



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

May 13, 2011

Mr. Timothy S. Rausch
Senior Vice President and Chief Nuclear Officer
PPL Susquehanna, LLC
769 Salem Boulevard, NUCSB3
Berwick, PA 18603

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION – NRC TEMPORARY
INSTRUCTION 2515/183 INSPECTION REPORT 05000387/2011008 AND
05000388/2011008

Dear Mr. Rausch:

On April 28, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Susquehanna Steam Electric Station (SSES), using Temporary Instruction 2515/183, "Followup to the Fukushima Daiichi Nuclear Station Fuel Damage Event." The enclosed inspection report documents the inspection results which were discussed on April 28, 2011, with you and other members of your staff.

The objective of this inspection was to promptly assess the capabilities of the Susquehanna Steam Electric Station to respond to extraordinary consequences similar to those that have recently occurred at the Japanese Fukushima Daiichi Nuclear Station. The results from this inspection, along with the results from this inspection performed at other operating commercial nuclear plants in the United States will be used to evaluate the United States nuclear industry's readiness to safely respond to similar events. These results will also help the NRC to determine if additional regulatory actions are warranted.

All of the potential issues and observations identified by this inspection are contained in this report. The NRC's Reactor Oversight Process will further evaluate any issues to determine if they are regulatory findings or violations. Any resulting findings or violations will be documented by the NRC in a separate report. You are not required to respond to this letter.

T. Rausch

2

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Sincerely,

A handwritten signature in cursive script that reads "Lawrence T. Doerflein".

Lawrence T. Doerflein, Chief
Engineering Branch 2
Division of Reactor Safety

Docket Nos.: 50-387; 50-388
License Nos.: NPF-14, NPF-22

Enclosure: Inspection Report 05000387/2011008 and 05000388/2011008

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T. Rausch

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Sincerely,

/RA/

Lawrence T. Doerflein, Chief
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T. Rausch

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U. S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No: 50-387, 50-388

License No: NPF-14, NPF-22

Report No: 05000387/2011008 and 05000388/2011008

Licensee: PPL Susquehanna, LLC

Facility: Susquehanna Steam Electric Station, Units 1 and 2

Location: Berwick, Pennsylvania

Dates: March 23, 2011 through April 28, 2011

Inspectors: P. Finney, Senior Resident Inspector
J. Greives, Resident Inspector

Approved by: Lawrence T. Doerflein, Chief
Engineering Branch 2
Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000387/2011008 and 05000388/2011008; 03/23/2011 – 04/28/2011; Susquehanna Steam Electric Station, Units 1 and 2; Temporary Instruction 2515/183 - Followup to the Fukushima Daiichi Nuclear Station Fuel Damage Event.

This report covers an announced Temporary Instruction (TI) inspection. The inspection was conducted by two resident inspectors. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

INSPECTION SCOPE

The intent of the TI is to provide a broad overview of the industry's preparedness for events that may exceed the current design basis for a plant. The focus of the TI was on (1) assessing the licensee's capability to mitigate consequences from large fires or explosions on site, (2) assessing the licensee's capability to mitigate station blackout (SBO) conditions, (3) assessing the licensee's capability to mitigate internal and external flooding events accounted for by the station's design, and (4) assessing the thoroughness of the licensee's walkdowns and inspections of important equipment needed to mitigate fire and flood events to identify the potential that the equipment's function could be lost during seismic events possible for the site. If necessary, a more specific followup inspection will be performed at a later date.

INSPECTION RESULTS

All of the potential issues and observations identified by this inspection are contained in this report. The NRC's Reactor Oversight Process will further evaluate any issues to determine if they are regulatory findings or violations. Any resulting findings or violations will be documented by the NRC in a separate report.

03.01 Assess the licensee's capability to mitigate conditions that result from beyond design basis events, typically bounded by security threats, committed to as part of NRC Security Order Section B.5.b issued February 25, 2002, and severe accident management guidelines and as required by Title 10 of the Code of Federal Regulations (10 CFR) 50.54(hh). Use Inspection Procedure (IP) 71111.05T, "Fire Protection (Triennial)," Section 02.03 and 03.03 as a guideline. If IP 71111.05T was recently performed at the facility the inspector should review the inspection results and findings to identify any other potential areas of inspection. Particular emphasis should be placed on strategies related to the spent fuel pool. The inspection should include, but not be limited to, an assessment of any licensee actions to:

Licensee Action	Describe what the licensee did to test or inspect equipment.
<p>a. Verify through test or inspection that equipment is available and functional. Active equipment shall be tested and passive equipment shall be walked down and inspected. It is not expected that permanently installed equipment that is tested under an existing regulatory testing program be retested.</p> <p>This review should be done for a reasonable sample of mitigating strategies/equipment.</p>	<p>PPL verified through testing, inspections, and walkdowns their capability to mitigate conditions that result from beyond design basis events. The actions completed for this effort included reviews, walkdowns, confirmation of equipment staging and testing of non-plant equipment for the station Extensive Damage Mitigation Guidelines (EDMGs), supporting Damage Control (DC) Procedures for B.5.b, and those Off Normal Procedures (ON) used under B.5.b.</p> <p>Additionally, the Emergency Operations Procedures (EOPs), Emergency Support (ES) Procedures, and supporting Off Normal (ON) Procedures that support implementation of the Severe Accident Management Guidelines (SAMGs) were reviewed. All necessary equipment used to implement these procedures was field-verified utilizing the organizations (Operations, Mechanical Maintenance, Instrument and Control (I&C), Electrical Maintenance, Chemistry, and Effluents Fire Brigade) that would perform the actions during an event.</p> <p>Describe inspector actions taken to confirm equipment readiness (e.g., observed a test, reviewed test results, discussed actions, reviewed records, etc.).</p> <p>The inspectors assessed PPL's capabilities by conducting a review of their walkdown and testing activities. Additionally, the inspectors independently walked down and inspected equipment, both plant and non-plant, associated with all major B.5.b strategies, with particular emphasis on those strategies related to the spent fuel pools.</p>

	<p>To assess the equipment credited for use by the SAMGs, the inspectors walked down plant equipment associated with venting the primary containment, both remotely and locally. Additionally, the inspectors field-verified equipment, both plant and non-plant, necessary to flood the reactor pressure vessel (RPV) and primary containment.</p>
	<p>Discuss general results including corrective actions by licensee.</p>
	<p>All equipment designated for use by the B.5.b strategies or SAMGs was verified as being available for use with one exception:</p> <p>During a procedure walkdown of the ability to perform EP-PS-115, Tab K, Chemistry identified that a critical action to determine primary containment drywell H₂, O₂ and N₂ concentrations based on a sample of DW atmosphere, could not be completed due to a failed plant component. This failure of the Post Accident Sampling System (PASS) was discovered in January 2011 during a routine surveillance and is scheduled to be repaired in July 2011 (Reference AR/CR 1341360 / PCWO 1341827).</p> <p>Additionally, numerous vulnerabilities and enhancements were identified by PPL and the inspectors. The inspectors concluded that the equipment was available and functional, and that none of the identified issues would prevent PPL from responding to beyond design basis events as specified in the B.5.b strategies or SAMGs. Documents reviewed by the inspectors, including specific condition reports (CRs), are listed in the Supplemental Information Attachment to this report.</p>
<p>Licensee Action</p>	<p>Describe the licensee's actions to verify that procedures are in place and can be executed (e.g. walkdowns, demonstrations, tests, etc.).</p>

<p>b. Verify through walkdowns or demonstration that procedures to implement the strategies associated with B.5.b and 10 CFR 50.54(hh) are in place and are executable. Licensees may choose not to connect or operate permanently installed equipment during this verification.</p> <p>This review should be done for a reasonable sample of mitigating strategies/equipment.</p>	<p>PPL verified through reviews and field walkdowns that the station EDMGs, supporting DC procedures for B.5.b and those ON procedures used under B.5.b were in-place and executable with four exceptions. Two B.5.b strategies were unable to be field verified due to being in a high radiation area or requiring a unit outage to complete. Plant Component Work Orders (PCWOs) were generated to track completion of these field verifications at the next available opportunity.</p> <p>Additionally, reviews and walkdowns were performed to verify that the station procedures required for implementation of the SAMGs were in-place and executable. All field walkdowns were performed by organizations that would be expected to perform the required actions during an event.</p>
	<p>Describe inspector actions and the sample strategies reviewed. Assess whether procedures were in place and could be used as intended.</p>
	<p>The inspectors assessed PPL's capabilities by conducting a review of their walkdown activities and reviewing all deficiencies, vulnerabilities, or enhancements entered into the corrective action program (CAP). In addition, the inspectors independently verified the availability of all required procedures and walked down selected procedures to assess the adequacy of PPL's actions. Specific procedural walkdowns included all major B.5.b strategies, with specific emphasis on those related to the spent fuel pools, as well as primary containment venting and RPV and primary containment flooding.</p>
	<p>Discuss general results including corrective actions by licensee.</p>
	<p>The inspectors concluded that all required procedures were in place and executable, and did not identify any issues that would prevent PPL's ability to respond to beyond design basis events. All documents reviewed by the inspectors, including CRs for vulnerabilities and enhancements identified through procedure reviews and field walkdowns, are listed in the Supplemental Information Attachment to this report.</p>

Licensee Action	Describe the licensee's actions and conclusions regarding training and qualifications of operators and support staff.
<p>c. Verify the training and qualifications of operators and the support staff needed to implement the procedures and work instructions are current for activities related to Security Order Section B.5.b and severe accident management guidelines as required by 10 CFR 50.54 (hh).</p>	<p>PPL reviewed all training requirements and records for Operations, Fire Brigade, and B.5.b pumper operators that were required to implement B.5.b strategies. PPL documented that all individuals were found to be qualified and that no gaps existed in the training program or documentation reviewed.</p>
	<p>Describe inspector actions and the sample strategies reviewed to assess training and qualifications of operators and support staff.</p>
	<p>The inspectors reviewed PPL's actions to assess the training and qualifications of personnel needed to implement B.5.b strategies. In addition, the inspectors independently verified that personnel qualifications were current and that periodic training was appropriate for implementation of B.5.b strategies and SAMGs.</p>
	<p>Discuss general results including corrective actions by licensee.</p>
	<p>All personnel required to implement the B.5.b strategies and SAMGs were found to have current qualifications. Additionally, qualification and periodic training material was determined to be adequate. The inspectors reviewed all training enhancements that were identified, both by PPL and the inspectors, and concluded that none of the enhancements would have prevented PPL from responding to beyond design basis events. All documents reviewed by the inspectors, including CRs describing specific enhancements, are listed in the Supplemental Information Attachment to this report.</p>

Licensee Action	Describe the licensee's actions and conclusions regarding applicable agreements and contracts are in place.
<p>d. Verify that any applicable agreements and contracts are in place and are capable of meeting the conditions needed to mitigate the consequences of these events.</p> <p>This review should be done for a reasonable sample of mitigating strategies/equipment.</p>	<p>PPL reviewed the Letters of Agreement with off-site agencies as required by Rev. 53 of the SSES Emergency Plan. PPL found that all of the agreements required were current, in place, and capable of meeting the conditions needed to mitigate the consequences of the events described in this Temporary Instruction. In addition, PPL confirmed that each off-site agency was in receipt of the current Letters of Agreement and were still capable of meeting the terms.</p>
	<p>For a sample of mitigating strategies involving contracts or agreements with offsite entities, describe inspector actions to confirm agreements and contracts are in place and current (e.g., confirm that offsite fire assistance agreement is in place and current).</p>
	<p>The inspectors assessed PPL's capabilities by conducting an independent review of the Letters of Agreement with the Berwick Volunteer Fire Company and Nanticoke Fire Department. Additionally, the inspectors interviewed personnel and walked down equipment at the Berwick Volunteer Fire Company to ensure they were aware of the current Letter of Agreement and that equipment met the requirements specified in the applicable B.5.b strategy.</p>
	<p>Discuss general results including corrective actions by licensee.</p>
	<p>PPL did not identify any deficiencies. The inspectors also determined that all Letters of Agreement necessary to implement the applicable B.5.b strategies were current. Additionally, all equipment necessary for implementation of the strategies was found to be adequate. All documents that were reviewed by the inspectors are listed in the Supplemental Information Attachment to this report.</p>

<p>Licensee Action</p>	<p>Document the corrective action report number and briefly summarize problems noted by the licensee that have significant potential to prevent the success of any existing mitigating strategy.</p>
<p>e. Review any open corrective action documents to assess problems with mitigating strategy implementation identified by the licensee. Assess the impact of the problem on the mitigating capability and the remaining capability that is not impacted.</p>	<p>The inspectors reviewed each CR for potential impact to PPL's mitigation strategies. The inspectors concluded none of the identified deficiencies, vulnerabilities, or enhancements had significant potential to prevent the success of any existing mitigating strategy. The CRs reviewed by the inspectors are listed in the Supplemental Information Attachment to this report.</p>

03.02 Assess the licensee's capability to mitigate station blackout (SBO) conditions, as required by 10 CFR 50.63, "Loss of All Alternating Current Power," and station design, is functional and valid. Refer to TI 2515/120, "Inspection of Implementation of Station Blackout Rule Multi-Plant Action Item A-22" as a guideline. It is not intended that TI 2515/120 be completely reinspected. The inspection should include, but not be limited to, an assessment of any licensee actions to:

<p>Licensee Action</p>	<p>Describe the licensee's actions to verify the adequacy of equipment needed to mitigate an SBO event.</p>
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<p>a. Verify through walkdowns and inspection that all required materials are adequate and properly staged, tested, and maintained.</p>	<p>PPL conducted tests, inspections, and walkdowns of the implementing procedures to verify attendant equipment and tools necessary to mitigate an SBO were properly staged and functional. PPL ran the SBO Diesel Generator (DG) under loaded conditions for one hour and verified that associated equipment was sufficient to be connected per procedures to identified motor control centers (MCCs).</p>
	<p>Describe inspector actions to verify equipment is available and useable.</p>
	<p>The inspectors assessed PPL's capabilities by conducting a review of PPL's walkdown activities and reviewing all deficiencies, vulnerabilities, or enhancements entered into the corrective action program (CAP). In addition, the inspectors independently verified the adequacy of PPL's actions by performing walkdowns of equipment in the field pertaining to an SBO. Specifically, the inspectors walked down the cross-tie of the residual heat removal (RHR) system to the RHR service water (RHRSW) system and the use of fire protection system water to cool the reactor core isolation cooling (RCIC) pump lube oil cooler. The inspectors verified that required equipment was also staged for bypassing the high pressure coolant injection (HPCI) turbine pump high exhaust pressure trip and HPCI high drywell pressure initiation signals. Lastly, the inspectors observed the loaded run of the SBO DG.</p>
	<p>Discuss general results including corrective actions by licensee.</p>

	<p>All equipment designated for use to respond to an SBO was verified as being available for use. PPL identified a vulnerability in that the SBO portable diesel generator may be susceptible to natural or manmade situations that would render it unavailable because it is not routinely stored in a hardened building or enclosure. This vulnerability was entered into PPL's CAP as AR/CR 1374258 for future consideration.</p> <p>Though other issues were identified by PPL and the inspectors, none were identified that would prevent PPL from responding to an SBO. The inspectors concluded that equipment was properly staged, tested, and maintained. All documents reviewed by the inspectors are listed in the Supplemental Information Attachment to this report.</p>
<p>Licensee Action</p>	<p>Describe the licensee's actions to verify the capability to mitigate an SBO event.</p>
<p>b. Demonstrate through walkdowns that procedures for response to an SBO are executable.</p>	<p>PPL verified through reviews and field walkdowns that all SBO procedures were in-place and executable. Walkdowns were performed by personnel that would be expected to implement the actions during an event.</p> <p>Describe inspector actions to assess whether procedures were in place and could be used as intended.</p> <p>The inspectors assessed PPL's capabilities by conducting a review of their activities described above and reviewing all deficiencies, vulnerabilities, or enhancements entered into the CAP. In addition, the inspectors independently verified the adequacy of PPL's actions by performing walkdowns of the procedures necessary to connect the station's portable SBO DG to plant MCCs and supply the RCIC lube oil coolers with fire protection water.</p> <p>Discuss general results including corrective actions by licensee.</p>

All procedures necessary to respond to an SBO were verified as being in-place and executable. Though outside the inspection period, two recent violations pertaining to PPL's ability to respond to an SBO were identified. Specifically, PPL identified that Emergency Operating Procedure, EO-000-031, "Station Power Restoration," Revision 17, was inadequate in the restoration of offsite power following an SBO. This licensee-identified violation of 10 CFR 50.63 was documented in Integrated Inspection Report 05000387; 388/2010-004 (ML103160334). Secondly, as documented in Integrated Inspection Report 05000387; 388/2011-002, PPL failed to enter a condition into the CAP as required when a Refueling Water Storage Tank level indicator was found out of calibration. This ultimately led to inaccurate level indication and an extended period with RWST level below that considered nominal for SBO response.

None of the issues identified by PPL and the inspectors during this Temporary Instruction would have prevented PPL from responding to an SBO. The inspectors concluded the SBO procedure was current and executable. All documents reviewed by the inspectors are listed in the Supplemental Information Attachment to this report.

03.03 Assess the licensee's capability to mitigate internal and external flooding events required by station design. Refer to IP 71111.01, "Adverse Weather Protection," Section 02.04, "Evaluate Readiness to Cope with External Flooding" as a guideline. The inspection should include, but not be limited to, an assessment of any licensee actions to verify through walkdowns and inspections that all required materials and equipment are adequate and properly staged. These walkdowns and inspections shall include verification that accessible doors, barriers, and penetration seals are functional.

<p>Licensee Action</p>	<p>Describe the licensee's actions to verify the capability to mitigate existing design basis flooding events.</p>
<p>a. Verify through walkdowns and inspection that all required materials are adequate and properly staged, tested, and maintained.</p>	<p>PPL's actions completed for this effort included reviews of the flooding design and licensing bases for internal and external flooding, walkdowns of all credited flood barriers, and confirmation of equipment functionality for the equipment credited in the design and licensing bases for internal and external flooding. Areas that were inaccessible due to high radiation were either scheduled for inspection during the next refueling outage or inspection of the accessible exterior portions of the area was credited.</p> <p>PPL has no temporary equipment staged, and uses permanent plant equipment for flood mitigation. Equipment credited in the internal or external flooding design and licensing bases analyses consisted of sump drain isolation valves, drain line check valves, level switches, and flood detectors. PPL verified this equipment to be adequate either by walkdown and inspection or by relying on existing preventive maintenance (PM) activities. Where existing PMs were credited, PPL verified the PM task was current and the frequency was appropriate. PPL also verified through visual inspection of accessible doors, barriers and penetration seals, that the plant could withstand design basis flooding events.</p> <p>Describe inspector actions to verify equipment is available and useable. Assess whether procedures were in place and could be used as intended.</p>

	<p>The inspectors assessed PPL's capabilities by conducting a review of their activities described above as well as reviewing all deficiencies, vulnerabilities, or enhancements entered into the CAP. In addition, the inspectors independently verified the adequacy of PPL's actions by performing walkdowns of an area containing risk significant structures, systems and components (SSCs) in accordance with IP 71111.06.</p>
	<p>Discuss general results including corrective actions by licensee.</p>
	<p>The inspector concluded that all required materials are adequate and properly staged, tested, and maintained to respond to an internal or external flood within the plant's design basis. While no operability or significant concerns were identified, issues were identified by PPL and the inspectors and appropriately entered into the corrective action program. All documents reviewed by the inspectors, including CRs identifying the various issues, are listed in the Supplemental Information Attachment to this report.</p>

03.04 Assess the thoroughness of the licensee's walkdowns and inspections of important equipment needed to mitigate fire and flood events to identify the potential that the equipment's function could be lost during seismic events possible for the site. Assess the licensee's development of any new mitigating strategies for identified vulnerabilities (e.g., entered it in to the corrective action program and any immediate actions taken). As a minimum, the licensee should have performed walkdowns and inspections of important equipment (permanent and temporary) such as storage tanks, plant water intake structures, and fire and flood response equipment; and developed mitigating strategies to cope with the loss of that important function. Use IP 71111.21, "Component Design Basis Inspection," Appendix 3, "Component Walkdown Considerations," as a guideline to assess the thoroughness of the licensee's walkdowns and inspections.

<p>Licensee Action</p>	<p>Describe the licensee's actions to assess the potential impact of seismic events on the availability of equipment used in fire and flooding mitigation strategies.</p>
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<p>a. Verify through walkdowns that all required materials are adequate and properly staged, tested, and maintained.</p>	<p>PPL performed walkdowns and inspections of important equipment needed to mitigate fire and flood events and identified equipment that could potentially be impacted during a safe shutdown earthquake (SSE). In most cases, the current design and licensing requirements excluded seismic qualification.</p> <p>PPL's evaluations addressed two (2) aspects of the walkdowns and inspections performed. The first aspect of PPL's review was aimed at assuring that the important fire and flood mitigating equipment met all of its current design and licensing requirements. The second aspect of PPL's review was to perform an assessment of the capability of important fire and flood mitigating equipment to survive an SSE level earthquake. The review performed for this second aspect was completed using the current knowledge of the SSES civil, seismic, and piping engineers, supplemented by the available industry information for assessing seismic ruggedness. The review performed for this second aspect was considered by PPL to be an expert assessment as opposed to a seismic qualification. The criteria PPL applied for this second aspect of the review, as discussed in EC-RISK-1151, Revision 0, were as follows:</p> <ol style="list-style-type: none">1. The site seismicity requirements for SSES are considered, in general, to be low. Additionally, most of the structures at SSES are founded on solid bed rock which eliminates any amplification of the seismic motion through the soil. The maximum ground acceleration for SSES is 0.1g. On the Richter Scale, this equates to an approximate 5.6 level earthquake. This would equate to an earthquake on the lower side of the Modified Mercalli Intensity Scale of VII, which means damage to most power plant equipment would not be expected.2. In general, equipment having rugged construction with a favorable profile located at lower elevations in the plant would not be expected to be damaged. This is particularly true for equipment anchor bolted to the floor, but could also be true for non-anchored equipment with a favorable profile, i.e. small height to width ratio. Where available, seismic evaluations performed for the Seismic Individual Plant Examination for External Events (IPEEE) were used.3. EPRI Report NP-5617 "Recommended Piping Seismic-Adequacy Criteria Based on Performance During and After Earthquakes" was published in January 1988. This report visited five power plants and two industrial facilities in California to collect data used to
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