



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION I  
2100 RENAISSANCE BOULEVARD, SUITE 100  
KING OF PRUSSIA, PA 19406-2713**

February 1, 2018

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

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION – INTEGRATED INSPECTION  
REPORT 05000387/2017004 AND 05000388/2017004

Dear Mr. Rausch:

On December 31, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Susquehanna Steam Electric Station (SSES), Units 1 and 2. On January 19, 2018, 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.

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 the NRC's Public Document Room in accordance with 10 *Code of Federal Regulations* (CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Erin E. Carfang, Acting Branch Chief  
Reactor Projects Branch 4  
Division of Reactor Projects

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

Enclosure:  
Inspection Report 05000387/2017004 and 05000388/2017004  
w/Attachment: Supplementary Information

cc w/encl: Distribution via ListServ

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION – INTEGRATED INSPECTION  
 REPORT 05000387/2017004 AND 05000388/2017004 DATED  
 FEBRUARY 1, 2018

Distribution:

- DDorman, RA
- DLew, DRA
- RLorson, DRP
- DPelton, DRP
- JYerokun, DRS
- BWelling, DRS
- ECarfang, DRP
- SBarber, DRP
- ATurilin, DRP
- LMicewski, SRI
- TDaun, DRP, RI
- AGould, DRP, AA
- JBowen, RI, OEDO
- RidsNrrPMSusquehanna Resource
- RidsNrrDorLp1 Resource
- ROPreports Resource

DOCUMENT NAME: G:\DRP\BRANCH4\Inspection Reports\Susquehanna\2017\4Q\2017\_004.docx  
 ADAMS ACCESSION NUMBER: ML18033A012

<input checked="" type="checkbox"/> SUNSI Review		<input checked="" type="checkbox"/> Non-Sensitive <input type="checkbox"/> Sensitive		<input checked="" type="checkbox"/> Publicly Available <input type="checkbox"/> Non-Publicly Available	
OFFICE	RI/DRP	RI/DRP	RI/DRP		
NAME	LMicewski	SBarber	EECarfang		
DATE	01/28/18	01/31/18	02/01/18		

OFFICIAL RECORD COPY

**U.S. NUCLEAR REGULATORY COMMISSION**

REGION I

Docket Nos. 50-387 and 50-388

License Nos. NPF-14 and NPF-22

Report No. 05000387/2017004 and 05000388/2017004

Licensee: Susquehanna Nuclear, LLC (Susquehanna)

Facility: Susquehanna Steam Electric Station, Units 1 and 2

Location: Berwick, Pennsylvania

Dates: October 1, 2017 through December 31, 2017

Inspectors: L. Micewski, Senior Resident Inspector  
T. Daun, Resident Inspector  
S. Barber, Senior Project Engineer  
J. Ambrosini, Senior Emergency Preparedness Inspector  
A. Turilin, Project Engineer  
M. Fannon, Resident Inspector  
J. Furia, Senior Health Physicist  
E. DiPaolo, Senior Reactor Inspector  
T. Fish, Operations Engineer  
T. Hedigan, Operations Engineer

Approved By: Erin E. Carfang, Acting Branch Chief  
Reactor Projects Branch 4  
Division of Reactor Projects

Enclosure

## TABLE OF CONTENTS

<b>SUMMARY .....</b>	<b>3</b>
<b>1. REACTOR SAFETY .....</b>	<b>4</b>
1R01 Adverse Weather Protection.....	4
1R04 Equipment Alignment .....	5
1R05 Fire Protection .....	6
1R11 Licensed Operator Requalification Program and Licensed Operator Performance ...	6
1R12 Maintenance Effectiveness.....	9
1R13 Maintenance Risk Assessments and Emergent Work Control .....	9
1R15 Operability Determinations and Functionality Assessments.....	10
1R18 Plant Modifications .....	11
1R19 Post-Maintenance Testing.....	11
1R22 Surveillance Testing .....	11
1EP2 Alert and Notification System Evaluation .....	12
1EP3 Emergency Response Organization Staffing and Augmentation System .....	12
1EP5 Maintaining Emergency Preparedness .....	13
<b>2. RADIATION SAFETY .....</b>	<b>13</b>
2RS1 Radiological Hazard Assessment and Exposure Controls .....	13
2RS2 Occupational ALARA Planning and Controls .....	14
2RS4 Occupational Dose Assessment.....	15
<b>4. OTHER ACTIVITIES.....</b>	<b>17</b>
4OA1 Performance Indicator Verification.....	17
4OA2 Problem Identification and Resolution .....	18
4OA6 Meetings, Including Exit.....	23
<b>SUPPLEMENTARY INFORMATION .....</b>	<b>A-1</b>
KEY POINTS OF CONTACT .....	A-1
LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATED .....	A-2
LIST OF DOCUMENTS REVIEWED.....	A-2
LIST OF ACRONYMS.....	A-9

**SUMMARY**

IR 05000387/2017004 and 05000388/2017004; October 1, 2017 through December 31, 2017; Susquehanna Steam Electric Station Units 1 and 2; Integrated Inspection Report.

This report covered a three-month period of inspection by resident inspectors and announced baseline inspections performed by regional inspectors. The Nuclear Regulatory Commission's (NRC) program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 6.

No findings were identified.

## REPORT DETAILS

### Summary of Plant Status

Unit 1 began the inspection period at 100 percent power. On October 26, 2017, operators reduced power to approximately 64 percent for a rod sequence exchange. Operators returned the unit to 100 percent on October 29, 2017. On November 26, 2017, operators reduced power to approximately 77 percent to perform a rod pattern adjustment and returned the unit to 100 percent the next day. On December 17, 2017, operators reduced power to approximately 77 percent to perform a rod pattern adjustment and returned the unit to 100 percent the next day. On December 24, 2017, operators reduced power to approximately 80 percent to perform a rod pattern adjustment and returned the unit to 100 percent power the same day. On December 26, 2017, operators reduced power to approximately 65 percent to remove a reactor feed pump from service to repair a hydraulic fluid leak on the pressure control unit. Operators returned the unit to 100 percent power the same day. The unit remained at or near 100 percent power for the remainder of the inspection period.

Unit 2 began the inspection period at 100 percent power. On October 27, 2017, operators reduced power to approximately 60 percent by inserting a runback in response to rapidly degrading main condenser vacuum caused by a spurious trip of the hydrogen recombiner. Following restoration of a hydrogen recombiner, main condenser vacuum was restored and operators returned the unit to 100 percent on the same day. On December 8, 2017, operators reduced power to approximately 65 percent to perform a leak repair on the moisture separator. Operators returned the unit to 100 percent the next day. On December 15, 2017, operators reduced power to approximately 69 percent to perform a rod pattern adjustment. Operators returned the unit to 100 percent power the next day, and remained at or near 100 percent power for the remainder of the inspection period.

### 1. REACTOR SAFETY

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

1R01 Adverse Weather Protection (71111.01 – 2 samples)

.1 Readiness for Seasonal Extreme Weather Conditions

a. Inspection Scope

The inspectors reviewed Susquehanna's readiness for the onset of seasonal low temperatures. The review focused on the engineered safeguard service water pump house and the emergency service water (ESW) system. The inspectors reviewed the Updated Final Safety Analysis Report (UFSAR), technical specifications (TSs), control room logs, and the corrective action program (CAP) to determine what temperatures or other seasonal weather could challenge these systems, and to ensure Susquehanna personnel had adequately prepared for these challenges. The inspectors reviewed station procedures, including Susquehanna's seasonal weather preparation procedure and applicable operating procedures. The inspectors performed walkdowns of the selected systems to ensure station personnel identified issues that could challenge the operability of the systems during cold weather conditions. Documents reviewed for each section of this inspection report are listed in the Attachment.

b. Findings

No findings were identified.

## .2 Readiness for Impending Adverse Weather Conditions

### a. Inspection Scope

The inspectors reviewed Susquehanna's preparations for a high wind and snow advisory on December 12, 2017. The inspectors reviewed the implementation of adverse weather preparation procedures before the onset of and during this adverse weather condition. The inspectors walked down the emergency diesel generators and ESW to ensure system availability. The inspectors verified that operator actions defined in Susquehanna's adverse weather procedure maintained the readiness of essential systems. The inspectors discussed readiness and staff availability for adverse weather response with operations and work control personnel.

### b. Findings

No findings were identified.

## 1R04 Equipment Alignment

### .1 Partial System Walkdowns (71111.04 – 2 samples)

#### a. Inspection Scope

The inspectors performed partial walkdowns of the following systems:

- Unit 1, high pressure coolant injection (HPCI) during reactor core isolation cooling (RCIC) system outage window (SOW) from October 23, 2017 – October 25, 2017
- Unit 1, division 1 residual heat removal (RHR) during division 2 SOW on October 30, 2017

The inspectors selected these systems based on their risk-significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors reviewed applicable operating procedures, system diagrams, the UFSAR, TSS, work orders, condition reports (CRs), and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have impacted the system's performance of its intended safety functions. The inspectors also performed field walkdowns of accessible portions of the systems to verify system components and support equipment were aligned correctly and were operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no deficiencies. The inspectors also reviewed whether Susquehanna staff had properly identified equipment issues and entered them into the CAP for resolution with the appropriate significance characterization.

#### b. Findings

No findings were identified.

1R05 Fire Protection.1 Resident Inspector Quarterly Walkdowns (71111.05Q – 5 samples)a. Inspection Scope

The inspectors conducted tours of the areas listed below to assess the material condition and operational status of fire protection features. The inspectors verified that Susquehanna controlled combustible materials and ignition sources in accordance with administrative procedures. The inspectors verified that fire protection and suppression equipment was available for use as specified in the area pre-fire plan, and passive fire barriers were maintained in good material condition. The inspectors also verified that station personnel implemented compensatory measures for out of service, degraded, or inoperable fire protection equipment, as applicable, in accordance with procedures.

- Unit 2, core spray 'A' pump room (fire zone 2-1B) on November 2, 2017
- Unit 1, remote shutdown panel room (fire zones 1-2B, 1-2D) on November 9, 2017
- Unit Common, diesel generator bay 'B' (fire zone 0-41B) on November 22, 2017
- Unit 2, equipment and battery rooms east side (fire zones 0-28A-I, 0-28G, 0-28E, 0-28C) on December 11, 2017
- Unit 1, lower relay room (fire zone 0-24D) on December 11, 2017

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program and Licensed Operator Performance (71111.11Q – 2 samples).1 Quarterly Review of Licensed Operator Requalification Testing and Traininga. Inspection Scope

The inspectors observed licensed operator simulator training on October 23, 2017, which included a feedwater heater leak resulting in a manual reactor scram, a loss of coolant accident, and the failure of select components to automatically start as required. The inspectors evaluated operator performance during the simulated event and verified completion of risk significant operator actions, including the use of abnormal and emergency operating procedures. The inspectors assessed the clarity and effectiveness of communications, implementation of actions in response to alarms and degrading plant conditions, and the oversight and direction provided by the control room supervisor. The inspectors verified the accuracy and timeliness of the emergency classification made by the shift manager and the technical specification action statements entered by the shift technical advisor. Additionally, the inspectors assessed the ability of the crew and training staff to identify and document crew performance problems.

b. Findings

No findings were identified.



## .2 Quarterly Review of Licensed Operator Performance in the Main Control Room

### a. Inspection Scope

The inspectors observed and reviewed reactivity manipulations associated with a rod pattern adjustment conducted on Unit 1 November 26, 2017. The inspectors observed the reactivity control briefing to verify that it met the criteria specified in Susquehanna's Operations Section Expectations Handbook. Additionally, the inspectors observed licensed operator performance to verify that procedure use, crew communications, and coordination of activities between work groups similarly met established expectations and standards.

### b. Findings

No findings were identified.

## .3 Licensed Operator Regualification (71111.11B – 1 sample)

### a. Inspection Scope

The following inspection activities were performed using NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," Revision 11, and Inspection Procedure Attachment 71111.11, "Licensed Operator Regualification Program."

#### Examination Results

The operating tests for the week of November 27, 2017, were reviewed for quality and performance.

On December 22, 2017, the results of the annual operating tests were reviewed to determine if pass/fail rates were consistent with the guidance of NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," Revision 11, and NRC IMC 0609, Appendix I, "Operator Regualification Human Performance Significance Determination Process." The review verified that the failure rate (individual or crew) did not exceed 20 percent.

- 1 of 70 operators failed at least one section of the Annual Exam. The overall individual failure rate was 1.4 percent.
- 0 of 13 crews failed the simulator test. The crew failure rate was 0 percent.

#### Written Examination Quality

The inspectors reviewed three written examinations previously administered during the October/November 2016 examination cycle for qualitative and quantitative attributes as specified in Appendix B of Attachment 71111.11, Licensed Operator Regualification.

#### Operating Test Quality

Ten job performance measures (JPMs) and five scenarios were reviewed for qualitative and quantitative attributes as specified in Appendix C of 71111.11, "Licensed Operator Regualification Program."

### Licensee Administration of Operating Tests

Observations were made of the dynamic simulator exams and JPMs administered during the week of November 27, 2017. These observations included facility evaluations of crew and individual performance during the dynamic simulator exams and individual performance of JPMs.

### Examination Security

The inspectors assessed whether facility staff properly safeguarded exam material. JPMs, scenarios, and written examinations were checked for excessive overlap of test items.

### Remedial Training and Re-Examinations

The remediation plans and retake exams for operators who failed either the 2016 operating test or 2016 biennial written exam were reviewed to assess the effectiveness of the remedial training. Remediation for the individuals was processed in accordance with site procedures.

### Conformance with Operator License Conditions

Medical records for three senior reactor operator (SRO) licenses and three reactor operator (RO) licenses were reviewed to assess conformance with license conditions. All records reviewed were satisfactory.

Proficiency watch standing records from January 2016 through November 2017 were reviewed. All active licensed operators met the watch standing requirements to maintain an active license.

No operators were reactivated from inactive status since the last inspection. Therefore, this area was not inspected.

Records for the participation of licensed operators in the requalification program from January 2016 through November 2017 were reviewed. Records for the performance of licensed operators on annual requalification operating tests and biennial requalification written exams were reviewed.

### Simulator Performance

Simulator performance and fidelity were reviewed for conformance to the reference plant control room. A sample of simulator deficiency reports was also reviewed to ensure facility staff addressed identified modeling problems. Simulator test documentation was also reviewed.

### Problem Identification and Resolution

A review was conducted of recent operating history documentation found in inspection reports, the licensee's corrective action program, and the most recent NRC plant issues matrix. The inspectors also reviewed specific events from the licensee's corrective action program which indicated possible training deficiencies, to verify that they had been appropriately addressed. The senior resident inspector was also consulted for insights regarding licensed operators' performance. These reviews did not detect any operational events that were indicative of possible training deficiencies.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12Q – 3 samples)

a. Inspection Scope

The inspectors reviewed the samples listed below to assess the effectiveness of maintenance activities on structure, system, and component performance and reliability. The inspectors reviewed system health reports, CAP documents, maintenance work orders, and maintenance rule basis documents to ensure that Susquehanna was identifying and properly evaluating performance problems within the scope of the maintenance rule. For each sample selected, the inspectors verified that the structure, system, or component was properly scoped into the maintenance rule in accordance with 10 *Code of Federal Regulations* (CFR) 50.65 and verified that the (a)(2) performance criteria established by Susquehanna staff was reasonable. As applicable, for structures, systems, and components classified as (a)(1), the inspectors assessed the adequacy of goals and corrective actions to return these structures, systems, and components to (a)(2). Additionally, the inspectors ensured that Susquehanna staff was identifying and addressing common cause failures that occurred within and across maintenance rule system boundaries.

- Unit Common, sticking contacts on 480 volts-alternating current (VAC) motor control center breakers on November 7, 2017
- Unit 1 and 2, electro-hydraulic control system degradations System 193/293 on November 14, 2017
- Unit Common, commercial-grade dedication of capacitors on December 22, 2017 (quality control)

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 5 samples)

a. Inspection Scope

The inspectors reviewed station evaluation and management of plant risk for the maintenance and emergent work activities listed below to verify that Susquehanna performed the appropriate risk assessments prior to removing equipment for work. The inspectors selected these activities based on potential risk significance relative to the reactor safety cornerstones. As applicable for each activity, the inspectors verified that Susquehanna personnel performed risk assessments as required by 10 CFR 50.65(a)(4) and that the assessments were accurate and complete. When Susquehanna performed emergent work, the inspectors verified that operations personnel promptly assessed and managed plant risk. The inspectors reviewed the scope of maintenance work and discussed the results of the assessment with the station's probabilistic risk analyst to verify plant conditions were consistent with the risk assessment. The inspectors also reviewed the technical specification requirements and inspected portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met.

- Unit 1, protected equipment and risk management during the RCIC SOW on October 25, 2017
- Unit 1, elevated risk during RHR division 2 SOW on October 30, 2017
- Unit 1, protected equipment during HPCI SOW on November 28, 2017 and November 29, 2017
- Unit 1, protected equipment during division 2 ESW piping replacement on December 13, 2017
- Unit 2, elevated risk during functional test of reactor pressure vessel low water level automatic depressurization system (ADS) permissive on December 22, 2017

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15 – 7 samples)

a. Inspection Scope

The inspectors reviewed operability determinations for the following degraded or non-conforming conditions based on the risk significance of the associated components and systems:

- Unit Common, control room envelope in-leakage on October 4, 2017
- Unit 1, RCIC with a 53VDC short on October 25, 2017
- Unit Common, ESW/residual heat removal service water (RHRSW) piping corrosion found during in-service inspection on December 15, 2017
- Unit Common, degradation of heater in Standby Gas Treatment System on December 21, 2017
- Unit Common, containment boundary valve limit switches not environmentally qualified for safety function on December 20, 2017
- Unit Common, fuel oil leak on diesel fuel oil pump on December 22, 2017
- Unit 1, standby liquid control accumulator tank pressure low on December 26, 2017

The inspectors evaluated the technical adequacy of the operability determinations to assess whether technical specification operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the TSs and UFSAR to Susquehanna's evaluations to determine whether the components or systems were operable. The inspectors confirmed, where appropriate, compliance with bounding limitations associated with the evaluations.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18 – 1 sample).1 Permanent Modificationsa. Inspection Scope

The inspectors evaluated a modification to the containment hydrogen and oxygen analyzers, "Install Delphi Control System 11901 Temperature Control Board and 11901-MK Modification Kit." The inspectors verified that the design bases, licensing bases, and performance capability of the affected systems were not degraded by the modification. In addition, the inspectors reviewed modification documents associated with the upgrade and design change, including design specifications, system drawings, installation and testing procedures, and the consequence risk factors screening.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 5 samples)a. Inspection Scope

The inspectors reviewed the post-maintenance tests for the maintenance activities listed below to verify that procedures and test activities adequately tested the safety functions that may have been affected by the maintenance activity, that the acceptance criteria in the procedure were consistent with the information in the applicable licensing basis and/or design basis documents, and that the test results were properly reviewed and accepted and problems were appropriately documented. The inspectors also walked down the affected job site, observed the pre-job brief and post-job critique where possible, confirmed work site cleanliness was maintained, and witnessed the test or reviewed test data to verify quality control hold point were performed and checked, and that results adequately demonstrated restoration of the affected safety functions.

- Unit 1, RCIC following SOW on October 26, 2017
- Unit 1, RHR division 2 following SOW on October 31, 2017
- Unit Common, control room envelope testing on November 30, 2017
- Unit 1, HPCI following SOW on December 1, 2017
- Unit 1, RHRSW following SOW on December 20, 2017

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 4 samples)a. Inspection Scope

The inspectors observed performance of surveillance tests and/or reviewed test data of selected risk-significant structures, systems, and components to assess whether test results satisfied TSs, the UFSAR, and Susquehanna procedure requirements. The inspectors verified that test acceptance criteria were clear, tests demonstrated operational readiness and were consistent with design documentation, test instrumentation had current calibrations and the range and accuracy for the application, tests were performed as written, and applicable test prerequisites were satisfied.

Upon test completion, the inspectors considered whether the test results supported that equipment was capable of performing the required safety functions. The inspectors reviewed the following surveillance tests:

- Unit 1, RHR division 1 quarterly flow surveillance on November 9, 2017
- Unit 2, drywell leakage on November 28, 2017 and November 29, 2017 (RCS leak detection)
- Unit 1, RHRSW pump 'A' automatic transfer logic test on December 18, 2017
- Unit 2, RHRSW division 1 quarterly flow verification testing on December 19, 2017

b. Findings

No findings were identified.

**Cornerstone: Emergency Preparedness**

1EP2 Alert and Notification System Evaluation (71114.02 - 1 sample)

a. Inspection Scope

The inspectors conducted an onsite review to assess the maintenance and testing of the Susquehanna alert and notification system (ANS). During this inspection, the inspectors reviewed the Susquehanna siren system and backup route alerting, and the associated ANS procedures and the Federal Emergency Management Agency ANS Design Report to ensure compliance with design report commitments for system maintenance and testing.

b. Findings

No findings were identified.

1EP3 Emergency Response Organization Staffing and Augmentation System (71114.03 - 1 sample)

a. Inspection Scope

The inspectors conducted a review of the Susquehanna Emergency Response Organization (ERO) augmentation staffing requirements and the process for notifying and augmenting the ERO to verify the readiness of key staff to respond to an emergency event and to verify their ability to activate their emergency response facilities (ERFs) in a timely manner. The inspectors reviewed: the Susquehanna Emergency Plan for ERF activation and ERO staffing requirements, the ERO duty roster, applicable station procedures, augmentation test reports, call-in drill reports, and corrective action reports related to this inspection area. The inspectors also reviewed a sample of ERO responder training records to verify training and qualifications were up to date.

b. Findings

No findings were identified.

1EP5 Maintaining Emergency Preparedness (71114.05 - 1 sample)

a. Inspection Scope

The inspectors evaluated the efficacy of efforts to maintain the Susquehanna emergency preparedness (EP) program. The inspectors reviewed: memorandums of agreement with offsite agencies; procedures for the 10 CFR 50.54(q) Emergency Plan change process; Susquehanna's maintenance of equipment important to EP; records of evacuation time estimate population evaluation; and provisions for, and implementation of, primary, backup, and alternative ERF maintenance. The inspectors also verified compliance with NRC EP regulations regarding: emergency action levels for hostile action events, protective actions for on-site personnel during events, emergency declaration timeliness, ERO augmentation and alternate facility capability, evacuation time estimate updates, on-shift ERO staffing analysis, and ANS back-up means.

The inspectors further evaluated the ability to maintain Susquehanna's EP program through their identification and correction of EP weaknesses, by reviewing a sample of drill reports, self-assessments, EP-related CRs, and 10 CFR 50.54(t) reviews since the last NRC EP program inspection in November 2015.

b. Findings

No findings were identified.

**2. RADIATION SAFETY**

**Cornerstones: Occupational/Public Radiation Safety (PS)**

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01 - 5 samples)

a. Inspection Scope

The inspectors reviewed Susquehanna's performance in assessing and controlling radiological hazards in the workplace. The inspectors used the requirements contained in 10 CFR 20, TSs, Regulatory Guide 8.38, and the procedures required by TSs as criteria for determining compliance.

Inspection Planning

The inspectors reviewed the performance indicators (PIs) for the occupational exposure cornerstone, radiation protection program audits, and reports of operational occurrences in occupational radiation safety since the last inspection.

Radiological Hazard Assessment (1 sample)

The inspectors conducted independent radiation measurements during walkdowns of the facility and reviewed the radiological survey program, air sampling and analysis, continuous air monitor use, recent plant radiation surveys for radiological work activities, and any changes to plant operations since the last inspection to verify survey adequacy of any new radiological hazards for onsite workers or members of the public.

### Instructions to Workers (1 sample)

The inspectors reviewed high radiation area work permit controls and use, observed containers of radioactive materials and assessed whether the containers were labeled and controlled in accordance with requirements.

The inspectors reviewed several occurrences where a worker's electronic personal dosimeter (EPD) alarmed. The inspectors reviewed Susquehanna's evaluation of the incidents, documentation in the CAP, and whether compensatory dose evaluations were conducted when appropriate. The inspectors verified follow-up investigations of actual radiological conditions for unexpected radiological hazards were performed.

### Contamination and Radioactive Material Control (1 sample)

The inspectors observed the monitoring of potentially contaminated material leaving the radiological controlled area and inspected the methods and radiation monitoring instrumentation used for control, survey, and release of that material. The inspectors selected several sealed sources from inventory records and assessed whether the sources were accounted for and were tested for loose surface contamination. The inspectors evaluated whether any recent transactions involving nationally tracked sources were reported in accordance with requirements.

### Radiation Worker Performance and Radiation Protection Technician Proficiency (1 sample)

The inspectors evaluated radiation worker performance with respect to radiation protection work requirements. The inspectors evaluated radiation protection technicians in performance of radiation surveys and in providing radiological job coverage.

### Problem Identification and Resolution (1 sample)

The inspectors evaluated whether problems associated with radiation monitoring and exposure control (including operating experience) were identified at an appropriate threshold and properly addressed in the CAP.

#### b. Findings

No findings were identified.

### 2RS2 Occupational ALARA Planning and Controls (71124.02 - 3 samples)

#### a. Inspection Scope

The inspectors assessed Susquehanna's performance with respect to maintaining occupational individual and collective radiation exposures as low as is reasonably achievable (ALARA). The inspectors used the requirements contained in 10 CFR 20, Regulatory Guides 8.8 and 8.10, TSs, and procedures required by TSs as criteria for determining compliance.



### Inspection Planning

The inspectors conducted a review of Susquehanna's collective dose history and trends; ongoing and planned radiological work activities; previous post-outage ALARA reviews; radiological source term history and trends; and ALARA dose estimating and tracking procedures.

### Radiological Work Planning (1 sample)

The inspectors selected the following radiological work activities based on exposure significance for review:

- Radiation work permit (RWP) 2017-2339, Main Steam Relief Valves
- RWP 2-17-2320, Drywell Scaffold
- RWP 2-17-2315, Drywell Temporary Shielding
- RWP 2017-2370, Nozzle and Vessel ISI

For each of these activities, the inspectors reviewed: ALARA work activity evaluations, exposure estimates, exposure reduction requirements, results achieved (dose rate reductions, actual dose), person-hour estimates and results achieved, and post-job reviews that were conducted to identify lessons learned.

### Implementation of ALARA and Radiological Work Control (1 sample)

The inspectors reviewed radiological work controls and ALARA practices during the observation of in-plant work activities. The inspectors verified use of shielding, contamination controls, airborne controls, RWP controls, and other work controls were consistent with ALARA plans. The inspectors ensured that work-in-progress reviews were performed in a timely manner and adjustments made to the ALARA estimates when appropriate. The inspectors reviewed the results achieved against the intended ALARA estimates to confirm adequate implementation and oversight of radiological work controls. The inspectors also verified that the ALARA staff was involved with emergent work activities and were revising both dose estimates and ALARA controls in the associated RWPs/ALARA Plans, as appropriate.

### Problem Identification and Resolution (1 sample)

The inspectors evaluated whether problems associated with ALARA planning and controls were identified at an appropriate threshold and properly addressed in the CAP.

#### b. Findings

No findings were identified.

### 2RS4 Occupational Dose Assessment (71124.04 - 5 samples)

#### a. Inspection Scope

The inspectors reviewed the monitoring, assessment, and reporting of occupational dose. The inspectors used the requirements in 10 CFR 20, Regulatory Guides 8.9 and 8.34, TSs, and procedures required by TSs as criteria for determining compliance.

### Inspection Planning

The inspectors reviewed radiation protection program audits, National Voluntary Laboratory Accreditation Program (NVLAP) dosimetry testing reports and procedures associated with dosimetry operations.

### Source Term Characterization (1 sample)

The inspectors reviewed the plant radiation characterization (including gamma, beta, alpha, and neutron) being monitored. The inspector verified the use of scaling factors to account for hard-to-detect radionuclides in internal dose assessments.

### External Dosimetry (1 sample)

The inspectors reviewed dosimetry NVLAP accreditation, onsite storage of dosimeters, the use of "correction factors" to align electronic personal dosimeter results with NVLAP dosimetry results, dosimetry occurrence reports, and CAP documents for adverse trends related to external dosimetry.

### Internal Dosimetry (1 sample)

The inspectors reviewed internal dosimetry procedures, whole body counter measurement sensitivity and use, adequacy of the program for whole body count monitoring of plant radionuclides or other bioassay technique, adequacy of the program for dose assessments based on air sample monitoring and the use of respiratory protection, and internal dose assessments for any actual internal exposure.

### Special Dosimetric Situations (1 sample)

The inspectors reviewed Susquehanna's worker notification of the risks of radiation exposure to the embryo/fetus, the dosimetry monitoring program for declared pregnant workers, external dose monitoring of workers in large dose rate gradient environments, and dose assessments performed since the last inspection that used multi-badging, skin dose or neutron dose assessments.

### Problem Identification and Resolution (1 sample)

The inspectors evaluated whether problems associated with occupational dose assessment were identified at an appropriate threshold and properly addressed in the CAP.

#### b. Findings

No findings were identified.

#### 4. OTHER ACTIVITIES

##### 4OA1 Performance Indicator Verification (71151 - 9 samples)

##### .1 Emergency Preparedness Performance Indicator Verification

###### a. Inspection Scope

The inspectors reviewed data for the following three EP PIs: (1) drill and exercise performance, (2) ERO drill participation, and, (3) ANS reliability. The last NRC EP inspection at Susquehanna was conducted in the fourth calendar quarter of 2016. Therefore, the inspectors reviewed supporting documentation from EP drills and equipment tests from the fourth calendar quarter of 2016 through the second calendar quarter of 2017 to verify the accuracy of the reported PI data. The review of the PIs was conducted in accordance with NRC Inspection Procedure 71151. The acceptance criteria documented in NEI 99-02, "Regulatory Assessment PI Guidelines," Revision 7, was used as reference criteria.

###### b. Findings

No findings were identified.

##### .2 Mitigating Systems Performance Index

###### a. Inspection Scope

The inspectors reviewed Susquehanna's submittal of the Mitigating Systems Performance Index for the following systems for the period of October 1, 2016 through September 30, 2017:

- Unit 1 RHR System
- Unit 2 RHR System
- Unit 1 RHRSW/ESW
- Unit 2 RHRSW/ESW

To determine the accuracy of the PI data reported during those periods, the inspectors used definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment PI Guideline," Revision 7. The inspectors also reviewed Susquehanna's operator narrative logs, CRs, mitigating systems performance index derivation reports, event reports, and NRC integrated inspection reports to validate the accuracy of the submittals.

###### b. Findings

No findings were identified.

### .3 Occupational Exposure Control Effectiveness

#### a. Inspection Scope

The inspectors reviewed licensee submittals for the occupational radiological occurrences PI for the first through third quarter 2017. The inspectors used PI definitions and guidance contained in NEI 99-02, Revision 7, to determine the accuracy of the PI data reported. The inspectors reviewed electronic personal dosimetry accumulated dose alarms, dose reports, and dose assignments for any intakes that occurred during the time period reviewed to determine if there were potentially unrecognized PI occurrences. The inspectors conducted walkdowns of various Locked High and Very High Radiation Area entrances to determine the adequacy of the controls in place for these areas.

#### b. Findings

No findings were identified.

### .4 Radiological Effluent Technical Specifications/Offsite Dose Calculation Manual Radiological Effluent Occurrences

#### a. Inspection Scope

The inspectors reviewed licensee submittals for the radiological effluent TS/Offsite Dose Calculation Manual radiological effluent occurrences PI for the first through third quarter of 2017. The inspectors used PI definitions and guidance contained in the NEI 99-02, Revision 7, to determine if the PI data was reported properly. The inspectors reviewed the public dose assessments for the PI for public radiation safety to determine if related data was accurately calculated and reported.

The inspectors reviewed the CAP database to identify any potential occurrences such as unmonitored, uncontrolled, or improperly calculated effluent releases that may have impacted offsite dose. The inspectors reviewed gaseous and liquid effluent summary data and the results of associated offsite dose calculations to determine if indicator results were accurately reported.

#### b. Findings

No findings were identified.

### 4OA2 Problem Identification and Resolution (71152 – 4 samples)

#### .1 Routine Review of Problem Identification and Resolution Activities

##### a. Inspection Scope

As required by Inspection Procedure 71152, "Problem Identification and Resolution," the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify Susquehanna entered issues into the CAP at an appropriate threshold, gave adequate attention to timely corrective actions, and identified and addressed adverse trends. In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the corrective action program.

The inspectors also confirmed, on a sampling basis, that, as applicable, for identified defects and non-conformances, Susquehanna performed an evaluation in accordance with 10 CFR Part 21.

b. Findings

No findings were identified.

.2 Semi-Annual Trend Review

a. Inspection Scope

The inspectors performed a semi-annual review of site issues to identify trends that might indicate the existence of more significant safety concerns. As part of this review, the inspectors included repetitive or closely-related issues documented by Susquehanna in trend reports, site PIs, major equipment problem lists, system health reports, maintenance rule assessments, and maintenance or CAP backlogs. The inspectors also reviewed Susquehanna's CAP database for the third and fourth quarters of 2017 to assess CRs written in various subject areas (equipment problems, human performance issues, etc.), as well as, individual issues identified during the NRCs daily CR review (Section 4OA2.1). The inspectors reviewed the most recent trend report for the period of May to August, 2017, conducted under LS-125-1009, "Station Trending Manual," Revision 2, to verify that Susquehanna personnel were appropriately evaluating and trending adverse conditions in accordance with applicable procedures.

b. Findings and Observations

No findings were identified.

The inspectors noted a significant reduction in the number of CRs written in the past year. The licensee identified that there was a decrease in CR generation in the most recent trimester, but noted that taken on an annual basis, Susquehanna is still within 5 percent of the industry average for CR generation rate. The licensee documented an action in DI-2017-18445 for the Performance Improvement group to evaluate the decrease in CR generation. The inspectors will continue to monitor the trend, as well as review the results of the licensee's evaluation.

The inspectors continued to focus on the licensee's assessment and management of plant risk. Inspectors noted that the licensee has implemented a more formalized process for communicating risk management actions (RMAs) to the station during periods of elevated risk by including a written explanation of RMAs in the Plan of the Day. This has heightened awareness of the plant staff as a whole, and also specifies who is responsible for ensuring the completion of each RMA.

The inspectors continued to monitor the station's actions to address human performance errors and events. Susquehanna's analysis of the adverse trend had determined that the common flawed defenses were questioning attitude, procedure use and adherence, and verification practices. Since these are already key elements of Susquehanna's "Focus on Five" communication strategy, which is emphasized to the station on pamphlets, posters, and emails, the station intends to continue to communicate using the "Focus on Five" theme.

In the past two quarters, the inspectors have noted fewer examples of human performance errors, with no scrams. The inspectors will continue to monitor, as it is difficult to determine what is driving the statistical improvement, and whether or not it is sustainable and permanent. The licensee independently recognized this trend in the May – August 2017 Performance Assessment Report, which noted a 19% decrease in human performance error trend codes applied to CRs written for the 2nd trimester 2017, in comparison to the last 5 quarters, and that there were 10% fewer crew clock resets this trimester than the average for the last 5 trimesters.

.3 Annual Sample: Actions to Address an Adverse Trend in CR Initiation Timeliness

a. Inspection Scope

The inspectors performed an in-depth review of the licensee's analysis and corrective actions associated with CR-2016-16254, "Trend in CR initiation timeliness identified," written July 1, 2016. Specifically, a trend was identified in the timeliness of generating CRs, as well as processing CRs through the corrective action program.

The inspectors assessed Susquehanna's apparent cause evaluation and the prioritization and timeliness of Susquehanna's corrective actions were appropriate. The inspectors' review was predominantly focused on the results of daily CAP item screenings to gauge the timeliness of writing CRs for emerging issues.

The inspectors also reviewed specific materials such as documentation of work group discussions, email communications to the plant staff about expectations and standards for writing CRs, and special articles in weekly plant newsletters that addressed the adverse trend. This review constituted one follow-up inspection sample for in-depth review as defined in IP 71152.

b. Findings and Observations

No findings were identified.

The inspectors verified that the licensee appropriately prioritized the planned corrective actions and that these actions were generally adequate to address the trend of untimely CR generation. The inspectors noted that occasionally, CR generation does not meet the station expectation of timeliness.

One recent example from September 2017 is CR-2017-16658 which was not written by plant staff until more than 24 hours after plant staff were made aware of a deficiency, and only after the inspectors made station management aware of the condition. This deficiency concerned inadequate control of clear plastic on the refueling floor, with several noted examples of noncompliance with station procedure NDAP-QA-0507, "Foreign Material Exclusion."

As another example, in July 2017, and again in November 2017, when engineering staff wrote CR-2017-13423 and CR-2017-19520 to document conditions adverse to quality concerning safety-related equipment, the descriptions had a level of detail beyond what is required for the initial reporting of a condition, including multi-page attachments, calculations, and analyses justifying operability.

Station procedure NDAP-QA-0703, "Operability Determinations and Functionality Assessments," states that a person discovering a potential or suspected degraded or nonconforming condition shall immediately notify the main control room and ensure the concern is documented in a CR. The procedure further states that entry into the CAP should not be delayed while waiting for completion of extensive evaluations.

The intent of the process laid out in the procedure is to inform the main control room as quickly as possible so a licensed operator can perform an Initial Operability Screening (IOS). The procedure does allow for an additional 72 hours of more in-depth information gathering and analysis through the prompt operability determination process, if this is considered appropriate following the initial operability screening. The inspectors determined that in both cases, CR generation was unnecessarily delayed while the engineer worked to first gather the information needed to support a potential prompt operability determination.

The inspectors independently evaluated the deficiencies noted above for significance in accordance with the guidance in Inspection Manual Chapter (IMC) 0612, Appendix B, "Issue Screening," and Appendix E, "Examples of Minor Issues." The inspectors determined these conditions were deficiencies of minor significance and, therefore, are not subject to enforcement action in accordance with the NRC's Enforcement Policy.

.4 Annual Sample: Actions to Address Inadequate Self-Assessment of Fire Brigade Deficiencies

a. Inspection Scope

The inspectors performed an in-depth review of the licensee's analysis and CAP associated with CR-2017-10767, CR-2017-14358, and the associated NRC-identified violation documented in NRC Integrated Inspection Report 05000387; 388/2017002. Specifically, the inspectors noted numerous discrepancies during a fire drill on May 1, 2017 that were not identified or documented by the drill controllers.

The inspectors assessed Susquehanna's cause evaluation and the prioritization and timeliness of Susquehanna's corrective actions to determine whether Susquehanna was appropriately identifying, characterizing, and correcting the problems identified during the May 1 drill. The inspectors also reviewed specific materials such as documentation of training and coaching provided to fire brigade members and drill controllers, and CRs generated following subsequent fire brigade drills. On December 20, 2017, the inspectors observed another fire drill to assess the performance of the fire brigade as well as the effectiveness of the drill monitors at identifying and critiquing deficiencies.

This review constituted one follow-up inspection sample for in-depth review as defined in IP 71152.

b. Findings and Observations

No findings were identified.

The inspectors assessed that the corrective actions taken by the licensee were adequate to address the issue. The inspectors noted very few weaknesses in fire brigade performance during the December 20, 2017 drill, and most of these were independently identified and critiqued by the licensee drill monitors. However, the inspectors observed that the control room once again did not sound the fire alarm until approximately nine minutes after drill initiation.

This was also an observation made during the May 1, 2017 drill. The inspectors noted that the control room staff was waiting to sound the alarm because the step in the fire response procedure said to sound the alarm upon confirmation of actual fire, even after the drill simulation had presented two diverse indications that installed fire protection systems had actuated.

The licensee subsequently entered the issue into the CAP and intends to revise the fire response procedure to include an explicit definition of a confirmed actual fire.

.5 Annual Sample: Repetitive Failures of Low Pressure Coolant Injection (LPCI) Swing Bus Automatic Transfer Switches (ATSs)

a. Inspection Scope

The inspectors performed an in-depth review of Susquehanna's identification, evaluation, and resolution following repetitive failures of LPCI Swing Bus ATSs. This issue resulted in non-cited violation (NCV) 05000387, 388/2016004-02, "Failure to Promptly Correct a Condition Adverse to Quality with LPCI Swing Bus ATS." Two redundant Class 1E 480 VAC swing buses provide power to their respective division's LPCI valves. The LPCI swing bus is capable of receiving electrical power from either of two Class 1E 480 VAC sources, a preferred and an alternate source. An ATS is provided to automatically transfer the swing bus from the preferred to the alternate source upon a loss of power from the preferred source. The NCV was written as a result of two failures of ATSs to properly swap power supplies (one in March 2016 and one in September 2016) during surveillance testing. Both of these failures were determined to be the result of inadequate corrective actions. The issues were entered into the CAP as CR-2016-05589, CR-2016-21554, CR-2016-25715, and CR-2017-03953.

The inspectors assessed Susquehanna's problem identification threshold, causal analysis, extent of condition reviews, compensatory actions, and the prioritization and timeliness of corrective actions to determine whether Susquehanna was appropriately identifying, characterizing, and correcting problems associated with these issues and whether the planned or completed corrective actions were appropriate. The inspectors compared the actions taken to the requirements of Susquehanna's CAP, Title 10 of the CFR Part 50, Appendix B, and with the reportability requirements of 10 CFR 50.73. In addition, the inspectors reviewed documentation associated with this issue, and interviewed engineering and regulatory affairs personnel to assess the effectiveness of the implemented and planned corrective actions.

b. Findings and Observations

No findings were identified.

The inspectors determined that Susquehanna took appropriate actions to identify the apparent cause of the ATS failures and appropriately identified, prioritized, and implemented corrective actions. The March 2016 failure of 1ATS229 was determined to be due to a deformed upper linkage bolt caused by the upper linkage rod being out of proper adjustment. Prior corrective actions from an ATS failure in 2013 determined that linkage rods needed to be adjusted for proper operation of the ATSs. However, the preventive maintenance instructions were not adequate to ensure optimal linkage rod adjustment. The September 2016 failure of 2ATS219 was determined to be due to inadequate lubrication.



During the prior performance of preventive maintenance on 2ATS219 the task of performing cleaning and lubrication of the main contactor hinge point was not performed. A CR was written to generate a work order and reschedule the task, however, the task was not rescheduled or performed.

Following the September 2016 failure of 2ATS219, Susquehanna consulted the ATS vendor manufacturer (Russelectric). The vendor provided technical input regarding proper linkage rod adjustment, ATS component lubrication practices, and well as other improved maintenance practices.

As a result, Susquehanna revised preventive maintenance instructions to incorporate the vendor recommended maintenance practices and reduced the preventive maintenance intervals for the ATSS. The inspectors verified that Susquehanna also incorporated these actions for the site's other Russelectric ATSS (i.e., the emergency diesel generator ATSS). The inspectors concluded that the actions taken by Susquehanna to incorporate the vendor recommendations into maintenance instructions were appropriate and, had they been incorporated earlier, could have prevented subsequent failures.

#### 4OA6 Meetings, Including Exit

On January 19, 2018, the inspectors presented the inspection results to Timothy S. Rausch, President and Chief Nuclear Officer, and other members of the Susquehanna staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

### **ATTACHMENT: SUPPLEMENTARY INFORMATION**

**SUPPLEMENTARY INFORMATION  
KEY POINTS OF CONTACT**

Personnel

T. Rausch, President and Chief Nuclear Officer  
B. Berryman, Site Vice President  
D. Jones, Plant Manager  
J. Barnhart, Radiological Operations Supervisor – Programs  
B. Bridge, Radiation Protection Manager  
R. Genovese, Nuclear Regulatory Affairs  
J. Gorman, Emergency Preparedness Manager  
B. Franssen, Support General Manager  
J. Jennings, Nuclear Support General Manager  
J. Jessick, Radiological Operations Supervisor - ALARA  
T. Karc, Preventive Maintenance Program Owner  
M. Krick, Nuclear Regulatory Affairs Supervisor  
C. Manges, Regulatory Affairs Senior Engineer  
C. Michaels, LOR Lead  
N. Pagliano, Nuclear Regulatory Affairs  
R. Williams, Components Maintenance Optimization Engineer

**LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATED**

None.

**LIST OF DOCUMENTS REVIEWED**

**Section 1R01: Adverse Weather Protection**

Procedures

NDAP-00-1913, Seasonal Readiness, Revision 9

Condition Reports

CR-2017-18002

CR-2017-18004

Maintenance Orders/Work Orders

2037807

2081395

Miscellaneous

Certification Letter for Winter Readiness, November 29, 2017

**Section 1R04: Equipment Alignment**

Procedures

SO-152-002, Quarterly HPCI Flow Verification, Revision 72

Maintenance Orders/Work Orders

2091242

Drawings

M-155, Unit 1 P&ID HPCI, Sheet 1, Revision 59  
 M-156, Unit 1 P&ID HPCI Turbine-Pump, Sheet 1, Revision 39  
 M-156, Unit 1 P&ID HPCI Lubricating and Control Oil, Sheet 2, Revision 11  
 M-151, Unit 1 P&ID RHR, Sheet 1, Revision 72

Miscellaneous

DBD004, Design Basis Document for HPCI

**Section 1R05: Fire Protection**Miscellaneous

FP-213-237, Core Spray Pump Room 'A' (I-17) Fire Zone 2-1B Elevation 645'-0", Revision 5  
 FPRR Volume 1 & 2  
 FP-113-109, Remote Shutdown Panel Room (I-109) Access Area (I-102) Fire Zones 1-2B, 1-2D  
 Elevation 670'-0", Revision 5  
 FP-013-192, Diesel Generator Bay 'B' Fire Zone 0-41B Elevations 677', 660' and 710',  
 Revision 4  
 FP-013-171, Equipment and Battery Rooms Unit 2 East Side (C-613, 609, 614, 615) Fire Zones  
 0-28A-I; 0-28G; 0-28E; 0-28C Elevation 771'-0, Revision 4  
 FP-013-139, Unit 1 Lower Relay Room (C-203) Fire Zone 0-24D Elevation 698'0", Revision 9

**Section 1R11: Licensed Operator Requalification Program**Procedures

ON-SCRAM-101, Reactor Scram, Revision 6  
 ON-FWHTG-101, Feedwater Heating Off-Normal Operation, Revision 1  
 ON-LVL-101, RPV Level Control System Malfunction, Revision 1  
 EO-000-103, Primary Containment Control, Revision 19  
 EO-000-102, RPV Control, Revision 17  
 OP-AD-300, Administration of Operations, Revision 24  
 RE-OTP-103, Guidelines for Planned Power Maneuvers, Revision 15  
 GO-100-012, Power Maneuvers, Revision 53  
 OP-AD-338, Reactivity Manipulations Standards and Communications Requirements,  
 Revision 31  
 2017 LOR Annual Operating Exam Sample Plan  
 OI-AD-044, Return to Shift Duty  
 TQ-106, Licensed Operator Requalification Program

Job Performance Measures

14.ON.20370.151	49.ON.39967.151	50.EO.26390.003	00.EO.27617.101
34.EO.20802.151	52.OP.26092.151	31.OP.20280.101	00.EP.20919.101
00.ON.20986.102	73.EO.23889.101		

Biennial Written Exams (Previously administered October-November 2016)

2016 Biennial Exam Alpha Shift  
 2016 Biennial Exam Bravo Shift  
 2016 Biennial Exam Foxtrot Shift

Simulator Scenarios

LOR 315      LOR 402      LOR307      LOR 508      LOR618

Simulator Testing

SSES-5301, Manual Scram, Revision 6

SSES-5303, Simultaneous Closure of all MSIV's, Revision 6

SSES-5501-2016-HP, Simulator to Reference Plant Comparison at Power Level, Revision 13

LOR-EXM-601 ATWS, Revision 12

LOR-EXM-516, Main Steam Leak, Revision 0

LOR-EXM-517 LOCA, Revision 0

**Section 1R12: Maintenance Effectiveness**Condition Reports

CR-2017-02584      CR-2017-10276      CR-2017-10807      CR-2017-11645

CR-2017-12018      CR-2017-12022      CR-2017-13783      CR-2017-13785

CR-2017-13829      CR-2017-14505      CR-2017-16696      CR-2017-17198

CR-2017-18883

Action Requests

16896

17169

1145057

Miscellaneous

FA-07112136-1, Failure Analysis Report for Cutler Hammer A200 Starter Part Number A200M1CACE, Revision 1

Failure Analysis of a Reversing Starter, Model A210M1CACE, Batch/Serial 351022228-STR-1, November 1, 2017

Failure Analysis of a Reversing Starter, Model A210M1CACE, Batch/Serial 50985-002-00001, November 1, 2017

Failure Analysis of a Reversing Starter, Model A210M1CACE, Batch/Serial 56547K1-02-0001, November 1, 2017

B 3.6.3.2, Drywell Air Flow System, Revision 2

10CFR Part 21 Notification: P21-06092017, A200 Series Contactor failing to open when de-energized, June 9, 2017

Eaton letter, Status update- Field reports of A200 Size 1 contactors failing to open when de-energized, June 9, 2017

Eaton letter, Status update- Field reports of A200 Size 1 contactors failing to open when de-energized, September 26, 2017

Exelon Lab Report, Failure Analysis of a Reversing Starter Manufacturer: Eaton-Cutler Hammer, April 11, 2017

Level of Effort Checklist, CR-2017-11645

Maintenance Rule Basis Document- System 60

Reactor Plant Event Notification Worksheet, July 14, 2017

VP-0717415-1, Starter &amp; Overload Relay Test Data Sheet, Revision 30

Maintenance Rule Basis Document- System 93L

EDU-CAP-0048, Capacitor Manufactured Formally BY GE, Revision 1

SUS-57107, Exelon Power Labs, CGD Testing of Capacitors, October 24, 2017

**Section 1R13: Maintenance Risk Assessments and Emergent Work Control**Condition Reports

CR-2017-20468

Maintenance Orders/Work Orders  
2111655

Miscellaneous

Protected Equipment Clearance Order, Unit 1 HPCI Protected During RCIC SOW  
Protected Equipment Clearance Order, Unit 1 Division 1 RHR, October 30, 2017  
Protected Equipment Clearance Order, Unit 1 RCIC, November 27, 2017  
Protected Equipment Clearance Order, ESW Division 1, December 11, 2017  
Protected Equipment Clearance Order, Fire Risk Management Zones Protected by OI-013-002, Attachment D, December 11, 2017  
Risk RMA's for the Week of December 11, 2017, December 8, 2017  
Risk RMA's for the Week of December 25, 2017, December 22, 2017

**Section 1R15: Operability Determinations and Functionality Assessments**

Procedures

NDAP-QA-0703, Operability Determinations and Functionality Assessments, Revision 30  
NDAP-QA-0424, Control Room Envelope Habitability Program, Revision 3  
SO-070-B01, Monthly Standby Gas Treatment Train B, Revision 4

Condition Reports

CR-2017-13061	CR-2017-13423	CR-2017-17462	CR-2017-17463
CR-2017-17485	CR-2017-17522	CR-2017-17659	CR-2017-18243
CR-2017-18437	CR-2017-19246	CR-2017-19490	CR-2017-19520
CR-2017-20222			

Action Requests

17458

Drawings

E-324, Schematic Diagram Annunciation Reactor Core Cooling System Benchboard IC601, Sheet 3, Revision 4  
E-324, Unit 1 Schematic Diagram Reactor Core Cooling System Benchboard IC601, Sheet 7, Revision 15  
E-381-16, Connection Diagram Reactor Protection System RHR & RCIC Terminal Boxes, Revision 9  
VC-157, Common P&ID HVAC Control Diagram Reactor Building Standby Gas Treatment System, Sheet 3, Revision 34

Miscellaneous

EC-030-1019, SSES Control Room Habitability Envelope Hazardous Chemical Analysis, Revision 2  
EC-RADN-1125, CRHE and Off Site Post LOCA Doses, Revision 6  
EC-030-1018, Response to NEI 99-03 Control Room Habitability Guidance Appendix A Smoke Evaluation, Revision 0  
NRC Generic Letter 2003-01, Control Room Habitability  
PLA-5711, SES Follow-up response to Generic Letter 2033-01 Control Room Habitability, February 3, 2004  
PLA-5861, SES Follow-up response to Generic Letter 2033-01 Control Room Habitability, February 11, 2005  
PLA-5916, SES Follow-up response to Generic Letter 2033-01 Control Room Habitability, June 28, 2005  
BOP-VT-17-169, Inspection of Wrapped Coatings and General Condition, October 27, 2017

EC-070-0013, Standby Gas Treatment System Charcoal Filters, Revision 1  
 NEDC-31344, Environmental Qualification Report, MSIV Limit Switch  
 EQAR-004, SSES EQ Binder EQAR-004, NAMCO Limit Switches Model Numbers  
 EA740-20000, -20001, -20100, -50100, -80000, -80001 Environmental Qualification  
 Assessment Report, Revision 14  
 EC-053-1001, Determination of Design Basis and Pressure Requirements for SLC  
 Accumulators, Revision 3

### **Section 1R18: Plant Modifications**

#### Drawings

J17-46, Unit 1 & 2 K-IV Electrical Wiring Diagram Panels 1C226A, 1C226B, 2C226A & 2C226B,  
 Sheet 2, Revision 6  
 M-2157, Unit 2 P&ID Containment Atmos Control, Sheet 3, Revision 28  
 J17-46, Unit 1 & 2 K-IV Electrical Wiring Diagram Panels 1C226A, 1C226B, 2C226A & 2C226B,  
 Sheet 4, Revision 6

#### Miscellaneous

EC 1848599, Install 'A' Delphi Control System 11901 Temperature Control Board and  
 11901-MK Modification Kit, Revision 0  
 4.30, Delphi Control Systems, 11901 Temperature Control Board and 11901-MK Modification  
 Kit Field Installation Procedure, Revision 2  
 Document 19350, Bill of Material Bechtel Power Corp, SSES Units 1 & 2, Purchase Order  
 88-56-J-17-B  
 Comsip Inc. Model K-IV Instruction Manual, Revision 2, March 24, 1982

### **Section 1R19: Post-Maintenance Testing**

#### Procedures

SO-149-B02, Quarterly RHR System Flow Verification Division 2, Revision 29  
 SO-150-002, Quarterly RCIC Flow Verification, Revision 57  
 OP-150-001, RCIC System (Reactivity Impact), Revision 47  
 SO-152-006, HPCI Comprehensive Flow Verification, Revision 25  
 SO-152-015, Two Year HPCI System Remote Position Indicator Checks, Revision 9  
 SO-152-004, Quarterly HPCI Valve Exercising, Revision 31  
 NDAP-QA-0424, Control Room Envelope Habitability Program, Revision 3  
 SO-030-151, Control Structure Boundary Envelope Air In-Leakage VIA Tracer Gas Testing,  
 Revision 1

#### Condition Reports

CR-2016-18196      CR-2017-17463      CR-2017-20094      CR-2017-20141

#### Maintenance Orders/Work Orders

1808107	1855263	1993843	1997594	2018444	2018446
2041918	2054060	2079619	2081468	2085813	2086042
2105241	2107704	2111091	2111110	2111655	2114269

#### Miscellaneous

E1105-02  
 E1520-02  
 PLA-5916, SSES Final Resolution to Generic Letter 2003-01 Control Room Habitability,  
 June 28, 2005

PLA-5861, SSES Follow-Up Response to Generic Letter 2003-01 Control Room Habitability, February 11, 2005  
PLA-5711, SSES Follow-Up Response to Generic Letter 2003-01 Control Room Habitability, February 3, 2004  
SO-116-A02, 92DY-RHRSW Valve Exercise- Div 1, Unit 1

**Section 1R22: Surveillance Testing**

Procedures

SO-149-A02, Quarterly RHR System Flow Verification Division I, Revision 27  
OP-149-001, RHR System, Revision 47  
SO-116-312, 1P506A Unit 1 RHRSW Pump 'A' DC Control Automatic Transfer Logic Test, Revision 0

Condition Reports

CR-2017-17671  
CR-2017-19627

Drawings

M-151, RHR, Sheet 1, Revision 72

Miscellaneous

SO-200-006, Drywell Leakage Calculation Worksheet, Revision 87  
SO-200-006, Drywell Floor Drain Inleakage Calculation Worksheet Instruction, Revision 87  
SO-216-A03, 92DY- RHRSW Sys Flow Verif- A LOOP, Unit 2

**Section 1EP2: Alert and Notification System Evaluation**

Condition Reports

CR-2016-25200  
CR-2017-10496

Miscellaneous

SSES Emergency Plan, Revision 61  
Susquehanna Nuclear Power Station, Siren Alert Notification System Design Evaluation, Final Report, dated September 2008  
Letter from FEMA Region III to Susquehanna Steam Electric Station, dated November 7, 2008  
TEMPEST T-112/ T-121 Omni-directional Siren Installation, Operation, Maintenance and Parts Manual, Revision E  
EP-108, Alert Notification System–American Signal Corporation Sirens, Revision 2  
ANS Testing and Maintenance Records, Spring 2016 – Spring 2017

**Section 1EP3: Emergency Response Organization Staffing and Augmentation System**

Miscellaneous

EP-102, Review, Revision, and Distribution of the SSES Emergency Plan and 50.54(Q) Evaluations, Revision 7  
SSES Emergency Plan, Revision 61  
On-call pager test results 2016-2017  
EP-113, Emergency Preparedness Staff Training, Revision 0  
TQ-113, Emergency Plan Training, Revision 4  
50.54(q) Screens and Evaluations:

S2016-06-06-01, Revision 2  
 S2017-02-16-01  
 S2017-07-03-01  
 E2017-09-08-01  
 E2017-09-07-01

### **Section 1EP5: Maintenance of Emergency Preparedness**

#### Condition Reports

CR-2016-02543      CR-2017-02868      CR-2017-18657      CR-2017-18694

#### Miscellaneous

SSES Emergency Plan, Revision 61  
 NOSP-QA-401, Internal Audits, Revision 1  
 NASP-QA-406, Control of Audit Commitments, Revision 13  
 Focused Area Self-Assessment DI-2015-29217  
 Focused Area Self-Assessment DI-2016-00962  
 Focused Area Self-Assessment DI-2015-29216  
 EP Excellence Plan, Revision 7  
 EP-115, Equipment Important to Emergency Response, Revision 8  
 ETE Annual Assessment, 2015 and 2016  
 SSES Evacuation Time Estimate Sensitivity Study Construction of the South Valley Parkway in Nanticoke, Pennsylvania, November 2016  
 Letters of Agreement/Memoranda of Understanding 2016, 2017  
 SI-179-319B, 24 Month Calibration of Containment Area High Radiation Monitoring System Channel RITS-15720B, Revision 0  
 SC-233-115, Calibration of the Unit 2 Turbine Building Vent Radiation Monitor System Low Range Noble Gas Channel, Revision 1  
 SC-233-116, Calibration of the Unit 2 Turbine Building Vent Radiation Monitor System Accident Channels, Revision 1

### **Section 2RS1: Radiological Hazard Assessment and Exposure Controls**

#### Condition Reports

CR-2017-05095      CR-2017-05119      CR-2017-05590      CR-2017-06369  
 CR-2017-06865      CR- 2017-07325      CR-2017-07337

### **Section 2RS2: Occupational ALARA Planning and Controls**

#### Miscellaneous

PPL Susquehanna, LLC, Unit 2 18th Refuel and Inspection Outage Radiological Performance Report

### **Section 2RS4: Occupational Dose Assessment**

#### Procedures

HP-TP-223, Internal Dose Investigations and Evaluations, Revision 14  
 HP-TP-201, Operation of the Whole Body Counting System Using Apex-Invivo Software, Revision 3  
 HP-TP-208, Performance Verification and Calibration of the Whole Body System, Revision 14  
 HP-TP-723, Personal Air Sampling, Revision 0  
 HP-TP-222, Special Dosimetry Issuance and Criteria, Revision 23  
 NDAP-QA-0625, Personnel Radiation Exposure Monitoring Program, Revision 18



Condition Reports

CR-2017-04795

CR-2017-05329

Miscellaneous

Lesson Plan HP009, Prenatal Radiation Exposure Briefing, Revision 4

NVLAP Annual Reports 2016 &amp; 2017 for Landauer, Inc. Scope of Accreditation

**Section 4OA1: Performance Indicator Verification**Procedures

NDAP-QA-0737, Reactor Oversight Process Performance Indicators, Revision 18

Condition Reports

CR-2016-14083

CR-2017-06220

Miscellaneous

ANS Reliability PI data, September 2016– June 2017

DEP PI data, September 2016– June 2017

ERO Drill Participation PI data, September 2016– June 2017

EP-114, Emergency Preparedness Performance Indicators, Revision 1

MSPI Derivation Report, MSPI RHR System, Performance Limit Exceeded, Unit 2,  
October, 2017

MSPI Derivation Report, MSPI RHR System, Unavailability Index, Unit 2, October, 2017

MSPI Derivation Report, MSPI RHR System, Unreliability Index, Unit 2, October, 2017

MSPI Derivation Report, MSPI RHR System, Performance Limit Exceeded, Unit 1,  
October, 2017

MSPI Derivation Report, MSPI RHR System, Unreliability Index, Unit 1, October, 2017

MSPI Derivation Report, MSPI RHR System, Unavailability Index, Unit 1, October, 2017

MSPI Derivation Report, MSPI Cooling Water System, Unreliability Index, Unit 1, October, 2017

MSPI Derivation Report, MSPI Cooling Water System, Unreliability Index, Unit 2, October, 2017

MSPI Derivation Report, MSPI Cooling Water System, Unavailability Index, Unit 1,  
October, 2017MSPI Derivation Report, MSPI Cooling Water System, Performance Limit Exceeded, Unit 1,  
October, 2017MSPI Derivation Report, MSPI Cooling Water System, Performance Limit Exceeded, Unit 2,  
October, 2017**Section 4OA2: Problem Identification and Resolution**Condition Reports

CR-2016-05589

CR-2016-10998

CR-2016-11217

CR-2016-11618

CR-2016-12098

CR-2016-12854

CR-2016-13039

CR-2016-14500

CR-2016-14613

CR-2016-15295

CR-2016-16254

CR-2016-18049

CR-2016-21554

CR-2016-25715

CR-2016-27289

CR-2017-03953

CR-2017-10767

CR-2017-14358

CR-2017-19229

CR-2017-19239

CR-2017-19928

CR-2017-19433

CR-2017-20755

CR-2017-21207

Miscellaneous

ACE for CR 2016-16254 Revision A, August 4, 2016

ACE for CR 2016-16254 Revision B, August 19, 2016

CARB Meeting Minutes, August 23, 2016 – August 25, 2016

Hot Box 17-27, October 11, 2017

Fire Brigade Quarterly Drill, Scenario #15

TQ-171-0102, Fire Brigade Drill Critique Form, Revision 4

Licensee Event Report 05000387/2016-007-00, Inoperability of Swing Bus Transfer Switch due to Deformed Bolt on Linkage, May 3, 2016

Russelectric Inc. Operation and Maintenance Instructions, Russelectric ATS, June 20, 1979

**LIST OF ACRONYMS**

ACE	apparent cause evaluation
ADS	automatic depressurization system
ALARA	as low as is reasonably achievable
ANS	alert and notification system
ATS	automatic transfer switch
CAP	corrective action program
CFR	<i>Code of Federal Regulations</i>
CR	condition report
EP	emergency preparedness
ERF	emergency response facility
ERO	Emergency Response Organization
ESW	emergency service water
HPCI	high pressure coolant injection
IMC	Inspection Manual Chapter
JPM	job performance measures
LER	licensee event report
LPCI	low pressure coolant injection
NRC	Nuclear Regulatory Commission
NVLAP	National Voluntary Laboratory Accreditation Program
PI	performance indicator
RCIC	reactor core isolation cooling
RHR	residual heat removal
RHRSW	residual heat removal service water
RMA	risk management action
RO	reactor operator
RWP	radiation work permit
SOW	system outage window
SRO	senior reactor operator
SSS	Susquehanna Steam Electric Station
TS	technical specifications
UFSAR	Updated Final Safety Analysis Report
VAC	volts-alternating current