

Susquehanna 1

2Q/2011 Plant Inspection Findings

Initiating Events

Significance:  Mar 31, 2011

Identified By: Self-Revealing

Item Type: FIN Finding

Inadequate Corrective Actions Result in Loss of Drywell Cooling and Downpower

A self-revealing Green finding of NDAP-QA-0702, "Action Request and Condition Report Process," Revision 27, was identified when inadequate corrective action from the July 2010 flooding event resulted in endbell leakage from the '1A' Reactor Building (RB) chiller during a post-maintenance test (PMT) that wetted and tripped the redundant '1B' RB chiller. The loss of both chillers resulted in elevated drywell temperatures and off-normal procedure entries, and also required a power reduction of approximately 40 percent rated thermal power (RTP). PPL's corrective actions from this event included updating MT-GM-015, "Torquing Guidelines," Revision 23, Section 8.4, "Joints Using Elastomer Gaskets," to require a torque recheck after one hour. Another corrective action required that equipment work instructions include correction of any adverse sealing surfaces on epoxy-coated flange faces identified. PPL entered this issue into their corrective action plan (CAP) as CR 1381163.

The finding was more than minor due to its adverse affect on the Initiating Events cornerstone objective of limiting the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations and was associated with its configuration control and equipment performance attributes. Specifically, the operating RB chiller's lineup and availability were impacted by being wetted and tripping during maintenance of the '1A' RB chiller and resulted in reactivity manipulations to control drywell parameters. The finding was evaluated in accordance with IMC 0609 Attachment 4, "Initial Screening and Characterization of Findings," and determined to be a transient initiator contributor. However, while the finding contributed to the likelihood of a reactor trip, it did not contribute to the likelihood that mitigation equipment or functions would not be available, and, therefore, screened as Green. The finding was determined to have a cross-cutting aspect in PI&R area, CAP, for which a licensee thoroughly evaluates problems such that the resolutions address causes and extent of conditions. Specifically, following the Unit 1 July 2010 internal flooding event, PPL did not thoroughly evaluate the problems of torque relaxation and coating irregularities such that corrective actions addressed the actual extent of cause and conditions.

Inspection Report# : [2011002](#) (*pdf*)

Significance:  Mar 31, 2011

Identified By: Self-Revealing

Item Type: FIN Finding

Inadequate Maintenance Procedure Results in Steam Leak and Manual Scram

A self-revealing finding of very low safety significance (Green) was identified when PPL personnel did not have adequate procedures to perform maintenance on a threaded connection on the '5C' feedwater heater (FWH) extraction steam bleeder trip valve, (BTV)10245C. Specifically, existing maintenance procedures did not ensure that a threaded vent plug was reinstalled properly following maintenance. As a result, on January 25, 2011, the threaded plug was ejected from the vent hole resulting in a steam leak that was un-isolable without removing the main turbine from service. The steam leak caused malfunctions of non-safety-related electrical systems and ultimately led to a manual reactor scram by control room operators. PPL entered this issue in their CAP as condition report CR 1346952.

The finding was more than minor because the finding was associated with the Initiating Events cornerstone attribute of Equipment Performance, and affected the cornerstone objective of limiting the likelihood of those events that upset plant stability and challenge critical safety functions during power operation. Specifically, failure of the pipe plug resulted in an un-isolable steam leak that ultimately led to a manual scram. The inspectors evaluated the finding using IMC 0609, Attachment 4, "Initial Screening and Characterization of Findings," and determined the finding did not contribute to both the likelihood of a reactor trip and the likelihood that mitigation equipment or functions would not be available. In this case, the main condenser was available as mitigation equipment once the turbine was tripped and

the leak was isolated. Consequently, the finding is of very low safety significance (Green). This finding is related to the cross-cutting area of Human Performance – Resources, because PPL did not ensure that personnel, equipment, procedures, and other resources were available and adequate to assure nuclear safety. Specifically, PPL did not ensure that complete, accurate and up-to-date procedures were available to reinstall a threaded plug on a BTV in the FWH extraction steam line.

Inspection Report# : [2011002](#) (pdf)

Significance: **W** Sep 30, 2010

Identified By: Self-Revealing

Item Type: FIN Finding

Procedural Inadequacies Result in Reactor Scram and Loss of Normal Heat Sink

A self-revealing preliminary White finding regarding procedure NDAP-QA-0008, “Procedure Writer’s Guide,” Revision 8, was identified following a July 16, 2010, flooding event in the Unit 1 condenser bay which resulted in a manual reactor scram and loss of the normal heat sink. There were three instances of inadequate procedures identified. The first instance involved maintenance procedure MT-043-001 which provided inadequate instructions regarding installation of the condenser waterbox gaskets and led to the event. In addition, two other off-normal procedures were inadequate in that they complicated operator response to the event. Specifically, operators used a diagram in off-normal procedure ON-100-003, “Chemistry Anomaly,” to identify and isolate the leak which was incorrect, delayed leak isolation, and resulted in a manual reactor scram in anticipation of a loss of the normal heat sink. Finally, ON-142-001, “Circulating Water (CW) Leak,” did not contain specific instructions to isolate a condenser waterbox leak which contributed to operators using ON-100-003 which was not intended to be used to isolate the condenser box during flooding conditions. PPL corrected the diagram error, dewatered and repaired affected equipment, and entered this issue into their CAP (1282128).

This finding was determined to be more than minor as it affected the Initiating Events cornerstone attribute of Procedure Quality and its objective of limiting the likelihood of those events that upset plant stability and challenge critical safety functions during power operation. The finding was evaluated using Phases 1, 2, and 3 of the Significance Determination Process. The conclusion of the Phase 3 analysis was an estimated change in core damage frequency (CDF) of 1.1E-6/yr (White) and an estimated change in large early release frequency (LERF) of 2.6E-7/yr (White). The finding is related to the cross-cutting area of Problem Identification and Resolution, Corrective Action Program, in that PPL did not thoroughly evaluate problems such that the resolutions address the causes and extent of condition, as necessary. Specifically, PPL did not appropriately evaluate and correct a known issue in an off-normal procedure or adequately evaluate previous CW system waterbox manway gasket leaks to ensure that future occurrences could be prevented.

Final SDP issued 12/16/2010. IR 2010-008

Inspection Report# : [2010004](#) (pdf)

Inspection Report# : [2010008](#) (pdf)

Mitigating Systems

Significance: **G** Jun 30, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Implement Risk Management Actions during Dual Unit Elevated Risk

The inspectors identified a Green NCV of 10 CFR 50.65a(4) when PPL failed to manage risk as assessed on June 1, 2011. During a period of dual unit Orange risk, PPL did not adequately implement protected equipment risk management actions (RMAs) designated in its risk assessment. During a walkdown, the inspectors identified that none of the core spray divisions or safety relief valves (SRVs) on either unit had been protected. They also identified that Unit 1 Division II low pressure coolant system (LPCI) had not been protected and Unit 2 Division I LPCI was only partially protected. Finally, the inspectors identified that some Unit 1 Division II residual heat removal (RHR) shutdown cooling equipment listed as protected in the Station Leadership Report had not been protected. This issue

was documented in PPL's CAP as Condition Report (CR) 1417135.

The inspectors determined that the performance deficiency was more than minor due to its similarity to examples 3.j and 3.k of IMC 0612 Appendix E, "Examples of Minor Issues." The issue also affected the Mitigating Systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences and its human performance attribute. Specifically, the issue was programmatic based on the extent of protected equipment deficiencies, five consecutive quarters of 10 CFR 50.65a(4) violations, the timing of the violation during dual unit Orange risk, and that if left uncorrected could lead to more significant issues such as pre-event human error that impacts mitigating equipment availability during a subsequent initiating event with already elevated plant risk. Since the exposure time of the deficiency was limited to four hours and with due consideration of the other RMAs taken by PPL, this finding is determined to be of very low safety significance (Green). This finding was determined to have a cross-cutting aspect in Problem Identification and Resolution, (PI&R) CAP. Specifically, although PPL had recognized the negative trend with execution of a root cause analysis (RCA), interim corrective actions for the adverse trend of 10 CFR 50.65 a(4) violations proved inadequate to prevent another violation of this regulation for the fifth consecutive quarter. (P.1 (d)) (1R13)
Inspection Report# : [2011003](#) (*pdf*)

Significance:  Jun 30, 2011

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Failure to Establish Design Control Measures Associated with Installation of a Gland Liner in the HPCI Steam Supply Inboard Isolation Valve

A self-revealing Green NCV of 10 CFR 50, Appendix B, Criterion III, "Design Control," occurred when a brass gland liner was installed in the gland for HV155F002, the high pressure coolant injection (HPCI) steam supply inboard isolation valve, without appropriately evaluating the material and design of the liner for its potential impact on the valve packing system. Inappropriate design and fabrication of the gland liner resulted in numerous steam leaks since its installation and ultimately led to a significant steam leak that resulted in the inoperability of the primary containment isolation valve (PCIV), necessitating isolation of the HPCI system. PPL entered this issue into their CAP as 1361274.

The finding is more than minor because it is associated with the design control attribute of the Mitigating Systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, inappropriate design of the gland liner resulted in numerous steam leaks since its installation and ultimately led to the significant steam leak that resulted in the inoperability of the PCIV and isolation of the HPCI system. The finding was evaluated for significance using IMC 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings." The inspectors answered "Yes" to the screening question, "Does the finding represent a loss of system safety function?" since the HPCI system is a single train high pressure injection system. Therefore, a Phase 2 SDP evaluation was performed using IMC 0609, Appendix A, "Determining the Significance of Reactor Inspection Findings for At-Power Situations." The pilot Phase 2 evaluation conducted using the SDP interface and the SRA conducted Phase 3 evaluation, assuming that HPCI was inoperable for 5 days, indicated a ?CDF in the low E-7 per year range. The dominant core damage sequence was a medium loss of coolant accident followed by a failure of high pressure cooling and failure of the operators to depressurize to allow use of low pressure core cooling systems. Given the delta CDF, in the low E-7 range, the SRA determined that the increase in large early release frequency (?LERF) would not be greater than very low significance because of the 0.3 high pressure core damage sequence factor applied for BWR Mark II containments in IMC 0609 Appendix H. Further the SRA determined that external events were not of concern given the very short < 5 day, exposure period. This issue was determined to not have a cross-cutting aspect as this issue was not reflective of current performance. This was based on the age of design modification, which was installed in 1996 and re-evaluated in 1998. (4OA2)

Inspection Report# : [2011003](#) (*pdf*)

Significance:  Mar 31, 2011

Identified By: NRC

Item Type: FIN Finding

RWST Level Transmitter Failure Not Entered in CAP

Inspectors identified a Green finding of MT-AD-605, "Maintenance and Calibration of Installed Plant Instrumentation (IPI)," Revision 11, when as-found calibration results of the refueling water storage tank (RWST) level transmitter were discovered outside tolerance and not captured in the CAP. Consequently, RWST level was later discovered to be 25 percent lower than indicated in the control room and below emergency operating procedure (EOP) procedural expectations. The inspectors concluded that finding the level transmitter out of tolerance by more than twice the as-found tolerance should have been entered into the CAP as a Level 3 condition adverse to quality (CAQ) Cause CR with a due date not to exceed September 28, 2010, and that the CR would have directed PPL to investigate the issue earlier, avoided inaccurate level indications to control room operators, and prevented RWST level from ultimately lowering below EOP normal levels. This issue was entered into PPL's CAP as CR 1371594.

The finding was more than minor since it affected the Mitigating Systems cornerstone objective to maintain the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences and was associated with its equipment performance and configuration control attributes. Specifically, the lack of accurate level indication caused operators to believe that more RWST inventory was available than actually present and an EOP procedural decision is based, in part, on the available RWST inventory. The finding was determined to be of very low safety significance in accordance with IMC 0609, Appendix A, "Determining the Significance of Reactor Inspection Findings for At-Power Situations" using SDP Phases 1, 2, and 3. Phase 1 screened the finding to Phase 2 because it represented an actual loss of safety function to makeup to the condensate storage tank (CST) from the RWST per 10CFR50.65, for greater than 24 hours. A Region I Senior Reactor Analyst (SRA) conducted a Phase 3 analysis because the Phase 2 analysis, conducted by the inspectors using the Susquehanna pre-solved Risk-Informed Inspection Notebook, indicated that the finding could be of more than very low safety significance. In conducting the Phase 3 analysis the SRA determined that refilling the CST from the RWST was not modeled in the Susquehanna Standardized Plant Analysis Risk (SPAR) model, Revision 8.15. The SRA reviewed a PPL-completed risk significance analysis which included the increase of both core damage and large early event release frequencies (i.e., delta CDF and delta LERF) assuming that the RWST was not available for a year. This PPL analysis, which appeared conservative given the actual volume of water in the RWST during the approximately 6 months that the RWST level instruments were not functioning properly, indicated that the delta CDF and delta LERF were in the very low safety significance range.

The finding was determined to have a cross-cutting aspect in Human Performance, Work Practices, in that the licensee defined and communicated expectations regarding procedural compliance, however, personnel did not follow procedures. Specifically, PPL technicians did not enter the out-of-tolerance level instrument calibration into the CAP in accordance with procedures.

Inspection Report# : [2011002](#) (pdf)

Significance:  Mar 31, 2011

Identified By: NRC

Item Type: FIN Finding

B CS Chiller Inoperable due to Refrigerant Stacking

The inspectors identified a Green finding for failure to evaluate the condition of the 'B' control structure (CS) chiller after completion of SE-054-301, "Emergency Service Water/Control Structure Chilled Water System Leakage Test," Revision 12. Specifically, personnel failed to evaluate whether system parameters were restored to normal prior to restoring the chiller to an operable status and, when maintenance subsequently reported that refrigerant level was non-visible, failed to appropriately evaluate the degraded condition with regard to equipment operability. PPL entered this issue into their CAP as CR 1382448.

The finding is more than minor because it is associated with the equipment performance attribute of the Mitigating systems cornerstone and affected its objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the condition of refrigerant stacking that occurred affected the reliability of the 'B' CS Chiller. The finding was evaluated for significance using IMC 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings." Since the finding did not result in a loss of safety function or the loss of a train for greater than its Technical Specification (TS) allowed outage time, and was not potentially risk significant due to external event initiators, the finding was determined to be of very low safety significance (Green). This finding is related to the cross-cutting area of PI&R – CAP, because PPL did not thoroughly evaluate problems such that the resolutions address the causes and extent of conditions, to include properly classifying, prioritizing and evaluating for operability. Specifically, PPL failed to appropriately evaluate the effect that refrigerant stacking had on the operability of the CS chiller and subsequently, failed to evaluate the CAQ and assign corrective actions.

Inspection Report# : [2011002](#) (pdf)

Significance:  Mar 31, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Replace Piping on B CS Chiller

An NRC-identified, Green NCV of 10 CFR 50, Appendix B, Criterion XVI, “Corrective Actions,” was identified because PPL failed to correct a condition adverse to quality, an adverse trend of Freon leaks, by identifying that previous work orders (WOs) have not been implemented as required prior to new leaks occurring. Three separate refrigerant leaks were identified that collectively led to the inoperability of the ‘B’ CS chiller due to an inability to meet its mission time. The leaks occurred on a section of pipe that was prescribed to be replaced as part of the extent of condition review of similar Freon leaks. However, the corrective actions to replace the line were not implemented as planned. PPL entered this issue into their CAP as CR 1387934.

The finding was more than minor since it was associated with the equipment performance attribute of the Mitigating systems cornerstone and affected its objective to ensure the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the availability and reliability of the control room emergency outside air supply (CREOAS) and CR floor cooling systems was impacted by the ‘B’ CS chiller failure. In accordance with IMC 0609, Appendix A, “Determining the Significance of Reactor Inspection Findings for At-Power Situations,” the finding was determined to be of very low safety significance (Green) because the finding was not a design or qualification deficiency, did not represent a loss of a system/train safety function and did not screen as potentially risk significant due to external events. This finding is related to the cross-cutting area of PI&R – CAP, because PPL did not thoroughly evaluate problems such that the resolutions address the causes and extent of conditions, to include properly classifying, prioritizing, and evaluating for operability. Specifically, despite four condition reports generated in 2010 that identified adverse trends in Freon leaks or chiller performance issues, PPL failed to appropriately evaluate the trend so as to identify causes, evaluate the effectiveness of past corrective actions, include similar equipment in extent of condition reviews, or identify that the ‘B’ CS chiller filter/dryer line was not replaced as planned.

Inspection Report# : [2011002](#) (pdf)

Significance:  Dec 31, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Control, Calibrate and Evaluate M&TE

An NRC-identified NCV of 10 CFR 50, Appendix B, Criterion XII, “Control of Measuring and Test Equipment”, occurred when PPL failed to control and calibrate measuring and test equipment (M&TE) at specified periods and document evaluations of missing M&TE. The issue was evaluated IAW IMC 0612 Appendix E examples and determined to be similar to 3J, 3K and 4A. Namely, that significant programmatic deficiencies were identified that could lead to worse errors if uncorrected (3J, 3K) and that there was a routine of failing to perform evaluations (4A). Specifically, overdue or missing M&TE were not being evaluated for their associated impact on the validity of past work in the CAP program since at least 2008 or that evaluations when performed did not meet the requirements of NDAP-QA-0515, Control and Calibration of Plant Measuring and Test Equipment, Revisions 3 and 4. It also affected the equipment performance attribute of the Mitigating Systems cornerstone and its objective to ensure the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences.

The NCV was determined to have a cross-cutting aspect in Problem Identification and Resolution, CAP. Namely, problems are thoroughly evaluated such that resolutions address causes and extent of conditions and evaluate CAQs for operability. Specifically, PPL did not thoroughly evaluate problems to include the individual missing M&TE, the overall programmatic recurrence, and the potential effects on operability.

Inspection Report# : [2010005](#) (pdf)

Significance:  Dec 31, 2010

Identified By: Self-Revealing

Item Type: FIN Finding

Failure to Evaluate a Non-Conforming Condition Resulted in an Alert.

A self revealing finding of Very low safety significance (Green), against PPL's CAP Procedure NDAP-QA-702, "Action Request and Condition Report Process." Specifically, a non-conforming condition with system design requirements was identified with the 'A' Reactor Building (RB) chiller filter line, in that the line was vibrating excessively and a support for the line was missing when compared to the other chillers. AR 888836 was written to document this condition in July 2007. However, the non-conformance with system design was never evaluated and corrective actions were never developed. Subsequently, in September 2008 an elbow in the line failed. The elbow was repaired; however, the missing support was not evaluated and replaced. As a result on August 10, 2010, the same elbow failed again resulting in the evacuation of the Unit 1 RB and the declaration of an ALERT due to toxic gas levels within the vital area of the plant.

This issue is more than minor as it affected the protection against external events (toxic gas) attribute of the corresponding Mitigating Systems cornerstone objective to ensure the reliability and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). The finding was evaluated for significance using IMC 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings." Since the finding did not result in a loss of safety function or loss of a train for greater than its Technical Specification (TS) allowed outage time and was not potentially risk significant due to external event initiators, the finding was determined to be of very low safety significance (Green).

This finding was assigned a cross-cutting aspect in the area of Operating Experience (OE) because PPL failed to implement and institutionalize OE through changes to station processes, procedures, equipment, and training programs. Specifically, PPL did not incorporate American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) codes, Dupont Refrigerant Piping Handbook, and the Carrier Piping Manual in the modification, evaluation, and troubleshooting of site refrigeration systems.

Inspection Report# : [2010005](#) (pdf)

Significance: SL-IV Dec 31, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

Inaccurate report of MSPI data

An NRC-identified NCV of 10 CFR 50.9(a), Completeness and Accuracy of Information, occurred when PPL failed to update the Mitigating Systems Performance Indicators (MSPIs) to reflect a change in PPL's MSPI basis document. The change to the basis document affected all five MSPIs on each unit and resulted in inaccurate values for three consecutive quarters. PPL evaluated the MSPIs for needed changes and updated over 100 values used in calculating the PIs and entered the issues in their CAP as CRs 1328561 and 1328563.

Because violations of 10 CFR 50.9 are considered to potentially impede or impact the regulatory process, they are dispositioned using the traditional enforcement process. The inspectors concluded that PPL had reasonable opportunity to foresee and correct the inaccurate information prior to the information being submitted to the NRC. This violation is characterized as a SL IV NCV consistent with Sections 2.2.1.c and 6.9 of the NRC Enforcement Policy. Because this finding was of very low safety significance, was not repetitive or willful, and was entered into PPL's CAP, this violation is being treated as an NCV, consistent with Section 2.3.2.a of the NRC Enforcement Policy. The significance of the associated performance deficiency was screened per the guidance of Manual Chapter 0612, Appendix B and the inspectors determined it to be minor because it did not result in any of the PIs exceeding the Green White threshold. As such, no finding was identified and no cross-cutting aspect was assigned. (Section 40A1
Inspection Report# : [2010005](#) (pdf)

Significance:  Oct 08, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

Inadequate Test Control of Safety-Related DC Circuit Breakers

The team identified a finding of very low safety significance (Green) involving a non-cited violation of 10 CFR 50, Appendix B, Criteria XI, "Test Control," in that PPL did not ensure that test results were documented and evaluated to verify that test requirements were satisfied. Specifically, PPL did not adequately evaluate the over-current trip setting test results for 125 Vdc circuit breaker 1D652-12 to ensure the results were within the established acceptance limits. PPL subsequently placed the breaker in-service with an as-left trip setting outside of the approved acceptance band. In response, PPL entered this issue into the CAP and determined there was sufficient margin to ensure breaker operability.

The finding was more than minor because it was associated with the equipment performance attribute of the

Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the operability, availability, and reliability of systems that respond to initiating events to prevent undesirable consequences. The team performed a Phase 1 SDP screening, in accordance with NRC IMC 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," and determined the finding was of very low safety significance (Green) because it was not a design or qualification deficiency, did not represent a loss of system safety function, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. This finding has a cross-cutting aspect in the area of Human Performance, Resources Component, because PPL did not ensure that complete, accurate, and up-to-date procedures and work packages were available and adequate to assure nuclear safety. Specifically, the procedure for DC breaker testing did not have adequate administrative controls to ensure that as-left test values were within the established acceptance criteria. (IMC 0310, aspect H.2(c)) (1R21.2.1.2)

Inspection Report# : [2010007](#) (pdf)

Significance:  Sep 30, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

HPCI and RCIC CST Low-Level Suction Transfer Made Inoperable Due to Transfer of Water from Condenser Area to CST Berm

The inspectors identified a Green NCV of Susquehanna Unit 1, TS 5.4.1, "Procedures," for an inadequate procedure to transfer water from the condenser area to the condensate storage tank (CST) berm. Specifically, the procedure failed to include a maximum level in the CST berm that was acceptable to limit interactions with other safety-related equipment. The NCV was identified following the July 16, 2010, Unit 1 manual reactor scram due to a non-isolable circulating water leak in the main condenser area. Operations personnel commenced dewatering efforts by transferring water from the condenser area to the CST berm using a "Liquid Radwaste Collection" operating procedure as a guide. Water was transferred to the berm to a level sufficient to cause water intrusion into cable conduit and junction boxes containing High Pressure Coolant Injection system (HPCI) and Reactor Coolant Isolation Cooling system (RCIC) CST low-level suction instrumentation which transfers HPCI and RCIC pump suction from the CST to the suppression pool. As a result, the low-level suction instrumentation became submerged affecting the reliability and capability of the HPCI and RCIC CST to suppression pool transfer function despite being required in Mode 3. The issue was entered into PPL's CAP (1297039).

This performance deficiency is more than minor as it affected the equipment performance and procedural quality attributes of the corresponding Mitigating Systems cornerstone objective to ensure the reliability and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the low-level suction instrumentation was not designed for submergence. Transferring too much water from the condenser bay to the CST berm submerged the low-level suction instrumentation and affected the reliability and capability of the HPCI and RCIC CST to suppression pool transfer function. The finding was evaluated for significance using IMC 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings." Since the finding did not result in a loss of safety function or the loss of a train for greater than its TS allowed outage time, and was not potentially risk significant due to external event initiators, the finding was determined to be of very low safety significance (Green). This finding was determined to have a cross-cutting aspect in the area of Human Performance, Resources, because PPL did not ensure that procedures were adequate to assure nuclear safety. Specifically, operating procedure OP-169-004, Revision 17, did not specify a maximum level that could be transferred to the CST berm to limit interactions with safety-related, HPCI and RCIC low-level suction transfer instrumentation.

Inspection Report# : [2010004](#) (pdf)

Significance:  Sep 30, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Accurately Model the Simulator for RCIC System Operation at Reduced Flow Rates in Automatic

An NRC-identified, Green NCV of 10 CFR 55.46(c)(1), "Plant Referenced Simulators," was identified because the Susquehanna simulator did not accurately model RCIC system response when operated in automatic flow control at less than design basis full flow. While the licensee has not yet completed simulator modifications to routinely model RCIC control system instabilities when operating the system in automatic flow control at less than design basis full flow, the simulator does model instabilities resulting from a control system malfunction. The inspectors verified that

licensed operators have trained on and responded to RCIC control system malfunctions during examinations. This issue was entered in PPL's corrective action process as CRs 1285503, 1287462, and 1286803.

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 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.

This issue was determined to not have a cross-cutting aspect. This was based on the age of the EPRI guidance (issued in 2002) applicable to the RCIC system flow instabilities and the lack of opportunities over the past three years to revisit this guidance. Therefore, this issue was not reflective of current performance.

Inspection Report# : [2010004](#) (pdf)

Significance:  Sep 30, 2010

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Failure to Accurately Model the Simulator for RPV Level Control Using the Integrated Control System

A self-revealing NCV of 10 CFR 55.46(c)(1), "Plant Referenced Simulators," was identified because the Susquehanna simulator did not accurately model integrated control system (ICS) response to reactor pressure vessel (RPV) level transients. This violation was due to an error in the simulator modeling that caused RPV level control in the simulator to respond more rapidly than the actual plant resulting in the simulation of a more stable response and smaller overall changes in RPV level during level transients in the simulator. This error contributed to the decision to proceed with an extended power uprate (EPU) required condensate pump trip test during reactor power ascension activities. As a result on May 14, 2010, when the condensate pump trip test was performed, the ICS system was unable to adequately control reactor vessel water level and operators inserted a manual reactor scram prior to a high level turbine trip at level 8. PPL completed corrective actions to update the simulator model to accurately reflect the feedwater flow component of ICS and has ensured that the simulator reflects actual plant performance and re-performed the condensate pump trip test. This issue was entered in PPL's corrective action process as AR/CR 1257781.

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 affected the ability of the operators 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 had a negative impact on the timeliness of operator actions during an actual plant transient. This finding has a cross-cutting aspect in the area of Human Performance, Resources, because PPL did not ensure that equipment and other resources were available and adequate to assure safety. Specifically, simulator fidelity was inadequate in that modeling information provided by the simulator vendor was not reviewed by PPL nor was an alternate methodology used to validate simulator performance prior to use in operator training and predictions of actual plant response. In addition, ICS adjustments made after the April 22, 2010, scram provided another opportunity to verify the validity of ICS gain settings.

Inspection Report# : [2010004](#) (pdf)

Significance:  Dec 31, 2009

Identified By: NRC

Item Type: FIN Finding

Scenarios for NRC Annual Operating Examinations Did Not Meet Quantitative Standards for Total Malfunctions

The inspectors identified greater finding in that 20% of the NRC annual operating exam simulator scenarios reviewed did not meet the quantitative standard for total malfunctions, 4 to 8 for a single scenario, and 10 to 14 for a scenario set established in NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," Form ES-604-1, "Simulator Scenario Review Checklist." In addition, the licensee's procedures NTP-QA-31.11, "Operator Requalification Exam Preparation and Implementation" and NTP-QA-31.7, "Simulator Scenario Writers Guides,"

recommend these same quantitative standards. The quantitative guidelines for malfunctions is an important metric because it establishes an objective standard used throughout the nuclear industry to ensure that the simulator portion of the NRC-required annual operating exams are written at an appropriate level of difficulty. As an immediate corrective action, the licensee entered this finding into their corrective action process (CR 1187760).

This finding was more than minor because it was associated with the Human Performance attribute of the Mitigation Systems cornerstone and affected the objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the finding affected the level of difficulty of simulator operating exams which potentially impacted PPL's ability to appropriately evaluate licensed operators. A review of the possible cross-cutting aspects was performed and no cross-cutting aspect was identified that would be considered a contributor to the cause of the finding.

Inspection Report# : [2009005](#) (pdf)

Barrier Integrity

Significance:  Jun 30, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

Inadequate Surveillance Procedure Results in Failure to Meet Required Action of Technical Specifications for Secondary Containment Isolation Valves

The inspectors identified a Green NCV of Susquehanna Unit 1 and 2 TS 3.6.4.2, "Secondary Containment Isolation Valves" and TS 5.4.1, "Procedures" for an inadequate surveillance procedure for implementing TS Surveillance Requirements and Action Statements. Specifically, the procedure failed to ensure that SCIVs were verified administratively when in a high radiation areas as required. PPL entered this issue in their CAP as 1421356 and 1431750.

The finding is more than minor because it was similar to example 3.d in IMC 0612 Appendix E, "Examples of Minor Issues" in that the failure to implement a requirement of TSs is not minor if the action had not been conducted. In this case, the valves inside of high radiation areas had not been verified in their closed position as required by TS 3.6.4.2 Required Action A.2. Additionally, it is associated with the procedure quality attribute of the Barrier Integrity cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, the inadequate surveillance procedure resulted in a violation of TS 3.6.4.2, "SCIVs" since valves that were closed to isolate a pathway due to an inoperable blind flange were not verified in the correct position as required. The finding was evaluated for significance using IMC 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings." Since the finding only represented a degradation of the radiological barrier function provided for the reactor building (RB) (i.e. secondary containment), the finding was determined to be of very low safety significance (Green). This finding is related to the cross-cutting area of Human Performance – Resources because PPL did not ensure that personnel, equipment, procedures, and other resources were available and adequate to assure nuclear safety. Specifically, the surveillance procedures SO-000-010, Revision 23, "Monthly Zone III Integrity," SO-100-010, Revision 24, "Monthly Zone 1 Integrity Verification" and SO-200-010, Revision 24, "Monthly Zone II Integrity Verification," did not ensure surveillance requirements or actions statements required by TS 3.6.4.2 were implemented. (H.2(c)) (1R04)

Inspection Report# : [2011003](#) (pdf)

Emergency Preparedness

Significance:  Sep 30, 2010

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Inadequate Equipment to Measure Freon Concentration and Assess Threshold for an EAL Declaration

A Green self-revealing NCV associated with emergency planning standard 10 CFR 50.47(b)(4) was identified regarding inadequate indications for operators to determine if a threshold for an Alert Emergency Action Level (EAL) (OA7) declaration based on toxic gas concentrations immediately dangerous to life and health (IDLH) within a vital area had been met. Specifically, there were no meters (permanently installed or portable) available on site to measure Freon concentration, a toxic gas in high concentrations. This impacted the operator's ability to make an EAL declaration and operators had to rely on other indications such as personal ill effects from exposure. PPL entered this issue into its CAP as AR 1294109 and is evaluating the development of permanent corrective actions.

This performance deficiency is more than minor because it was associated with the Emergency Preparedness (EP) cornerstone attribute of Facilities and Equipment, and affected the cornerstone objective of ensuring that a licensee is capable of implementing adequate measures to protect the health and safety of the public in the event of a radiological emergency. This finding was similar to an example of a green finding evaluated using IMC 0609, Appendix B, "Emergency Preparedness SDP," Sheet 1, "Failure to Comply." This finding is associated with a failure to meet or implement a regulatory requirement. The deficiency is not greater than Green because it did not result in the Risk-Significant Planning Standard Function being lost or degraded and was similar to an example of a green finding in that "the EAL classification process would not declare any Alert or Notification of Unusual Event that should be declared." Since the declaration of Alert OA7 based on toxic gas levels for Freon concentrations IDLH (defined as greater than 2000 ppm Freon) within a vital area could have been missed or delayed, this finding was considered consistent with the example provided and was determined to be of very low safety significance (Green). This finding is related to the cross-cutting area of Human Performance, Resources, because PPL did not ensure that equipment and other resources were available and adequate to assure safety. Specifically, PPL did not appropriately evaluate equipment necessary to effect a change to the emergency plan for an EAL classification related to toxic gasses in a vital area. PPL lacked adequate equipment to make an accurate EAL classification and had to rely on secondary means (personnel ill effects) for appropriately classifying a Freon leak in the Unit 1 RB that occurred on August 10, 2010. This was determined to be the most significant contributing factor to this issue.

Inspection Report# : [2010004](#) (*pdf*)

Occupational Radiation Safety

Public Radiation Safety

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

Last modified : October 14, 2011