay Setting Calculations for Diesel Generator ABCD Sync	Revision 1
		Corrective Action Documents	AR-2016-09219	
	AR-2016-09451			
	AR-2016-12920			
	AR-2017-01015			
	CR 2016-08441			
	CR 2017-13061			
	CR 2018-06820			
		CR 2019-11984		
	CR 2019-11994			
	CR-2016-08172			

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		CR-2016-12235		
		CR-2016-12238		
		CR-2018-17000		
	Corrective Action Documents Resulting from Inspection	CR-2019-11742		
		CR-2019-11752		
		CR-2019-11801		
		CR-2019-11816		
		CR-2019-11918		
		CR-2019-11926		
		CR-2019-11993		
		CR-2019-12188		
		CR-2019-12283		
		CR-2019-12357		
		CR-2019-12362		
		CR-2019-12410		
		CR-2019-12525		
		CR-2019-12698		
	Drawings	E-148	Unit 1 RBCCW Transfer SOVs	Revision 16
		E106216, Sh. 1	Emergency Service Water System	Revision 51
		E107158, Sh. 1	Unit 1 and 2 Single Line Diagram Station	Revision 40
		FF105801, Sh. 2411	Common DG Control Schematic, Shutdown and Alarm System for OC521A	Revision 15
		M-110	Unit 1 Service Water	Revision 45
		P-25-5, Sheet 1	Drainage Reactor Building Unit #1 Area 25 Plan Of Elevation 749	Revision 13
		P-27-5, Sheet 1	Drainage Reactor Building Unit #1 Area 25 Plan Of Elevation 749	Revision 10
		P-28-5, Sheet 1	Drainage Reactor Building Unit #1 Area 25 Plan Of Elevation 749	Revision 9
		P-29-5, Sheet 1	Drainage Reactor Building Unit #1 Area 25 Plan Of Elevation 749	Revision 8
	Engineering Changes	EC-002-0500	125 VDC System 1D620 Master Battery Calculation	Revision 38
EC-088-0530		Evaluation of Overvolt-250/125 VDC 1E Equip	Revision 6	

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
	Engineering Evaluations		CR Evaluation/Action Plan Report for CR 923407	Revision 2
	Miscellaneous	BMR E121	Material Requisition Direct Current Control Centers and Load Centers	Revision 23
		DBD-10	Design Basis Document for HELB/MELC/Internal Flooding	Revision 3
		IOM 1282	Tricentric Service Manual	Revision 7
		M1441-29	Flush/Check Floor Drains (Pre-Outage),	dated February 15, 2018
		M2139-01	RCIC Turbine, 1S212 005 for Turbine Internal Inspection	dated 4/14/16
		SO-150-002	Quarterly RCIC flow verification	dated 5/2/18
	Procedures	NDAP-QA-0343	Time Critical and Time Sensitive Operator Actions	Revision 4
		OP-003-001	13.8 kV Common Electrical Equipment	Revision 20
		OP-102-001	125V DC System	Revision 27
		OP-111-001	Unit 1 Service Water System	Revision 52
		OP-150-001	RCIC System	Revision 50
		OT-150-004	RCIC Turbine overspeed trip testing	Revision 1
	Work Orders	1837564		
		1863850		
		2108859		