

Susquehanna 2

1Q/2008 Plant Inspection Findings

Initiating Events

Mitigating Systems

Significance:  Mar 31, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

Inadequate Application of Work Instructions Resulted in Unavailable and Inoperable Engineering Safeguards Electrical Bus

A self-revealing, Green NCV was identified for failure to accomplish work in accordance with the appropriate instructions as required by 10 CFR 50 Appendix B, Criterion V, "Instructions, Procedures, and Drawings." Specifically, PPL did not complete the required actions that would properly protect the Unit 1 transformer 1X210 windings from moisture intrusion when heat was not applied to the transformer as specified by the work instructions and original equipment vendor manual. This resulted in high initial Doble test results, an investigation into cause, a drying out period, and additional Doble testing which caused an approximate 24-hour delay in the restoration of the safety-related 1A 4 KV ES bus. This electrical bus provides power to common safety-related loads which increased the online risk for Unit 2, the operating unit during the Unit 1 refueling outage. PPL applied concentrated heat and energized the primary windings to remove moisture from the windings prior to returning the transformer to service. This finding is greater than minor because it adversely impacted the equipment performance attribute of the Mitigating Systems cornerstone and affected the objective to ensure the availability, reliability and the capability of systems that respond to initiating events to prevent undesirable consequences. This finding was considered to have very low safety significance (Green), using phase one of the significance determination process for Unit 2. A contributing cause of this finding is related to the Human Performance cross cutting area, work control planning attribute H.3.(a). Specifically, PPL did not appropriately plan and coordinate the work activities by incorporating job site conditions, including environmental conditions.

Inspection Report# : [2008002 \(pdf\)](#)

Significance:  Feb 01, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Adequately Evaluate a Deviation from BWROG EPG/SAG Resulted in an Inadequate EOP

The NRC identified a Non-Cited Violation of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," because, in the 1990s, Susquehanna failed to adequately evaluate a deviation from the Boiling Water Reactor Owner's Group Emergency Procedure Guidelines / Severe Accident Guidelines (BWROG EPG/SAG), which resulted in one of the emergency operating procedures (EOPs) being inadequate. Specifically, Caution #1 in the BWROG EPG/SAG warned the operators that reactor pressure vessel (RPV) level instrumentation may be unreliable if the drywell temperatures exceeded RPV saturation temperature. The purpose of the Caution was to give the operators a chance to evaluate the validity of the RPV level instrumentation to avoid premature entry into the RPV flooding contingency procedure. Susquehanna did not adequately evaluate the deviation, and the Susquehanna EOPs did not use a Caution statement; but instead, changed the caution to a procedural step, which directed the operators to transition directly to the RPV flooding procedure.

The performance deficiency is more than minor because it is associated with the Procedure Quality attribute of the Mitigating Systems cornerstone and affects the objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the EOP could have directed entry into the RPV flooding procedure unnecessarily which would have restricted the use of suppression pool cooling and required other actions that would have complicated the operators' response to the event. The finding was determined to be of very low safety significance because it was not a design deficiency, did not result in an actual loss

of safety function, and did not screen as potentially risk significant due to external initiating events. (Section 40A2.a.3 (a))

Inspection Report# : [2008006 \(pdf\)](#)

Significance:  Feb 01, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

failure to Identify and Correct Inconsistencies in the Licensing Basis and the EOPs

The NRC identified a Non-Cited Violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," for the failure to identify that an inconsistency between the procedures and the design basis for suppression pool (SP) cooling was a condition adverse to quality (CAQ), which resulted in corrective actions not being taken in a timely manner. Specifically, in January 2006, a Condition Report (CR) identified an inconsistency between an assumption in the Final Safety Analysis Report (FSAR) for the design basis accident and the emergency operating procedures (EOPs) regarding the timing for the implementation of SP cooling. At the time of the inspection, the inconsistency had not been resolved because Susquehanna did not recognize that it impacted current plant operations. This performance deficiency has a cross-cutting aspect in the area of Problem Identification and Resolution, Corrective Action Program, because Susquehanna did not identify that the inconsistency documented in the CR should have been categorized as a CAQ, commensurate with its safety significance. [P.1(a)]

The performance deficiency is more than minor because it is associated with the Design Control attribute of Mitigating Systems and affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the EOPs provided direction that, under some accident conditions, would affect the availability and/or capability of the SP cooling system to perform its safety function. The finding screened out as having very low safety significance because it was not a design deficiency, did not result in an actual loss of safety function, and did not screen as potentially risk significant due to external initiating events.

Inspection Report# : [2008006 \(pdf\)](#)

Significance:  Feb 01, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Accurately Model the Simulator for RPV Water Level Instrumentation

The NRC identified a Non-Cited Violation of 10 CFR 55.46(c)(1), "Plant Referenced Simulators," because the Susquehanna simulator did not accurately model reactor pressure vessel (RPV) level instrumentation following a design basis accident loss of coolant accident (DBA LOCA). Specifically, an analysis performed in 1994 to determine if the observed simulator response during a large break LOCA was consistent with the expected plant response, was based on an overly conservative assumption that the drywell would experience superheated conditions, which would cause RPV water level instrumentation reference leg flashing and a subsequent loss of all RPV level indication. The expected plant response, as stated in the analysis, was incorrect; in that a LOCA would not always cause a loss of all RPV level instruments. As a result, the simulator modeling was incorrect.

The performance deficiency is more than minor because it is associated with the Human Performance attribute of Mitigating Systems and affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the modeling of the Susquehanna simulator introduced negative operator training that could affect the ability of the operators (a mitigating system) to take the appropriate actions during an actual event. The finding was determined to be of very low safety significance because it is not related to operator performance during requalification, it is related to simulator fidelity, and it could have a negative impact on operator actions.

Inspection Report# : [2008006 \(pdf\)](#)

Significance:  Feb 01, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to identify and Correct a Setpoint Error in the RHR and CS Operating Procedures

The NRC identified a Non-Cited Violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," for the

failure to identify that a setpoint error in the operating procedures for safety-related systems was a condition adverse to quality (CAQ), resulting in the procedures not being corrected in a timely manner. The setpoint for the low pressure injection permissive interlock in the RHR and CS systems had been changed in 1999 as part of a modification. However, the setpoint was not changed in the system operating procedures and operator aids. When this issue was identified by Susquehanna staff in 2006, the setpoint error in the procedure was not screened as a CAQ, which resulted in the procedures not being revised for 17 months after the issue was identified in an Action Report. This performance deficiency has a cross-cutting aspect in the area of Problem Identification and Resolution, Corrective Action Program, because Susquehanna did not identify that a setpoint error in operating procedures for safety-related systems was a CAQ, commensurate with its safety significance. [P.1(a)]

The performance deficiency is more than minor because it is associated with the Procedure Quality attribute of Mitigating Systems and affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the incorrect setpoint reference in the procedure impacted the reliability of operator response to the event in that it could delay operator actions or result in misoperation of equipment. The finding screened out as having very low safety significance because it was not a design deficiency, did not result in an actual loss of safety function, and did not screen as potentially risk significant due to external initiating events.

Inspection Report# : [2008006](#) (pdf)

Significance:  Jun 30, 2007

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Take Timely Corrective Actions for an "E" Emergency Diesel Generator Jacket Water Leak

The inspectors identified a non-cited violation (NCV) of Title 10 of the Code of Federal Regulations (CFR), Part 50, Appendix B, Criterion XVI, "Corrective Action," when PPL did not correct a condition adverse to quality, associated with a jacket water supply header leak on the "E" emergency diesel generator (EDG) 3R (right) engine cylinder.

Inspectors identified that PPL had several opportunities to correct this leak before the condition impacted safety system reliability and availability. PPL identified the jacket water leak during a diesel generator surveillance test on December 2, 2005 and entered this condition into the corrective action system. Although, the leak was small and did not originally impact system operability or reliability, PPL rescheduled, delayed, and deferred the repair work for this gasket connection until the condition resulted in a leak of approximately 12 gallons per hour during a March 28, 2007 surveillance test. Due to the rate of jacket water coolant inventory loss, PPL shutdown the engine and declared the "E" emergency diesel inoperable. PPL repaired the leak and entered the issue into the corrective action program.

This finding is greater than minor because it is associated with the equipment performance attribute of the Mitigating Systems cornerstone and negatively affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This finding is related to the Problem Identification and Resolution cross-cutting area (Corrective Action) because PPL did not take actions to correct the jacket water leak in a timely manner, commensurate with the issue's safety significance. (P.1(d)) (Section 1R19)

Inspection Report# : [2007003](#) (pdf)

Significance:  Jun 29, 2007

Identified By: NRC

Item Type: NCV NonCited Violation

Inoperable Pumphouse Ventilation lineup Corrective Actions

The inspectors identified a non cited violation (NCV) of 10CFR 50 Appendix B, Criterion III Design Control because PPL failed to ensure that the design basis for the Residual Heat Removal System (RHR) was correctly translated into specifications and procedures. In 1990 PPL identified a single point vulnerability that could result in a complete loss of RHR to one of the units during a design basis event. PPL corrected this vulnerability by establishing alternate ventilation by opening a door. In 2002 PPL sealed the door disabling this strategy and reintroducing the same single point vulnerability. In November 2005, PPL identified that the modification had made the ventilation procedure unusable. PPL's assessment of the condition report incorrectly concluded that the ventilation procedure was not part of the design basis and immediate corrective actions were not performed. Following the team's identification of the issue PPL took immediate corrective actions to establish a new ventilation path. The issue had a crosscutting aspect in the area of problem identification and resolution related to corrective actions.

The finding was more than minor because it is associated with the design control attribute of the Mitigating Systems cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems

that respond to initiating events to prevent undesirable consequences. The team conducted a Phase 3 SDP and determined the finding to be of very low safety significance.

Inspection Report# : [2007007](#) (*pdf*)

Significance:  Jun 29, 2007

Identified By: NRC

Item Type: NCV NonCited Violation

E EDG Procedure Violation Human Performance

The inspectors identified a non cited violation of Susquehanna Steam Electric Station (SSES) Technical Specification 5.4.1, Administrative Controls, Procedures, for failure to use procedures required by Regulatory Guide 1.33. PPL operators did not follow the procedure adherence requirements when aligning the E emergency diesel generator (EDG) for standby operation prior to removing the C EDG from service for planned maintenance. The field supervisor concurred that not following procedure adherence requirements was an acceptable practice in this instance. Both the station procedure review and management expectations confirmed that the administrative procedure required strict procedure adherence during this evolution. SSES entered this issue into the corrective action program for resolution. The finding is more than minor because it affected the human performance attribute of the mitigating systems cornerstone and affected the cornerstone objective to ensure the availability and reliability of systems that respond to initiating events to prevent undesirable consequences. The finding was determined to be of very low safety significance (Green) because it did not result in a loss of system safety function. This finding has a cross cutting aspect in the area of human performance because SSES did not effectively communicate expectations regarding procedural compliance and because personnel did not follow procedures.

Inspection Report# : [2007007](#) (*pdf*)

Barrier Integrity

Significance:  Dec 31, 2007

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Inadequate Design Control to Sport Fuel Rechanneling Activities

A self-revealing non-cited violation of 10CFR 50 Appendix B, Criterion III, "Design Control," was identified on December 6, 2007, when PPL maintenance personnel found broken pieces of fuel spacer grid assemblies at fuel preparation machines. The damage to fuel assembly spacer assemblies was determined to be from rechanneling activities performed on or before October 20, 2007. The cause of the damaged fuel assemblies was due to the differing exposure histories of fuel channels and fuel bundle spacers not having been adequately analyzed prior to performance of the fuel rechanneling activities. Inspectors determined that the engineering analysis which implemented the allowable applied force limit used in fuel rechanneling procedures had not verified design interfaces, and did not verify the adequacy of design limits. PPL determined that the extent of condition was limited to those rechanneled fuel assemblies re-installed in the Unit 1 or Unit 2 reactors with greater than 25 GigaWatt-Days per Metric Tonne Uranium (GWD/MTU) average exposure.

This finding was more than minor because the finding is related to the Design Control and Human Performance attributes of the barrier integrity cornerstone and negatively impacts the cornerstone objective to provide reasonable assurance that physical design barriers (fuel cladding) protect the public from radio nuclide releases caused by accidents or events. The inspectors completed a Phase 1 significance determination using IMC 0609 Appendix A, Significance Determination Process Phase 1 screening worksheet, and determined the finding to be of Very Low Safety Significance (Green) because the performance issue only degraded the Fuel Cladding Barrier and its associated cornerstone.

This finding is related to a cross-cutting component in the area of Human Performance associated with work practices H.4.(c) because PPL did not ensure supervisory and management oversight of specific work activities, specifically design reviews which supported the fuel rechanneling procedures used from October 2005 through October 2007 and the collective evaluation of 25 condition reports related to rechanneling difficulties. PPL entered this issue into the corrective action program and promptly initiated compensatory measures to impose fuel thermal limit penalties to assure fuel barrier integrity during reactor operation.

Emergency Preparedness

Occupational Radiation Safety

Significance:  Dec 31, 2007

Identified By: Self-Revealing

Item Type: FIN Finding

Failure to Maintain Occupational Radiation Exposure As Low As Reasonably Achievable During CREOAS Work

A self-revealing finding having very low safety significance was identified due to a deficiency in the area of maintaining occupational radiation exposures as low as is reasonably achievable (ALARA). ALARA and work planning for the control room emergency outside air supply system (CREOAS) modification was less than adequate resulting in collective exposure for the work to expand from 3.37 person-rem to 11.9 person-rem.

The performance deficiency that resulted in the exposure overrun was due to significantly increased hours beyond that planned to perform the work. The root cause of the overrun was determined to be: (1) a failure to include contractor work hours in the ALARA planning process; and (2) design errors which did not properly identify bolting locations for the duct work, requiring extensive on-site rework. Susquehanna's three-year rolling average is 101 Person-rem, which is below the SDP criteria of 240 person-rem for Boiling Water Reactors (BWRs), therefore, overall ALARA performance has been effective and this finding is of very low safety significance.

A contributing cause of this finding was related to the Work Control aspect of the Human Performance cross-cutting area because the licensee did not appropriately coordinate work activities by incorporating actions to address the impact of the work on different job activities, and the need for work groups to maintain interfaces with offsite organizations, and communicate, coordinate, and cooperate with each other during activities in which interdepartmental coordination is necessary to assure plant and human performance.

Inspection Report# : [2007005 \(pdf\)](#)

Significance:  Jun 30, 2007

Identified By: NRC

Item Type: FIN Finding

Failure to Maintain Occupational Radiation Exposure As Low As reasonably Achievable During Reactor Water Cleanup Pipe Replacement Activities

A self-revealing finding having very low safety significance was identified due to a deficiency in the area of maintaining occupational radiation exposures as low as is reasonably achievable (ALARA). For the Unit 2 refueling outage (2RIO13), the replacement of the reactor water clean-up (RWCU) piping was planned, and the estimated collective exposure for this work was 2.070 person-rem. Actual collective exposure for the job was 7.742 person-rem, more than 50 percent above the dose goal.

The performance deficiency that resulted in the exposure overrun was due to significantly increased hours to perform the work (budgeted for 308 person-hours, actual was 1081 person-hours when the work was suspended). The root cause of the overrun was determined to be poor initial welding on the piping, which required extensive rework.

Susquehanna's three-year rolling average is 101 person-rem, which is below the SDP criteria of 240 person-rem for boiling water reactors (BWRs), therefore, overall ALARA performance has been effective and this finding is of very low safety significance (Green). A contributing cause of this finding was related to the Work Practice Oversight aspect of the Human Performance cross-cutting area because the contracted vendor utilized inexperienced workers without providing additional supervisory oversight and PPL did not ensure adequate supervisory and management oversight of the work activities. H.4.c (Section 2OS2.1)

Inspection Report# : [2007003 \(pdf\)](#)

Significance:  Jun 30, 2007

Identified By: NRC

Item Type: FIN Finding

Failure to Maintain Occupational Radiation Exposure ALARA During Outage Inservice Inspection of Reactor Pressure Vessel

A self-revealing finding having very low safety significance was identified due to a deficiency in the area of maintaining occupational radiation exposures ALARA. For the Unit 2 refueling outage (2RIO13), the inservice inspection of the reactor pressure vessel and nozzles was planned, and the estimated collective exposure for this work was 6.536 person-rem. Actual collective exposure for the job was 10.684 person-rem, more than 50 percent above the dose goal.

The performance deficiency that resulted in the exposure overrun was due to significantly increased hours to perform the work (budgeted for 654 person-hours, actual was 1517 person-hours). The root cause of the overrun was determined to be an inexperienced work force. Susquehanna's three-year rolling average is 101 person-rem, which is below the SDP criteria of 240 person-rem for BWRs, therefore, overall ALARA performance has been effective and this finding is of very low safety significance (Green). A contributing cause of this finding was related to the Work Practice Oversight aspect of the Human Performance cross-cutting area because the contracted vendor utilized inexperienced workers without providing additional supervisory oversight and PPL did not ensure adequate supervisory and management oversight of the work activities. (H.4.c) (Section 2OS2.2)

Inspection Report# : [2007003](#) (pdf)

Public Radiation Safety

Significance:  Jun 30, 2007

Identified By: NRC

Item Type: NCV NonCited Violation

Violation of 10 CFR 71.5 for Inadequately Secured Transport of Condensate Pump Motors (Class 7 Material)

An NRC-identified finding having very low safety significance was identified due to a deficiency in the radioactive material control program. On March 20, 2007, Susquehanna shipped two condensate pump motors in a sealand container as Class 7 material, surface contaminated objects, to a vendor, in Memphis, TN. Upon receipt at the vendor on March 22, 2007, it was identified that there had been a breach of the package during transit, in that several holes were in the side wall of the container due to inadequate blocking and bracing of the load.

Code of Federal Regulations 10 CFR 71.5 requires that each licensee who transports licensed material shall comply with the applicable requirements of the Department of Transportation (DOT) regulations in 49 CFR Parts 171 through 180. 49 CFR 173.448 requires that each shipment of Class 7 materials must be secured to prevent shifting during normal transportation conditions. 49 CFR 173.410 requires that each package used for the shipment of Class 7 materials be designed so that the package will be capable of withstanding the effects of any acceleration, vibration or vibration resonance that may arise under normal conditions of transport without any deterioration in the integrity of the package. Contrary to these requirements, PPL failed to properly block and brace the contents of a sealand container, resulting in the loss of package integrity. This finding has a cross-cutting aspect in the area of human performance (work practices) because the contracted vendor did not have established instructions for proper loading and bracing of the shipment and PPL did not ensure adequate supervisory and management oversight of the work activities. (H.4.c) (Section 2PS2.1)

Inspection Report# : [2007003](#) (pdf)

Significance:  Jun 30, 2007

Identified By: NRC

Item Type: NCV NonCited Violation

Violation of 10 CFR 71.5 for Inadequately Accounting for Activity in a Shipment of Irradiated Fuel Channels

A self-revealing finding having very low safety significance was identified due to a deficiency in the radioactive material control program. On June 22, 2007, while preparing to load fuel channels in a disposal liner, Susquehanna identified that a liner of irradiated fuel channels previously shipped to the Barnwell Disposal facility in South Carolina contained an incorrect fuel channel for that shipment.

Code of Federal Regulations 10 CFR 71.5 requires that each licensee who transports licensed material shall comply with the applicable requirements of the DOT regulations in 49 CFR Parts 171 through 180. 49 CFR 172.203(d)(3) requires that the shipping papers for Class 7 materials include the activity contained in the shipment. Contrary to these

requirements, PPL failed to properly account for the activity contained in a shipment due to the inclusion of the wrong item in the shipment. This finding has a cross-cutting aspect in the area of human performance (work practices) because the contracted vendor did not follow established instructions for proper loading of the shipment and the licensee did not ensure adequate supervisory and management oversight of the work activities. (H.4.c) (Section 2PS2.2)

Inspection Report# : [2007003](#) (*pdf*)

Physical Protection

Although the NRC is actively overseeing the Security cornerstone, the Commission has decided that certain findings pertaining to security cornerstone will not be publicly available to ensure that potentially useful information is not provided to a possible adversary. Therefore, the [cover letters](#) to security inspection reports may be viewed.

Miscellaneous

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