



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

April 13, 2015

Mr. Timothy S. Rausch  
Senior Vice President  
and Chief Nuclear Officer  
PPL Susquehanna, LLC  
769 Salem Boulevard  
Berwick, PA 18603-0467

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2 - REPORT FOR THE AUDIT REGARDING IMPLEMENTATION OF MITIGATING STRATEGIES AND RELIABLE SPENT FUEL POOL INSTRUMENTATION RELATED TO ORDERS EA-12-049 AND EA-12-051 (TAC NOS. MF0888, MF0889, MF0890 AND MF0891)

Dear Mr. Rausch:

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design-Basis External Events" and Order EA-12-051, "Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation," (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML12054A736 and ML12054A679, respectively). The orders require holders of operating reactor licenses and construction permits issued under Title 10 of the *Code of Federal Regulations* Part 50 to submit for review, Overall Integrated Plans (OIPs) including descriptions of how compliance with the requirements of Attachment 2 of each order will be achieved.

By letter dated February 28, 2013 (ADAMS Accession No. ML13060A357), PPL Susquehanna, LLC (PPL, the licensee) submitted its OIP for Susquehanna Steam Electric Station (SSES), Units 1 and 2, in response to Order EA-12-049. By letters dated August 26, 2013, February 28, 2014, August 27, 2014 and February 25, 2015 (ADAMS Accession Nos. ML13240A214, ML14062A061, ML14251A231 and ML15057A228, respectively), the licensee submitted its first four six-month updates to the OIP. By letter dated August 28, 2013 (ADAMS Accession No. ML13234A503), the NRC notified all licensees and construction permit holders that the staff is conducting audits of their responses to Order EA-12-049 in accordance with NRC Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No. ML082900195). This audit process led to the issuance of the SSES interim staff evaluation (ISE) and audit report (ADAMS Accession No. ML13339A750) on January 24, 2014, and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13064A276), the licensee submitted its OIP for SSES in response to Order EA-12-051. By letter dated June 17, 2013 (ADAMS Accession No. ML13163A003), the NRC staff sent a request for additional information (RAI) to the licensee. By letters dated July 3, 2013, August 26, 2013, February 27, 2014, August 27, 2014 and February 25, 2015 (ADAMS Accession Nos. ML13186A052, ML13240A215, ML14059A079, ML14239A527 and ML15057A035, respectively), the licensee submitted its RAI responses and first four six-month updates to the OIP. The NRC staff's

review of these submittals led to the issuance of the SSES ISE and RAI dated November 6, 2013 (ADAMS Accession No. ML13295A606). By letter dated March 26, 2014 (ADAMS Accession No. ML14083A620), the NRC notified all licensees and construction permit holders that the staff is conducting in-office and onsite audits of their responses to Order EA-12-051 in accordance with NRC NRR Office Instruction LIC-111, as discussed above.

The ongoing audits allow the staff to review open and confirmatory items from the mitigation strategies ISE, RAI responses from the spent fuel pool instrumentation (SFPI) ISE, the licensee's integrated plans, and other audit questions. Additionally, the staff gains a better understanding of submitted and updated information, audit information provided on ePortals, and preliminary Overall Program Documents/Final Integrated Plans while identifying additional information necessary for the licensee to supplement its plan and staff potential concerns.

In support of the ongoing audit of the licensee's OIPs as supplemented, the NRC staff conducted an onsite audit at SSES from December 8 - 11, 2014, per the audit plan dated November 24, 2014 (ADAMS Accession No. ML14323A680). The purpose of the onsite portion of the audit was to provide the NRC staff the opportunity to continue the audit review and gain key insights most easily obtained at the plant as to whether the licensee is on the correct path for compliance with the Mitigation Strategies and SFPI orders. The onsite activities included detailed analysis and calculation discussion, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, review of staging and deployment of offsite equipment, and review of installation details for SFPI equipment.

The enclosed audit report provides a summary of the activities for the onsite audit portion. Additionally, this report contains an attachment listing all open onsite audit items currently under NRC staff review.

T. Rausch

- 3 -

If you have any questions, please contact me at 301-415-3204 or by e-mail at John.Hughey@nrc.gov.

Sincerely,

A handwritten signature in black ink that reads "John D. Hughey". The signature is written in a cursive style with a large, stylized initial "J".

John D. Hughey, Project Manager  
Orders Management Branch  
Japan Lessons-Learned Division  
Office of Nuclear Reactor Regulation

Docket No.: 50-387 and 50-388

Enclosure:  
Audit report

cc w/encl: Distribution via Listserv



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

AUDIT REPORT BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO ORDERS EA-12-049 AND EA-12-051 MODIFYING LICENSES  
WITH REGARD TO REQUIREMENTS FOR  
MITIGATION STRATEGIES FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS  
AND RELIABLE SPENT FUEL POOL INSTRUMENTATION  
PPL SUSQUEHANNA, LLC  
SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2  
DOCKET NOS. 50-387 AND 50-388

BACKGROUND AND AUDIT BASIS

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design-Basis External Events" and Order EA-12-051, "Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation," (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML12054A736 and ML12054A679, respectively). Order EA-12-049 directs licensees to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool (SFP) cooling capabilities in the event of a beyond-design-basis external event (BDBEE). Order EA-12-051 requires, in part, that all operating reactor sites have a reliable means of remotely monitoring wide-range SFP levels to support effective prioritization of event mitigation and recovery actions in the event of a BDBEE. The orders require holders of operating reactor licenses and construction permits issued under Title 10 of the *Code of Federal Regulations* Part 50 to submit for review, Overall Integrated Plans (OIPs) including descriptions of how compliance with the requirements of Attachment 2 of each order will be achieved.

By letter dated February 28, 2013 (ADAMS Accession No. ML13060A357), PPL Susquehanna, LLC (PPL, the licensee) submitted its OIP for Susquehanna Steam Electric Station (SSES), Units 1 and 2, in response to Order EA-12-049. By letters dated August 26, 2013, February 28, 2014, August 27, 2014 and February 25, 2015 (ADAMS Accession Nos. ML13240A214, ML14062A061, ML14251A231 and ML15057A228, respectively), the licensee submitted its first four six-month updates to the OIP. By letter dated August 28, 2013 (ADAMS Accession No. ML13234A503), the NRC notified all licensees and construction permit holders that the staff is

Enclosure

conducting audits of their responses to Order EA-12-049 in accordance with NRC Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No. ML082900195). This audit process led to the issuance of the SSES interim staff evaluation (ISE) and audit report (ADAMS Accession No. ML13339A750) on January 24, 2014, and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13064A276), the licensee submitted its OIP for SSES in response to Order EA-12-051. By letter dated June 17, 2013 (ADAMS Accession No. ML13163A003), the NRC staff sent a request for additional information (RAI) to the licensee. By letters dated July 3, 2013, August 26, 2013, February 27, 2014, August 27, 2014 and February 25, 2015 (ADAMS Accession Nos. ML13186A052, ML13240A215, ML14059A079, ML14239A527 and ML15057A035, respectively), the licensee submitted its RAI responses and first four six-month updates to the OIP. The NRC staff's review of these submittals led to the issuance of the SSES ISE and RAI dated November 6, 2013 (ADAMS Accession No. ML13295A606). By letter dated March 26, 2014 (ADAMS Accession No. ML14083A620), the NRC notified all licensees and construction permit holders that the staff is conducting in-office and onsite audits of their responses to Order EA-12-051 in accordance with NRC NRR Office Instruction LIC-111, as discussed above.

The ongoing audits allow the staff to review open and confirmatory items from the mitigation strategies (MS) ISE, RAI responses from the spent fuel pool instrumentation (SFPI) ISE, the licensee's integrated plans, and other audit questions. Additionally, the staff gains a better understanding of submitted and updated information, audit information provided on ePortals, and preliminary Overall Program Documents (OPDs)/Final Integrated Plans (FIPs) while identifying additional information necessary for the licensee to supplement its plan and address staff potential concerns.

In support of the ongoing audit of the licensee's OIPs as supplemented, the NRC staff conducted an onsite audit at SSES from December 8 - 11, 2014, per the audit plan dated November 24, 2014 (ADAMS Accession No. ML14323A680). The purpose of the onsite portion of the audit was to provide the NRC staff the opportunity to continue the audit review and gain key insights most easily obtained at the plant as to whether the licensee is on the correct path for compliance with the MS and SFPI orders. The onsite activities included detailed analysis and calculation discussion, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, review of staging and deployment of offsite equipment, and review of installation details for SFPI equipment.

Following the licensee's declarations of order compliance, the NRC staff will evaluate the OIPs, as supplemented; the resulting site-specific OPDs/FIPs; and, as appropriate, other licensee submittals based on the requirements in the orders. For Order EA-12-049, the staff will make a safety determination using the Nuclear Energy Institute (NEI) developed guidance document NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Rev. 0, issued in August 2012 (ADAMS Accession No. ML12242A378), as endorsed, by NRC Japan Lessons-Learned Directorate (JLD) interim staff guidance (ISG) JLD-ISG-2012-01 "Compliance with Order EA-12-049, 'Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events'" (ADAMS Accession No. ML12229A174). For Order EA-12-051, the staff will make a safety determination using the NEI developed guidance document NEI 12-02, Revision 1, "Industry Guidance for Compliance with NRC Order

EA-12-051, 'To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation'" (ADAMS Accession No. ML12240A307), as endorsed, with exceptions and clarifications, by NRC ISG JLD-ISG-2012-03, "Compliance with Order EA-12-051, 'Reliable Spent Fuel Pool Instrumentation'" (ADAMS Accession No. ML12221A339), as providing one acceptable means of meeting the order requirements. Should the licensee propose an alternative strategy for compliance, additional staff review will be required to evaluate the alternative strategy in reference to the applicable order.

### AUDIT ACTIVITIES

The onsite audit was conducted at the SSES facility from December 8, 2014, through December 11, 2014. The NRC audit team staff was as follows:

<b>Title</b>	<b>Team Member</b>	<b>Organization</b>
Team Lead/Project Manager	John Hughey	NRR/JLD
Technical Support – Containment	Bruce Heida	NRR/JLD
Technical Support – Electrical	Matthew McConnell	NRR/JLD
Technical Support – Electrical	Duc Nguyen	NRR/JLD
Technical Support – Reactor Systems	Reed Anzalone	NRR/DSS
Technical Support – Balance of Plant	Michael Levine	NRR/JLD
Technical Support – SFPI	Stephen Wyman	NRR/JLD
Supplemental Support	Travis Daun	Region I/Resident Inspector

The NRC staff executed the onsite portion of the audit per the three part approach discussed in the November 24, 2014, plan, to include conducting a tabletop discussion of the site's integrated mitigating strategies compliance program, a review of specific technical review items, and discussion of specific program topics. Activities that were planned to support the above included detailed analysis and calculation discussions, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, staging and deployment of offsite equipment, and physical sizing and placement of SFPI equipment.

### AUDIT SUMMARY

#### 1.0 Entrance Meeting (December 8, 2014)

At the onsite audit entrance meeting, the NRC staff audit team introduced itself followed by introductions from the licensee's staff. The NRC audit team provided a brief overview of the audit's objectives and anticipated schedule.

#### 2.0 Integrated Mitigating Strategies Compliance Program Overview

Per the audit plan and as an introduction to the site's program, the licensee provided a presentation to the NRC audit team describing the site's strategies to meet the NRC orders. The licensee presented a review of its strategy to maintain core cooling, containment, and SFP cooling in the event of a BDBEE, and the plant modifications being done in order to implement the strategies. Also reviewed were the design and location of the storage facilities for the FLEX

equipment, the interface with the Strategic Alliance for FLEX Emergency Response (SAFER), and the SFPI modification.

### 3.0 Onsite Audit Technical Discussion Topics

Based on the audit plan, and with a particular emphasis on the Part 2 "Specific Technical Review Items," the NRC staff technical reviewers conducted interviews with licensee technical staff, site walk-downs, and detailed document reviews. A summary of the results of the technical reviews and discussions is provided below.

#### 3.1 Reactor Systems Technical Discussions and Walk-Downs

- a. NRC staff discussed the licensee's evaluations demonstrating that the amount of leakage from the reactor core isolation cooling (RCIC) pump seals is acceptable as well as the maximum expected RCIC room temperature.
- b. NRC staff reviewed the licensee's use of the Modular Accident Analysis Program (MAAP) and the licensee's documentation for applying MAAP.
- c. NRC staff reviewed the licensee's analyses and evaluations demonstrating that the collapsed reactor pressure vessel level remains above Top of Active Fuel and the reactor coolant system (RCS) cool down rate is within Technical Specifications limits.
- d. NRC staff reviewed the licensee's evaluations demonstrating that spray pond water is acceptable for long term use in reactor pressure vessel (RPV) direct injection, as well as SFP and suppression pool (SP) makeup.
- e. NRC staff performed plant walk-throughs of the mitigating strategies to provide core cooling and RCS inventory makeup, including portable pumping equipment, flow paths, and water storage locations.
- f. NRC staff reviewed the licensee's evaluations regarding SP temperature under extended loss of alternate current (ac) power (ELAP) conditions and the SSES calculations demonstrating that adequate net positive suction head (NPSH) remains available to support RCIC operation under the conditions described in the baseline coping strategy.
- g. NRC staff reviewed the licensee's evaluations regarding the licensee's ability to swap RCIC suction for the condensate storage tank (CST) to the SP should the CST become unexpectedly unavailable. NRC staff reviewed the licensee's calculations demonstrating that successful transfer of RCIC suction from the CST to the SP was a viable option.
- h. NRC staff reviewed the SSES FLEX coping time evaluation in relation to the application of the MAAP analysis for SSES. NRC staff reviewed the licensee's calculations that integrated time constraints in the SSES OIP.

- i. NRC staff reviewed SSES evaluations stating that modifications to RCIC were demonstrated to be unnecessary to support operation at the maximum temperature experienced during an ELAP.
- j. NRC staff reviewed SSES evaluations regarding the use of raw water sources for mitigating an ELAP event. SSES procedures direct that operators flood over the reactor vessel steam separator level in the event that raw water is used for direct vessel injection, so as to preclude adverse impact from any debris.

### 3.2 Balance of Plant Technical Discussions and Walk-Downs

- a. The licensee's strategy to accomplish RCS cool down and depressurization relies on the containment instrument gas (CIG) system to operate the RCS safety relief valves. The CIG system includes a 90 pounds-per-square-inch pressure header portion that the licensee originally stated was non-safety related, but was seismically robust. During the onsite audit, NRC staff questioned the licensee's conclusions and the licensee determined that documentation did not exist to support the seismic robustness of the portion of the CIG system in question. The licensee issued corrective action item CR-2014-37566 in the SSES corrective action program to track the development of the necessary seismic qualification evaluation. NRC staff closed the associated audit item to SSES corrective action item CR-2014-37566.
- b. NRC staff reviewed SSES calculations and evaluations associated with refueling FLEX equipment that demonstrate the adequacy of the licensee's strategy.
- c. NRC staff reviewed the licensee's strategy for mitigating internal flooding from large non-seismic piping. The licensee has not analyzed internal flooding from large non-seismic piping within the Reactor Building. The licensee issued corrective action item CR-2014-37444 to track the completion of an evaluation of internal flooding hazards and take actions as necessary to mitigate any impacts on the FLEX implementation strategies. NRC staff closed the associated audit item to SSES corrective action item CR-2014-37444.
- d. NRC staff reviewed the licensee's hydraulic analysis modeling the FLEX equipment utilized in the flow paths from the ultimate heat sink (UHS) to the RPV, SP, and the SFP. NRC staff reviewed the calculations that had been developed to demonstrate that the SSES FLEX pumps are capable of delivering the required flow and the anticipated pressure at each end point location.
- e. NRC staff walked down the deployment areas for diesel-powered FLEX equipment. The licensee stated that this equipment will be deployed to outside locations with adequate space for air intake and exhaust.
- f. NRC staff reviewed the licensee's strategy for addressing the loss of heat tracing and the potential for pipe freezing. The licensee stated that with the exception of the engineered safeguards service water (ESSW) pump house, no piping or instrument lines required for FLEX strategies are subject to freezing. The licensee's strategy will deploy heaters to the ESSW pump house to ensure inside temperatures remain above freezing.



- g. NRC staff reviewed the licensee's strategy for providing cooling water to the RCIC lube oil cooler that demonstrates that the use of the fire protection water system in Phase 1 of an ELAP is appropriate.
- h. NRC staff reviewed and walked down equipment used to support the SSES FLEX mitigating strategies and focused on non-safety related equipment credited in FLEX strategies. As part of the review, the licensee stated that parts of the RCIC system are non-safety related but are seismically qualified and protected from all applicable hazards such that use of this equipment was appropriate to support implementation of the FLEX strategies.
- i. NRC staff reviewed the licensee's FLEX strategy for shutdown and refueling modes which states that a robust water source, the SSES spray pond, would be used for core cooling during these modes.
- j. NRC staff reviewed SSES draft FLEX procedures that demonstrate that residual heat removal (RHR) pump motor cooling will be provided before the RHR pumps are put in operation. NRC staff also reviewed calculations demonstrating that the FLEX pumper trucks can provide sufficient pressure and flow to supply the RHR motor coolers.
- k. NRC staff reviewed the licensee's strategy for venting the SFP area. During the review the licensee stated that even though the SFP area will be vented, significant condensation will accumulate in the associated sump room. The NRC staff further reviewed the licensee's planned actions to ensure that the sump room can be dewatered before there is any impact to the FLEX strategies.
- l. NRC staff reviewed the licensee's strategy for providing cooling flow to the RPV and SFP from the spray pond, which is the licensee's UHS. The staff questioned the useable volume of the UHS with the design-basis ice thickness on the spray pond. The licensee verified the adequacy of the resulting usable water volume of the UHS.
- j. NRC staff reviewed the licensee's strategy for providing an indefinite source of cooling water for RPV injection and SFP cooling.

### 3.3 Electrical Technical Discussions and Walk-Downs

- a. NRC staff reviewed the SSES FLEX strategy related to protection of installed electrical equipment when connected to FLEX electrical generators. The NRC staff reviewed documentation supporting that the licensee has completed the analytical modeling verifying that plant equipment parameters will be maintained including assuring adequate voltage to all Motor Control Centers required for phase 2. In addition, the documentation demonstrated that electrical bus and cable ratings were verified to not be exceeded. The licensee issued corrective action item CR-2014-37451 to track the completion of documentation verifying that the mitigation strategy for Phase 3 will prevent damage to installed electrical equipment when energized by the FLEX electrical generator. NRC staff closed the associated audit item to SSES corrective action item CR-2014-37451.

- b. NRC staff reviewed the licensee's sizing calculations for FLEX generators demonstrating that they can supply the electrical loads assumed in phases 2 and 3 of an ELAP event. The licensee also issued corrective action item CR-2014-37450 to track SSES participation in an industry-developed analytical transient model for the Turbine Marine Generator and then apply the model to SSES specific applications. NRC staff closed the associated audit item to SSES corrective action item CR-2014-37450.
- c. NRC staff reviewed SSES battery room ventilation calculations demonstrating that hydrogen accumulation will be prevented while recharging the batteries in phase 2 or 3.
- d. NRC staff reviewed summaries of the results, conclusions, and key assumptions of the licensee's battery calculations. NRC staff reviewed these summaries regarding the adequacy of the capacity and capability of the vital batteries to supply direct current (dc) power to the required loads during the first phase of the Susquehanna FLEX mitigation strategies plan for an ELAP as a result of a BDBEE. NRC staff also walked down the load shedding procedures with the licensee to demonstrate that load shedding can be completed within the time assumed in the associated analysis. The licensee indicated to the NRC staff that it uses the station blackout (SBO) load shed procedures during a SBO prior to an ELAP event. The NRC staff reviewed the SSES dc system capacity and capability to power the loads required to mitigate the consequences during the first phase of an ELAP as a result of a BDBEE and the licensee's documentation demonstrating that the necessary load shedding can reasonably be accomplished within the times assumed in the associated analysis.
- e. NRC staff reviewed SSES SBO procedures regarding the guidance on how to connect portable instrumentation when the primary instrumentation is unavailable.
- f. NRC staff walked down the electrical supply pathway (i.e., cable routing) and connection points. NRC staff reviewed the licensee's provisions for adequate electrical isolation between FLEX electrical (non-Class 1E) systems and Class 1E systems.
- g. NRC staff reviewed the licensee's strategy for venting hydrogen from the turbine generator. The instructions to accomplish this activity will be located in SSES SBO procedures.

#### 3.4 SFPI Technical Discussions and Walk-Downs

- a. NRC staff reviewed licensee documentation confirming that plant environmental conditions during an ELAP are consistent with the performance capabilities of SSES SFPI components.
- b. NRC staff confirmed that the ac and dc power sources for SFPI components are specified in the associated calculations and FLEX plant change package.
- c. During the onsite SFPI walkdown, NRC staff reviewed the SSES SFPI design provisions for Electro Magnetic Compatibility compliance.

3.5 Containment and Ventilation Discussions and Walk-Downs

- a. NRC staff reviewed calculations associated with the SSES refueling floor ventilation strategy and confirmed that the assumptions and inputs were reasonable to ensure that the SFP area was adequately addressed.
- b. NRC staff confirmed that the licensee had completed evaluations demonstrating that the suppression pool will not be adversely impacted when operated in accordance with the plan.
- c. NRC staff reviewed calculations associated with maintaining control room habitability during ELAP conditions and determined that the assumptions, inputs and conclusion were reasonable.
- d. NRC staff reviewed the SSES evaluation that justifies that the parameter values used when making the decision to vent containment are adequate for determining the plant states and that these plant states are consistent with analytical assumptions used in containment analyses.
- e. NRC staff reviewed the labeling of SSES essential instrumentation for monitoring containment conditions.
- f. NRC staff confirmed that SSES calculations and procedures address the effect of high area temperatures resulting from the loss of ventilation systems during an ELAP on Engineered Safety Features and other interlocks and automatic actuations and isolations.
- g. NRC staff reviewed the licensee's evaluations demonstrating the adequacy of the ventilation provided in the battery room to protect the batteries from the effects of extreme high and low temperatures.
- h. NRC staff reviewed the licensee's strategy regarding anticipatory containment venting. The licensee stated that SSES is adopting Revision 3 of the Boiling Water Reactor Owners Group (BWROG) Emergency Procedure Guideline (EPG)/Severe Accident Guideline (SAG) to implement the procedure changes necessary to accomplish anticipatory containment venting.

3.6 Other Technical Discussion Areas and Walk-Downs

- a. NRC staff walked down the SSES FLEX storage building, FLEX deployment paths and NSRC staging area B, as well as the helicopter landing pad. The FLEX building is designed to protect against all applicable BDBEE hazards and is sized to store the full N+1 compliment of portable FLEX equipment including equipment for debris removal that will be capable of moving large debris. The FLEX storage building incorporates a stand-alone diesel generator to power the building HVAC systems. The FLEX storage building is located inside the protected area (PA) and the licensee has developed analyses to demonstrate that staging areas and deployment paths will not be impacted by flooding or liquefaction. Additional debris removal equipment is being evaluated for

placement in the FLEX building such as chain saws, demolition saws, and other tools including equipment to deal with downed power lines. Corrective action item CR-2014-37387 was initiated to track completion of the debris removal equipment evaluation and implementation. NRC staff closed the associated audit item to SSES corrective action item CR-2014-37387.

- b. NRC staff reviewed the licensee's provided letter of agreement from the Pennsylvania Emergency Management Agency dated November 13, 2014, acknowledging cooperation with SSES regarding the transportation of emergency equipment to the site for a beyond design basis event. NRC staff also reviewed the licensee's letter of agreement from the Wilkes-Barre/Scranton International Airport regarding the receipt and staging of emergency equipment.
- c. NRC staff reviewed the SSES plant communications strategy during an ELAP.
- d. NRC staff discussed the plans and procedures to ensure control of personnel and equipment access to the PA and access to security doors in the power block during ELAP conditions.
- e. NRC staff discussed the licensee's FLEX equipment maintenance and testing program. Portable FLEX equipment is being procured under the plant engineering change process which includes programmatic actions to develop and implement preventative maintenance tasks for the equipment. In addition, corrective action item CR-2014-37460 was initiated to track the development and implementation of preventative maintenance tasks associated with FLEX portable equipment. NRC staff closed the associated audit item to SSES corrective action item CR-2014-37460.
- f. NRC staff walked down the B staging area which is large open area near the South Gate (primary PA access) that will accommodate the equipment delivered from the Regional Response Center (RRC). The FLEX storage building will store debris removal equipment including a front-end loader that will be capable of moving large debris, such as vehicles, out of the B staging area. NRC staff also walked down the helicopter landing site and found it to be open and adequate to accommodate receipt of FLEX equipment via helicopter transport.
- g. NRC staff reviewed the incorporation of human factors considerations into the FLEX deployment strategies.
- h. NRC staff walked down the FLEX pump deployment strategy, including the spray pond, pump house, pump staging location, the pumper trucks and pond FLEX suction strainers. NRC staff questioned the operators' ability to clean off a suction strainer while continuing to operate the pumper truck. As a result, the licensee initiated corrective action item CR-2014-37554 to modify the pumper truck strategy such that either strainer can be isolated and cleaned off if it becomes clogged. NRC staff closed the associated audit item to SSES corrective action item CR-2014-37554.
- i. NRC staff reviewed Draft (Rev. B) of the SSES FLEX OPD.

- j. NRC staff discussed the SSES FLEX training activities. The FLEX training program at Susquehanna is still in the development stage. The licensee initiated corrective action item CR-2014-37493 with assigned actions to ensure that FLEX related simulator changes are evaluated and implemented as well training for the Emergency Response Organization, Operations, Security, Effluents and other SSES work groups. NRC staff closed the associated audit item to SSES corrective action item CR-2014-37493.
- k. NRC staff reviewed the SSES Draft SAFER Response Plan and noted that it contained transportation methods and routes as identified in Section 4 and 5. Chapter 7 of the playbook provides the NSRC equipment list for SSES.

#### 4.0 Exit Meeting (December 11, 2014)

The NRC staff audit team conducted an exit meeting with licensee staff following the closure of onsite audit activities. The NRC staff highlighted the staff's onsite reviews and discussions and noted that all SSES FLEX audit items had been closed.

#### CONCLUSION

The NRC staff completed all three parts of the November 24, 2014, onsite audit plan. Each audit item listed in Part 2 of the plan was reviewed by NRC staff members while on site. In addition to the list of NRC and licensee onsite audit staff participants in Attachment 1, Attachment 2 provides a list of documents reviewed during the onsite audit portion.

In support of the continuing audit process the licensee proceeds towards orders compliance for this site and the NRC staff is continuing evaluations in anticipation of issuance of a combined safety evaluation for both the MS and SFPI orders. The five sources for the audit items discussed in this report are as follows:

- a. ISE Open Items (OIs) and Confirmatory Items (CIs)
- b. Audit Questions (AQs)
- c. Licensee-identified OIP OIs
- d. SFPI RAIs
- e. Additional Safety Evaluation (SE) needed information

The attachments provide audit information as follows:

- a. Attachment 1: List of NRC staff and licensee staff audit participants
- b. Attachment 2: List of documents reviewed during the onsite audit

While this report notes the completion of the onsite portion of the audit per the audit plan dated November 24, 2014, the ongoing audit process continues as per the letters dated August 28, 2013, and March 26, 2014, to all licensees and construction permit holders for both orders.

Additionally, the status and progress of the NRC staff's review may change based on licensee plan changes, resolution of generic issues, and other NRC staff concerns not previously documented. Changes in the NRC staff review will be communicated in the ongoing audit process.

**Attachments:**

1. NRC and Licensee Staff Onsite Audit Participants
2. Onsite Audit Documents Reviewed

## Onsite Audit Participants

### NRC Staff:

John Hughey	NRR/JLD/JOMB
Bruce Heida	NRR/JLD/JCBB
Matthew McConnell	NRR/JLD/JERB
Michael Levine	NRR/JLD/JCBB
Reed Anzalone	NRR/DSS/SRXB

Stephen Wyman	NRR/JLD/JERB
Duc Nguyen	NRR/JLD/JERB
Travis Daun	Region I/Resident Inspector

### SSES Staff:

Phil Brady	Design Engineering - Electrical
Joseph Brendlen	Worley-Parsons Project Lead
Rich Centenaro	Design Engineering - Lead Mechanical
Mark Chaiko	FLEX Core Team
Mike Crowthers	FLEX Responsible Manager
Kevin Daly	Project Management
Jeff Dills	Core Team
Tom Dolan	Engineering Project Management
John Emmett	Core Team
Brian Frymyer	Design Engineering - Mechanical
Bill Gettel	Design Engineering - Civil/Structural
Patrick Gilligan	Core Team
Chuck Himmelberger	Worley-Parsons Site Lead
Ken Klass	Procedures
Curt Kramer	Design Engineering - Instrumentation and Controls/Electrical
Charlie Manges	Regulatory Affairs
Mike McCullough	Design Engineering - Electrical
Paul Nederostek	Field Project Manager
Tim Page	Regulatory Affairs
Ken Potter	Project Cost Estimator
Dan Reinsmith	Design Engineering - Civil Lead
John Rothe	Design Engineering - Electrical
Todd Swoyer	Design Engineering - Seismic Lead
Gary Treven	Design Engineering - Instrumentation and Controls/Electrical Supervisor
Betsy Walser	Project Administration Support
Jim Williams	Operations Support
Mike Verazin	Security Shift Supervisor

## Documents Reviewed

- Calculation EC-050-1032, "Evaluate RCIC pump operation during Extended Station Blackout Conditions, as defined in the Baseline Coping Strategy for NRC Order EA-12-049 – Mitigating Strategies," Rev. 0.
- Calculation EC-088-0526, "Battery Room Hydrogen Generation," Rev. 3.
- Calculation EC-RISK-1189, "Soil Liquefaction Evaluation for SAFER-RRC FLEX Equipment Staging Areas and Pathways," Rev 0.
- Calculation EC-012-6122, "Refuel Floor Venting during Extended Loss of AC Power Event," Rev. 0.
- Calculation EC-SBOR-0504, "Reactor Building Heat-up Analysis During Station Blackout," Rev. 6.
- Calculation EC-SBOR-0505, "Calculation of HPCI [high pressure core injection] and RCIC Room Temperatures During Station Blackout," Rev. 6.
- Calculation EX-FLEX-007, "Fukushima Battery 2D610 Coping Time for ELAP," Rev. 0.
- Calculation EC-FLEX-0008, "Fukushima Battery 2D620 Coping Time for ELAP," Rev. 0.
- Calculation EC-FLEX-0009, "Fukushima Battery 2D630 Coping Time for ELAP," Rev. 0.
- Calculation EC-FLEX-0010, "Fukushima Battery 2D630 Coping Time for ELAP," Rev. 0.
- Calculation EC-FLEX-0011, "Fukushima Battery 2D630 Coping Time for ELAP," Rev. 0.
- Calculation EC-FLEX-0012, "Fukushima Battery 2D630 Coping Time for ELAP," Rev. 0.
- Calculation EC-FLEX-0015, "Fukushima Flex Generators – Phase 2 Load Flow Analysis," Rev. 0.
- Calculation EC-FLOD-1002 "Impact of Postulated Flooding from Rupture of Cooling Tower Basin Circulating Water in Turbine Building, U1 & U2 and RWST [refueling water storage tank]," Rev. 2.
- Calculation EC-013-1896, "Performance Requirements for Portable Diesel Driven Pump in Support of FLEX Mitigation Strategies, NRC Order EA-12-049," Rev. 0.
- Calculation EC-016-1043, "Flow Model of UHS Cooling Water Supply to Support Phase II and III FLEX Mitigation Strategy Plan," Rev. 0.
- Calculation EC-030-1006, "Control Structure Temperature Response to a Station Blackout or Fire Induced Loss of Control Structure HVAC [heating ventilation and cooling]," Rev. 13.
- Procedure DC-FLEX-002, "Debris Removal From FLEX Deployment Paths," Draft.
- Procedure DC-FLEX-003, "Deployment For FLEX Strategies," Draft.
- Procedure SI-SO-003, "Duties and Responsibilities of Access Control Officer," Rev. 36, Attachment C.
- Procedure NS-SSP-002, "Control, Issuance and Assignment of Security Controlled Locks and Keys," Rev. 15.
- Procedure EO-000-102, "RPV Control," Rev. 11.
- Procedure EO-100-030, "Unit 1 Response to Station Blackout," Rev. 29.



- Procedure EO-200-030, "Unit 2 Response to Station Blackout," Rev. 25.
- Procedure NDAP-QA-1220, "Engineering Change Process," Rev. 9.
- Procedure "Engineering Change Process Handbook," Rev. 21.
- SSES Unit 1 Drawing No. J-653, Sh. 21 (A-103785, Sh. 21), "CST Level Settings Diagrams," Rev 6.
- SSES Unit 1 Drawing No. FF129010, Sh. 90204, "RCIC System," Rev 11.
- SSES Unit 2 Drawing No. D107303, Sh. 29,"Schematic Diagram RCIC PP Suction from Suppression Pool Valve HV-E51-2F031," Rev 18.
- SSES Unit 2 Drawing No. D107303, Sh. 30, "RCIC Pump Suction from Condensate Tank Valve HV-E51-2F010," Rev 13.
- SSES Unit 2 Drawing No. FF129010, Sh. 90210, "RCIC System," Rev 9.
- SSES Fukushima Training Plan, Rev. 4.
- SSES SAFER Response Plan, Draft.
- Specification 13.006-083956-1, Section 083956, "Tornado/Missile Resistant Sliding Door," Rev. 1.
- Westinghouse LTR-AEO-12-0004, "Susquehanna Steam Electric Station FLEX Coping Time Evaluation," Rev. 2.

T. Rausch

- 3 -

If you have any questions, please contact me at 301-415-3204 or by e-mail at John.Hughey@nrc.gov.

Sincerely,

*/RA/*

John D. Hughey, Project Manager  
Orders Management Branch  
Japan Lessons-Learned Division  
Office of Nuclear Reactor Regulation

Docket No.: 50-387 and 50-388

Enclosure:  
Audit report

cc w/encl: Distribution via Listserv

DISTRIBUTION:

PUBLIC  
JOMB R/F  
RidsNrrDorlLpl 1-2Resource  
RidsNrrPMSusquehanna Resource  
RidsNrrLASLent Resource  
BPham, NRR/JLD

RidsRgn1MailCenter Resource  
JHughey, NRR/JLD  
MHalter, NRR/JLD  
RidsAcrcAcnw\_MailCTR Resource  
SBailey, NRR/JLD

**ADAMS Accession No. ML15089A123**

**\*via email**

OFFICE	NRR/JLD/JOMB/PM	NRR/JLD/LA	NRR/JLD/JCBB/BC	NRR/JLD/JERB/BC
NAME	JHughey	SLent	SBailey	SWhaley
DATE	03/31/15	03/30/15	03/31/15	03/31/15
OFFICE	NRR/JLD/JOMB/BC(A)	NRR/DORL/LPL1-2/PM	NRR/JLD/JOMB/PM	
NAME	MHalter	JWhited	JHughey	
DATE	04/06/15	03/31/15	04/13/15	

**OFFICIAL AGENCY RECORD**