UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 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 INTEGRATED INSPECTION REPORT 05000387/2011002 AND 05000388/2011002

Dear Mr. Rausch:

On March 31, 2011, the U. S. Nuclear Regulatory Commission (NRC) completed an inspection at your Susquehanna Steam Electric Station Units 1 and 2. The enclosed integrated inspection report presents the inspection results, which were discussed on April 28, 2011, with you and other members of your staff.

This inspection examined activities completed under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

This report documents three NRC-identified findings (Green) and two self-revealing findings (Green), all of very low safety significance. One of these findings was determined to involve a violation of NRC requirements. Additionally, two licensee-identified violations, which were determined to be of very low safety significance, are listed in this report. However, because of the very low safety significance and because they are entered into your correction action program (CAP), the NRC is treating these findings as non-cited violations (NCVs) consistent with Section 2.3.2 of the NRC's Enforcement Policy. If you contest any NCV in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington, D.C. 20555-0001; with copies to the Regional Administrator Region I; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at the Susquehanna Steam Electric Station. In addition, if you disagree with the cross-cutting aspect of any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region I, and the NRC Resident Inspector at the Susquehanna Steam Electric Station. The information you provide will be considered in accordance with Inspection Manual Chapter 0305.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any), will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

Paul G. Krohn

Paul G. Krohn, Chief
Projects Branch 4
Division of Reactor Projects

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

Enclosures: Inspection Report 05000387/2011002 and 05000388/2011002
Attachment: Supplemental Information

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Sincerely,

/RA/

Paul G. Krohn, Chief
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Docket Nos. 50-387; 50-388
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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:	05000387/2011002 and 05000388/2011002
Licensee:	PPL Susquehanna, LLC
Facility:	Susquehanna Steam Electric Station, Units 1 and 2
Location:	Berwick, Pennsylvania
Dates:	January 1, 2011 through March 31, 2011
Inspectors:	P. Finney, Senior Resident Inspector J. Greives, Resident Inspector E. DiPaolo, Senior Resident Inspector, Limerick J. Furia, Senior Health Physicist D. Molteni, Operations Engineer A. Rosebrook, Senior Project Engineer J. Tomlinson, Operations Engineer
Approved By:	Paul G. Krohn, Chief Projects Branch 4 Division of Reactor Projects

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SUMMARY OF FINDINGS

IR 05000387/2011002, 05000388/2011002, 01/01/2011 - 03/31/2011; Susquehanna Steam Electric Station, Units 1 and 2; Maintenance Risk Assessments and Emergent Work Control; Post-Maintenance Testing; Problem Identification and Resolution (PI&R); Event Followup.

The report covered a 3-month period of inspection by resident inspectors and announced inspections by regional reactor inspectors. One Green NCV and four Green findings were identified. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Cross-cutting aspects associated with findings are determined using IMC 0310, "Components Within The Cross-Cutting Areas," dated February 2010. Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. 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.

Cornerstone: Initiating Events

Green: 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. (P.1(c)) (1R19)

Green: 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. (H.2(c)) (4OA3)

Cornerstone: Mitigating Systems

Green: 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. (H.4 (b)) (1R13)

Green: 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. (P.1(c)) (4OA2)

Green: 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. (P.1(c)) (4OA2)

Other Findings

Two violations of very low safety significance, identified by PPL, were reviewed by the inspectors. Corrective actions taken or planned by PPL have been entered into PPL's CAP. These violations and corrective action tracking numbers are listed in Section 4OA7 of this report.

REPORT DETAILS

Summary of Plant Status

Susquehanna Steam Electric Station (SSES) Unit 1 began the inspection period at 100 percent RTP. Following identification of an unisolable steam leak on an extraction line from the high pressure turbine to the 5C FWH, Unit 1 was manually scrammed on the morning of January 25, 2011. A reactor startup was conducted on January 27, 2011, and full RTP was reached on January 31, 2011. On March 3, Unit 1 commenced a shutdown to address a steam leak from the packing of the high pressure coolant injection (HPCI) inboard isolation valve. On March 9, Unit 1 commenced a reactor startup and reached full RTP on March 15. Unit 1 ended the inspection period at full RTP.

Unit 2 began the inspection period at the authorized power level of 94.4 percent RTP. On January 15, 2011, the unit was reduced to 67 percent RTP over 8 hours for a control rod pattern adjustment. On February 4, the unit was reduced to 74 percent RTP for a control rod pattern adjustment and reached full RTP on February 5. On February 18, the unit was reduced to 70 percent RTP for a control rod pattern adjustment and reached full RTP on February 19. On March 4, the unit was reduced to 72 percent RTP for a control rod pattern adjustment and returned to full RTP on March 5. On March 14, Unit 2 commenced a coastdown to a refueling outage. Unit 2 ended the inspection period at 88 percent RTP.

Note: The licensed RTP for both units is 3952 megawatts thermal. The Extended Power Uprate (EPU) License Amendment for SSES was approved in January 30, 2008, and was implemented for both units in accordance with the issued license conditions. For the purposes of this report and the remainder of the current operating cycle, the authorized power level for Unit 1 is 100 percent of the EPU licensed power limit. For the current operating cycle, the authorized power level for Unit 2 is 94.4 percent of the EPU licensed power limit.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection

Readiness for Impending Weather Conditions (71111.01 – 1 sample)

a. Inspection Scope

The inspectors reviewed system operations and readiness for extreme cold weather conditions related to an impending snow storm on January 20, 2011. Plant walkdowns of all five emergency diesel generators (EDGs) and the station blackout (SBO) diesel generator were performed to determine the adequacy of PPL's weather protection features. Inspectors reviewed operator actions to address failures of equipment due to freezing and compensatory actions during the adverse cold weather conditions. The inspectors also reviewed and evaluated considerations in PPL's Maintenance Rule station risk assessment. Documents reviewed are listed in the Attachment.

- Common, readiness for impending snow storm on January 20, 2011.

b. Findings

No findings were identified.

1R04 Equipment Alignment

.1 Partial Walkdown (71111.04Q – 5 samples)

a. Inspection Scope

The inspectors performed partial walkdowns to verify system and component alignment and to identify any discrepancies that would impact system operability. The inspectors verified that selected portions of redundant or backup systems or trains were available while certain system components were out-of-service (OOS). The inspectors reviewed selected valve positions, electrical power availability, and the general condition of major system components. Documents reviewed are listed in the Attachment. The walkdowns included the following systems:

- Unit 2, steam leak detection;
- Unit 2, core spray Division II;
- Unit 2, reactor protection system (RPS);
- Common, spent fuel pool mitigating strategies implemented per Security Order Section B.5.b issued February 25, 2002 (TI-183); and
- Common, reactor core isolation cooling (RCIC) operation during SBO (TI-183).

b. Findings

No findings were identified.

.2 Complete Walkdown (71111.04S - 1 sample)

a. Inspection Scope

The inspectors performed a detailed review of the alignment and condition of the RCIC system. The inspectors reviewed operating procedures, checkoff lists, and system piping and instrumentation drawings. Walkdowns of accessible portions of the systems were performed to verify components were in their correct positions and to assess the material condition of systems and components. The inspectors evaluated ongoing maintenance and outstanding CRs associated with the RCIC system to determine the effect on system health and reliability. The inspectors verified proper system alignment and looked at system operating parameters. The walkdown included the following system:

- Unit 1, RCIC.

b. Findings

No findings were identified.

1R05 Fire Protection

.1 Fire Protection – Tours (71111.05Q - 5 samples)

a. Inspection Scope

The inspectors reviewed PPL's fire protection program to evaluate the specified fire protection design features, fire area boundaries, and combustible loading requirements for selected areas. The inspectors walked down these areas to assess PPL's control of transient combustible material and ignition sources, fire detection and suppression capabilities, fire barriers, and any related compensatory measures. The inspected areas included:

- Unit 1, RB containment access area (Fire Zones 1-4A-N,S,W);
- Unit 1, drywell (Fire Zone 1-4F);
- Unit 2, H & V equipment and exhaust fan room (Fire Zone 2-6D);
- Unit 2, upper and lower turbine building (TB) switchgear rooms (Fire Zones 2-34A, 2-33A); and
- Common, control structure elevation 806' – CS chillers/CREOAS/standby gas treatment systems (SGTS) (FZ 0-30A).

b. Findings

No findings were identified.

.2 Fire Protection - Drill Observation (71111.05A – 1 sample)

a. Inspection Scope

The inspectors observed an announced fire drill in the vicinity of the Unit 2 reactor feed pump turbines and an unannounced fire drill in the vicinity of Unit 2 RCIC to evaluate fire brigade performance. The inspectors evaluated whether the fire brigade members responded in the appropriate numbers, correctly donned the proper gear, carried and applied the proper fire protection equipment, and arrived at the scene in a timely manner. Further, the inspectors evaluated the fire brigade leader's command and control throughout the fire response organization. Finally, the inspectors observed the drill evaluators' conduct and control during the drill to include post-drill critique and evaluation against established acceptance criteria. Documents reviewed are listed in the Attachment.

- Common, announced drill on February 8, 2011 and unannounced drill on February 9, 2011.

b. Findings

No findings were identified.

1R06 Flood Protection Measures

.1 Internal Flooding (71111.06 - 1 sample)

a. Inspection Scope

The inspectors reviewed documents, interviewed plant personnel, and walked down structures, systems and components (SSCs) to evaluate the adequacy of PPL's internal flood protection measures. The inspection focused on verifying that PPL's flooding mitigation plans and equipment were consistent with the design requirements and risk analysis assumptions. The material condition of credited components such as watertight plugs, floor drains, flood detection equipment, and alarms were also assessed to determine whether the components were capable of performing their intended function. The inspectors also verified that adequate procedures were in place to identify and respond to floods. Documents reviewed are listed in the Attachment. The following area was reviewed:

- Common, water from junction box housing 13.8 kV cables to Engineering Safeguards System (ESS) transformers.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program

.1 Resident Inspector Quarterly Review (71111.11Q – 1 sample)

a. Inspection Scope

On March 29, 2011, the inspectors observed licensed operator simulator performance. The inspectors compared their observations to TSs and the use of system operating procedures. The inspectors also evaluated PPL's critique of the operators' performance to identify discrepancies and deficiencies in operator training. Documents reviewed are listed in the Attachment. The following training was observed:

- Common, licensed operator performance during integrated control system (ICS) training evolutions and reactor startup with failed rod worth minimizer and multiple nuclear instrumentation failures, OP002-11-02-02 and OP002-11-02-03.

b. Findings

No findings were identified.

.2 Biennial Requalification Program Review

a. Inspection Scope

On February 10, 2011, one NRC region-based inspector conducted an in-office review of results of licensee-administered annual operating tests and comprehensive written exams for 2010. The inspection assessed whether pass rates were consistent with the guidance of NRC Manual Chapter 0609, Appendix I, "Operator Requalification Human Performance Significance Determination Process (SDP)." The inspector verified that:

- Crew pass rates were greater than 80% (Pass rate was 94.7%);
- Individual pass rates on the written exam were greater than 80% (Pass rate was 89.9%);
- Individual pass rates on the job performance measures of the operating exam were greater than 80% (Pass rate was 98.7%);
- Overall pass rates on the dynamic simulator test were greater than 80% (Pass rate was 100%); and
- Overall pass rate among individuals for all portions of the exam was greater than or equal to 80% (Overall pass rate was 84.1%).

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12 – 2 samples)

a. Inspection Scope

The inspectors evaluated PPL's work practices and followup corrective actions for selected SSC issues to assess the effectiveness of PPL's maintenance activities. The inspectors reviewed the performance history of those SSCs and assessed PPL's extent of condition determinations for those issues with potential common cause or generic implications to evaluate the adequacy of PPL's corrective actions. The inspectors reviewed PPL's PI&R actions for these issues to evaluate whether PPL had appropriately monitored, evaluated, and dispositioned the issues in accordance with PPL procedures and the requirements of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance." In addition, the inspectors reviewed selected SSC classification, performance criteria and goals, and PPL's corrective actions that were taken or planned, to verify whether the actions were reasonable and appropriate. Documents reviewed are listed in the Attachment. The following systems were reviewed:

- Unit 1, feedwater containment isolation valve local leak rate test (LLRT) failures; and
- Common, control structure heating, ventilation, and air-conditioning (HVAC).

b. Findings

No findings were identified.

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

a. Inspection Scope

The inspectors reviewed the assessment and management of selected maintenance activities to evaluate the effectiveness of PPL's risk management for planned and emergent work. The inspectors compared the risk assessments and risk management actions to the requirements of 10 CFR Part 50.65(a)(4) and the recommendations of NUMARC 93-01, Section 11, "Assessment of Risk Resulting from Performance of Maintenance Activities." The inspectors evaluated the selected activities to determine

whether risk assessments were performed when specified and appropriate risk management actions were identified.

The inspectors reviewed scheduled and emergent work activities with licensed operators and work-coordination personnel to evaluate whether risk management action threshold levels were correctly identified. In addition, the inspectors compared the assessed risk configuration to the actual plant conditions and any in-progress evolutions or external events to evaluate whether the assessment was accurate, complete, and appropriate for the emergent work activities. The inspectors performed control room and field walkdowns to evaluate whether the compensatory measures identified by the risk assessments were appropriately performed. Documents reviewed are listed in the Attachment. The selected maintenance activities included:

- Unit 1, elevated risk for HPCI inoperable due to steam leak;
- Unit 1, shutdown risk during RPS electrical protective assembly (EPA) breaker surveillance coincident with shutdown cooling in service and core spray unavailable on March 6, 2011;
- Unit 2, risk assessment during swing bus motor generator (MG) set maintenance;
- Common, RWST level less than indicated; and
- Common, 'B' EDG kilovolt amps reactive (KVAR) indication variances as emergent work.

b. Findings

Introduction: Inspectors identified a Green finding (FIN) of MT-AD-605, "Maintenance and Calibration of IPI," Revision 11, when as-found calibration results of the RWST level transmitter were discovered outside tolerance and not entered in the CAP. Consequently, RWST level was later discovered to be 25 percent lower than indicated in the control room and below EOP expectations.

Description: On July 16, 2010, the Unit 1 condenser bay was flooded due to manway gasket failures (IR 05000387;388/2010004). In response to that flooding, PPL pumped water from the condenser bay to the Unit 1 CST berm which houses both the Unit 1 CST and the RWST. Subsequent to the berm being filled, the submerged RWST level indicator became erratic and suffered level swings (AR 1282613). The level transmitter and indicator were inspected, reworked, and calibrated under WO 1282632. That WO acknowledged evidence of water intrusion to the level transmitter and the as-found readings were low by 13 percent to 38 percent of span across the range, exceeding the as-found tolerance of +/-.08mA by as much as 42 times. The reference manual, 00809-0100-4235, "Rosemount 1152 Alphaline Nuclear Pressure Transmitter," Revision BA, Table 5-2 suggests that troubleshooting for low output include the sensing module, noting that it is not field repairable and must be replaced if found defective. The table also suggests troubleshooting for erratic output to include checking for liquid in dry lines on impulse piping and process connections. In this application, the transmitter has its reference side vented to atmosphere and was susceptible to liquid entry during the water transfer to the berm. The transmitter was adjusted within final tolerance without comment on troubleshooting and no CR was generated on the as-found condition. Also, the local level indicator associated with the transmitter was determined to be non-calibratable and replacement was recommended.

On October 23, 2010, Operations attempted to crosstie the RWST with the CSTs. The CSTs can be procedurally filled by either gravity feed via the RWST inter-tie or by driving flow via an RWST pump through its minimum flow line. While calculations predicted over 160,000 gallons to be transferred, only minimal changes in level were observed over two hours. Operations then transferred water via the RWST pump method and generated Action Report (AR) 1316480 documenting that "tank level indication may not be reading correctly as no appreciable water was transferred." On December 6, 2010, Operations attempted to fill the CST from the RWST via the gravity feed method. When the inter-tie was opened, CST levels decreased and RWST level increased contrary to expectations (AR 1330724). Operations then transferred water via the RWST pump minimum flow method. WOs from the October and December events (1317010 and 1331046) were generated but work was not performed prior to January 19, 2011.

On January 7, 2011, the oil level in the 'B' RWST pump was down to the bulb bottom due to a suspected oil leak (AR 1339548). On January 11, the 'A' RWST pump tripped on 'low level' despite indication that RWST level was 38 percent (CR 1340649). Operations identified this as a spurious alarm and the CR was classified as a Level 3 Close, Condition Not Adverse to Quality with no action. On January 15, Operations attempted to start the 'A' RWST pump twice but it tripped both times. CR 1342842 was generated to document this and identify that makeup to the CSTs via RWST was unavailable. On the same day, CR 1342844 was generated identifying the issue as a significant challenge to water inventory management and a dual unit generation risk. No comments were made regarding the nuclear risk associated with the EOP procedural capability to transfer water from the RWST to CST until PPL was questioned by the resident inspectors. On January 17, the 'B' RWST pump oil reservoir was filled but the pump tripped on 'low level' during the subsequent start (AR 1343638).

On January 19, 2011, investigation of the 'A' RWST pump trip led to the RWST level transmitter. Under WO 1343432, actual RWST level was determined to be 11 percent while the control room level indication was 36 percent. The level transmitter was replaced and an investigative calibration check was performed on the removed transmitter. The transmitter was high out of tolerance by 12 percent to 26 percent of span across the range.

EOPs, EO-1(2)00-030, "Unit 1(2) Response to SBO," Revision 25 and 21 respectively, have a procedural step to provide additional CST inventory for RCIC and HPCI suction by cross-tying the RWST with both CSTs. The intent is to ensure RCIC alignment is maintained to the CSTs and ensure HPCI availability via continuous operation in a CST-to-CST configuration. Unit 2's EOP states in the discussion that "assuming a normal minimum RWST level of 50 percent, availability of makeup water from CST can be extended." Calculation, EC-RISK-1139, "Susquehanna Probabilistic Risk Assessment (PRA) Model Event Tree Notebook and Success Criteria Post-EPU Level 2 Model," Revision 3, Section 2.1.11 states, "initially, the RWST water volume is assumed to be 50 percent of full capacity." The PRA assumes 25 percent capacity exists in the RWST for each online unit.

After resident inspector questioning, PPL generated CR 1345435 for inadequate risk modeling of the RWST during the week of January 17, 2011, based on a lack of understanding shared by Operations and Work Management. CR 1345301 was generated for configuration control in conflict with the 50 percent RWST level assumed

in the PRA. From July 16, 2010 through January 28, 2011, RWST level was below 50 percent for 95 days and below 25 percent for 48 days.

MT-AD-605, "Maintenance and Calibration of IPI," Revision 11, step 6.2.2 states "An AR shall be generated for any equipment exceeding 'As Found' tolerances... The AR shall include the instrument's 'As Found' value and tolerances." IC-DC-100, "Transmitter/Converter Calibration/Calibration Check Procedure," Revision 12, Step 6.6 has a note that states, "An AR shall be generated for equipment tracking purposes for any equipment exceeding 'As Found' tolerances."

The Maintenance Rule basis document for the RWST includes a function to provide RWST level indication in the control room and is based on its inclusion in EO-1(2)00-030 as key instrumentation available during an SBO. NDAP-QA-0413, "Maintenance Rule Program," Revision 8, Step 7.4.7a states for Maintenance Rule Functional Failures (MRFFs) that, "Instruments that support Maintenance Rule functions should be considered failed if their accuracy falls outside twice the as-found calibration tolerances." Step 7.1.3 of the procedure states that "CRs involving MRFFs shall as a minimum be assigned the apparent cause evaluation type in accordance with NDAP-QA-0702. The due date shall be a maximum of 60 days from date of failure."

NDAP-QA-0702, "AR and CR Process," Revision 27, Attachment C identified that conditions that adversely affect the reliability, availability, or conditions of SSCs within the Maintenance Rule scope are CRs. Attachment D of the procedure identified that a MRFF should be a CAQ. 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 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.

Analysis: The inspectors determined that the failure to enter the high out of specification as-found tolerance calibration check into the CAP was a performance deficiency within PPL's ability to foresee and correct. The finding was evaluated in accordance with IMC 0612 Appendix B and determined to be 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, inaccurate 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" (IMC 0609A) 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 CST from the RWST per 10 CFR 50.65, for greater than 24 hours. A Region I 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 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. (H.4(b))

Enforcement: MT-AD-605, "Maintenance and Calibration of IPI," Revision 11, step 6.2.2 states, "An AR shall be generated for any equipment exceeding 'As Found' tolerances... The AR shall include the instrument's 'As Found' value and tolerances." Contrary to this, on January 19, 2011, an AR was not generated for the RWST level transmitter being out of as-found tolerance. The RWST is not a safety-related component, MT-AD-605 is not a safety-related procedure, and this finding does not involve enforcement action because no regulatory requirement violation was identified. Because this finding does not involve a violation and has very low safety significance, it is identified as a FIN. **(FIN 05000387; 388/2011-002-01, RWST Level Transmitter Failure Not Entered in CAP)**

1R15 Operability Evaluations (71111.15 – 6 samples)

a. Inspection Scope

The inspectors reviewed operability determinations that were selected based on risk insights to assess the adequacy of the evaluations, the use and control of compensatory measures, and compliance with TSs. In addition, the inspectors reviewed the selected operability determinations to evaluate whether the determinations were performed in accordance with NDAP-QA-0703, "Operability Assessments." The inspectors used the TSs, Technical Requirements Manual (TRM), Final Safety Analysis Report (FSAR), and associated Design Basis Documents as references during these reviews. Documents reviewed are listed in the Attachment. The issues reviewed included:

- Unit 2, RPS and End of Cycle – Recirculation Pump Trip instrumentation operability with #1 main turbine bypass valve slightly open;
- Unit 2, containment gas analyzer inboard isolation slow strike times;
- Units 1 and 2, emergency service water (ESW) pump logic diagram discrepancies;
- Units 1 and 2; HPCI/RCIC operability for single point vulnerability discovered in RB HVAC;
- Common, 'B' ESW flow transmitter; and
- Common, ESW leak on 'B' HPCI room cooler.

b. Findings

No findings were identified.

1R18 Plant Modifications

.1 Permanent Plant Modifications (1 sample)

a. Inspection Scope

The inspectors reviewed the following permanent plant modifications to determine whether the changes adversely affected system or support system availability, or adversely affected a function important to plant safety. The inspectors reviewed the associated system design bases, including the FSAR, TSs, and assessed the adequacy of the safety determination screenings and evaluations. The inspectors also assessed configuration control of the changes by reviewing selected drawings and procedures to verify whether appropriate updates had been made. The inspectors compared the actual installations to the permanent modification documents to determine whether the implemented changes were consistent with the approved documents. The inspectors reviewed selected post-installation test results to evaluate whether the actual impact of the changes had been adequately demonstrated by the test. Documents reviewed are listed in the Attachment. The following modification and document were included in the review:

- Units 1 and 2, removal of differential temperature isolation for steam leak detection.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (PMT) (71111.19 – 7 samples)

a. Inspection Scope

The inspectors observed portions of PMT activities in the field to determine whether the tests were performed in accordance with the approved procedures. The inspectors assessed the test adequacy by comparing the test methodology to the scope of maintenance work performed. In addition, the inspectors evaluated acceptance criteria to determine whether the test demonstrated that components satisfied the applicable design and licensing bases and TS requirements. The inspectors reviewed the recorded test data to determine whether the acceptance criteria were satisfied.

- Unit 1, 'B' and 'C' source range neutron monitoring system (SRMs);
- Unit 1, HPCI inboard steam supply isolation steam leak;
- Unit 1, '1A' RB chiller PMT results in 1B RB chiller trip;
- Unit 2, Division II core spray system outage window (SOW);
- Unit 2, '2A' direct expansion unit following condenser tube cleaning;
- Unit 2, HPCI turbine exhaust vacuum breaker line check valve inspection; and
- Common, 'A' EDG relay replacement following abnormal shutdown.

b. Findings

Introduction: A self-revealing Green Finding of NDAP-QA-0702, "AR and CR Process," Revision 27, was identified when inadequate corrective action from the July 2010 flooding event resulted in endbell leakage from the '1A' RB chiller during a PMT that

wetted on and tripped the redundant '1B' RB chiller. The loss of both chillers resulted in elevated drywell temperatures, off-normal procedure entries, and required a Unit 1 power reduction of approximately 40 percent RTP.

Discussion: On October 15, 2010, maintenance had been completed on the Unit 1 '1A' RB chiller that included work inside the condenser. During the subsequent PMT, the condenser endbell developed a service water leak that sprayed on the adjacent '1B' RB chiller, impacted its control panel, and caused it to trip. With both RB chillers out of service (OOS), chilled water was lost to the air coolers for both reactor recirculation pump motors as well as the drywell coolers. Temperatures inside the drywell rose due to the lack of cooling and the average temperature exceeded the TS limit of 135 degrees Fahrenheit. Operators entered ON-134-001, "Loss of RB Chilled Water," Revision 26, ON-164-002, "Loss of Reactor Recirculation Flow," Revision 33, and ON-100-101, "Scram, Scram Imminent," Revision 25. Ultimately, Unit 1 RTP was reduced to 62 percent and returned to full power approximately 35 hours later.

PPL conducted an apparent cause evaluation (ACE) subsequent to the leak and attributed the cause to torque relaxation associated with use of elastomer gaskets, the lack of a torque check, and the endbell seating surface coating not meeting quality standards. The ACE identified that the as-left torque of 55 ft-lbs was found to be 40 ft-lbs on 12 of 40 bolts after the leak. It also cited the industry best practice of following final torque with a "re-torque" approximately an hour later. Finally, the ACE cited previous experience with elastomer gaskets exhibiting torque relaxation. The ACE for the '1A' RB chiller leak event included a 'Correct Condition' corrective action to revise MT-GM-015, "Torquing Guidelines," Revision 23. This procedure provides general guidance on tightening threaded fasteners and its scope includes those for pressure retaining purposes. Section 8.4, "Joints Using Elastomer Gaskets," was amended to require that "After one hour has elapsed, Recheck for proper torque. Do not tighten to where the gasket extrudes excessively from the joint." The ACE also had a Correct Condition action that equipment work instructions include correction of any adverse sealing surfaces on coated flange faces identified.

Four months earlier, on July 16, 2010, Unit 1 experienced a flooding event in the main condenser bay (IR 0500387;388/2010004). The associated root cause analysis (RCA) had attributed that event to an inadequate manway gasket installation process (RC1) and that identified epoxy coating irregularities on the seating surface were also a causal factor (CF2). The installation process, which did not require a torque check, allowed the bolts to relax since rubber gaskets tend to creep after installation. A smooth epoxy coating on the seating surface reduces the load bearing capability of the gasket. The inspectors noted the similarities between causes in the flooding RCA and the RB chiller ACE.

NDAP-00-0752, "Cause Analysis," Revision 7, requires that 'Prevent Recurrence' corrective actions are "used to identify an action that will prevent recurrence of the causes of a same or similar event" and "significantly reduce the probability of occurrence of similar events of lower significance." It also requires that 'Correct Condition' corrective actions are "used to identify an action that will correct the condition, reduce the frequency of occurrence of an event, or minimize the consequences of an event." NDAP-QA-0702, "AR and CR Process," Revision 27, Step 7.8.14.b requires corrective actions for each identified cause and causal factor and Step 7.18.4.d requires 'Prevent Recurrence' corrective actions for root causes. The RCA included two corrective actions

considered pertinent to this finding. The first was a 'Prevent Recurrence' for RC1 to revise MT-043-001, "Main Condenser Leak Detection, Tube Pulling, Waterbox Inspection and Cleaning," Revision 14, to include a re-check of the torque two hours later. The second was a 'Correct Condition' for CF2 to enhance MT-GM-031, "Immersed Component Heat Exchanger Internals Epoxy Lining Cladding," Revision 11, to ensure compliance with manway coating specification H-1002, "Nuclear Engineering Specification for Protective Epoxy Cladding Lining System for Condenser Tubesheets and Waterboxes and Large Diameter Piping," Revision 2. The scope of the first procedure, MT-043-001, is limited to maintenance on the main condenser so its revision did not prevent recurrence of torque relaxation on other plant components susceptible to the same cause. Also, no requirement for a torque check on the '1A' RB Chiller endbell was incorporated into its WO. The second procedure, MT-GM-031, was incorporated as both a reference and a procedural step in the '1A' RB chiller WO. However, the step to repair/replace the heat exchanger epoxy was marked not applicable (N/A). Contrary to NDAP-QA-0702, corrective actions from the RCA did not prevent recurrence of a similar event or reduce the probability of occurrence of a similar event of lower significance, the '1A' RB chiller leak.

NDAP-00-0752 Section 13.7 requires that, for RCAs, all root causes and significant causal factors shall be evaluated for extent of cause. It defines an extent of cause as "other programs, processes, components, or activities that are reasonably susceptible to the failure modes and causes of the condition being evaluated." Determination of what constitutes a significant causal factor is not defined in the procedure. A causal factor is defined by the NDAP as a "factor that made the event or situation worse, made it happen sooner...; but was not necessary for the event to happen." Contrary to the NDAP, RC1 was not evaluated for extent of cause as it was "not considered a generic issue with installation procedures" and "not considered a generic issue with installation of elastomer gaskets" at Susquehanna. None of the eight causal factors were considered for extent of cause including CF2, despite other components like the RB chiller condensers and residual heat removal (RHR) heat exchangers using the epoxy procedure, and no explanation was provided as to why none were considered significant. Given that the causes of the '1A' RB chiller leak were common to a root cause and causal factor in the Unit 1 main condenser bay flooding event, the inspectors concluded that the causes of the flooding event had wider implications, were not thoroughly evaluated, and that resolutions were inadequate. The inspectors determined that inadequate corrective action from the main condenser flooding event was a performance deficiency. PPL entered this issue into their CAP as CR 1381163.

Analysis: Inadequate corrective actions related to torque checks of elastomer gaskets and coating irregularities on the seating surface was a performance deficiency within PPL's ability to foresee and correct. 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 '1B' 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 CAP, PI&R, for which the 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. (P.1(c))

Enforcement: NDAP-00-0752, "Cause Analysis," Revision 7, Section 13.7, requires that, for RCAs, all root causes and significant causal factors shall be evaluated for extent of cause. NDAP-QA-0702, "AR and CR Process," Revision 27, Step 7.8.14.b requires corrective actions for each identified cause and causal factor and Step 7.18.4.d requires Prevent Recurrence corrective actions for root causes. Contrary to the above, corrective actions from the RCA did not prevent recurrence of a similar event or reduce the probability of occurrence of a similar event of lower significance, the '1A' RB Chiller leak on October 19, 2010. The RB chillers are not safety-related and this finding does not involve enforcement action because no regulatory requirement violation was identified. Because this finding does not involve a violation and has very low safety significance, it is identified as a FIN. **(FIN 0500387/2011-002-02, Inadequate Corrective Actions Result in Loss of Drywell Cooling and Downpower)**

1R20 Refueling and Other Outage Activities (71111.20 – 2 samples)

.1 Unit 1 Forced Outage following Unisolable Extraction Steam Leak and Manual Scram

a. Inspection Scope

On January 25, 2011, Unit 1 was manually scrammed following identification of an unisolable extraction steam leak on the '5C' FWH. Major work during the outage included repairs to the '5C' FWH Extraction Steam BTV and the 'B' and 'C' SRMs. During the outage and through reactor startup, as appropriate, inspectors performed the activities below to verify PPL's controls over outage activities:

- Outage Plan - reviewed the outage risk plan and work schedules for staff on both the operating unit and the shutdown unit;
- Shutdown activities - monitored the shutdown, cooldown, and transfer to the shutdown cooling mode of decay heat removal;
- Outage activity control - monitored or verified the following:

    1) Clearance activities;
    2) RCS Instrumentation;
    3) Electrical power;
    4) Decay heat removal;
    5) Inventory and reactivity control;
    6) Fatigue management;

- Monitoring of Heatup and Startup Activities; and
- Identification and Resolution of Problems - reviewed CAP entries to verify an adequate threshold for issues and appropriate corrective actions.

b. Findings

One self-revealing finding of very low safety significance (Green) was identified and is documented in section 4OA3 of this report.

.2 Unit 1 Forced Outage Following Identification of Steam Leak on Inboard HPCI Isolation Valve

a. Inspection Scope

Resident inspectors were tracking unidentified drywell leakage on both units in accordance with IMC 2515 Appendix D, "Plant Status," and identified that Unit 1 leakage had exceeded the Action Level 3 criterion at 0.13 gallons per minute (gpm) on December 25, 2010. PPL entered the issue into the CAP as 1338244. Following this date, Unit 1 drywell leakage continued to rise. Both PPL and the resident inspectors extrapolated the data which predicted leakage would exceed the TS criteria prior the scheduled Unit 1, 2012 refueling outage. On January 15, 2011, the drywell unidentified leakage began to increase at a faster rate. PPL generated an operational decision-making (ODM) paper that provided a decision making process for established leak rate thresholds. On February 24, 2011, unidentified leakage reached 0.69 gpm. PPL entered ON-100-005, "Excess Drywell Leakage Identification," Revision 16, and stroked suspect valves to identify the source. PPL identified that the inboard HPCI isolation valve, HV155F002 was a significant contributor to the observed leakage. The valve was shut to isolate the suspected leaking packing, rendering HPCI inoperable. This condition was reported to the NRC via the Emergency Notification System (ENS) on February 25, 2011, as required by 10CFR 50.72(b)(3)(v) for a condition that results in a complete loss of safety function (EN46644). PPL commenced outage planning and, on March 3, 2011, performed a controlled shutdown to Mode 4. A drywell entry confirmed a stem packing leak from the HPCI valve. Major work during the outage included repairs to the inboard HPCI isolation valve and the 'B' source range neutron monitor. During the outage and through reactor startup, as appropriate, inspectors performed the activities below to verify PPL's controls over outage activities:

- Outage Plan - reviewed the outage risk plan and work schedules for staff on both the operating unit and the shutdown unit;
- Shutdown activities - monitored the shutdown, cooldown, and transfer to the shutdown cooling mode of decay heat removal;
- Outage activity control-monitored or verified the following:

    1) Clearance activities;
    2) RCS Instrumentation;
    3) Electrical power;
    4) Decay heat removal;
    5) Inventory and Reactivity control;
    6) Containment closure;
    7) Fatigue management;

- Drywell - walkdowns after shutdown;
- Monitoring of Heatup and Startup Activities; and
- Identification and Resolution of Problems - reviewed CAP entries to verify an adequate threshold for issues and appropriate corrective actions.

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 7 samples)

a. Inspection Scope

The inspectors observed portions of selected surveillance test activities in the control room and in the field and reviewed test data results. The inspectors compared the test results to the established acceptance criteria and the applicable TS or TRM operability and surveillance requirements to evaluate whether the systems were capable of performing their intended safety functions. Documents reviewed are listed in the Attachment. The observed or reviewed surveillance tests included:

- Unit 1, rising unidentified leakage into drywell sumps;
- Unit 1, RCIC turbine exhaust vacuum breaker check valve;
- Unit 1, Rod Worth Minimizer functional test after system failure;
- Unit 2, quarterly calibration of drywell pressure (primary containment) high pressure channels;
- Unit 2, quarterly calibration of main steam line low pressure channels;
- Common, 24 hour endurance run – 'A' EDG; and
- Common, SBO diesel (Blue Max) loaded run (TI-183).

b. Findings

No findings were identified.

2. RADIATION SAFETY

Cornerstone: Occupational/Public Radiation Safety (PS)

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

a. Inspection Scope

Radiological Hazard Assessment

The inspector reviewed operations to verify that, since the last inspection, there have been no changes to plant operations that resulted in a significant new radiological hazard for onsite workers or members of the public.

The inspector reviewed the last two radiological surveys from selected plant areas. The inspector verified that the thoroughness and frequency of the surveys is appropriate for the given radiological hazard.

The inspector conducted walkdowns of the facility to evaluate material conditions and potential radiological conditions in the radiological control areas (RCA), protected area, controlled area, contaminated tool storage, contaminated machine shops and radioactive waste areas.

The inspector selected air sample survey records and verified that samples were collected and counted in accordance with PPL's procedures. The inspector observed work in potential airborne areas to verify that air samples were representative of the breathing air zone. The inspector verified that PPL has a program for monitoring levels of loose surface contamination in areas of the plant with the potential for the contamination to become airborne.

Contamination and Radioactive Material Control

The inspector observed several locations where PPL monitors potentially contaminated material leaving the RCA, and inspected the methods used for control, survey, and release from these areas. The inspector verified that the radiation monitoring instrumentation had appropriate sensitivity for the types of radiation present.

The inspector reviewed PPL's criteria for the survey and release of potentially contaminated material. The inspector verified that there was guidance on how to respond to an alarm that indicated the presence of licensed radioactive material. The inspector reviewed PPL's procedures and records to verify that the radiation detection instrumentation was used at its typical sensitivity level based on appropriate counting parameters.

The inspector verified that any transactions involving nationally tracked sources were reported in accordance with 10 CFR 20.2207.

b. Findings

No findings were identified.

2RS2 Occupational ALARA Planning and Controls (71124.02)

a. Inspection Scope

Inspection Planning

The inspector reviewed pertinent information regarding plant collective exposure history, current exposure trends, and ongoing or planned activities in order to assess current performance and exposure challenges. The inspector reviewed the plant's 3-year rolling average collective exposure.

The inspector reviewed the site specific trends in collective exposures and source term measurements.

The inspector reviewed site-specific procedures associated with maintaining occupational exposures as low as reasonably achievable (ALARA), which included a review of processes used to estimate and track exposures from specific work activities.

The inspector reviewed work activities and the resultant exposures from the March 2011 Unit 1 forced outage. PPL completed work activities for 1.263 person-rem, against a goal of 2.329 person-rem. The inspector also reviewed current exposure estimates for the upcoming Unit 2 15th refueling and inspection outage.

b. Findings

No findings were identified.

2RS4 Occupational Dose Assessment (71124.04 – 1 sample)

a. Inspection Scope

Inspection Planning

The inspector reviewed the results of radiation protection program audits related to internal and external dosimetry.

The inspector reviewed the most recent National Voluntary Laboratory Accreditation Program (NVLAP) accreditation report on PPL.

The inspector reviewed PPL procedures associated with dosimetry operations, including issuance/use of external dosimetry, assessment of internal dose, and evaluation of and dose assessment for radiological incidents.

The inspector verified that PPL had established procedural requirements for determining when external and internal dosimetry was required.

External Dosimetry

NVLAP Accreditation

The inspector verified that PPL's personnel dosimeters that require processing were NVLAP accredited. The inspector verified the vendor's NVLAP accreditation. The inspector ensured that the approved irradiation test categories for each type of personnel dosimeter used were consistent with the types and energies of the radiation present, and the way that the dosimeter was being used.

Passive Dosimeters

The inspector evaluated the onsite storage of dosimeters before their issuance, during use, and before processing/reading, and the guidance provided to radiation workers with respect to care and storage of dosimeters.

Active Dosimeters

The inspector determined that PPL uses a "correction factor" to address the response of the electronic dosimeter (ED) as compared to the thermoluminescent dosimeter for situations when the ED must be used to assign dose. The inspector verified that the correction factor was based on sound technical principles.

The inspector selected CAP documents for adverse trends related to electronic dosimeters, such as interference from electromagnetic frequency, dropping or bumping, failure to hear alarms, etc. The inspector determined that PPL had not identified any trends and implemented appropriate corrective actions.

Internal Dosimetry

Routine Bioassay

The inspector reviewed procedures used to assess dose from internally deposited nuclides using whole body counting equipment. The inspector verified that the procedures addressed methods for determining if an individual was internally or externally contaminated, the release of contaminated individuals, the determination of entry route and assignment of dose.

The inspector verified that the frequency of such measurements was consistent with the biological half-life of the potential nuclides available for intake.

The inspector evaluated the minimum detectable activity (MDA) of the instrument. The inspector determined that the MDA was adequate to determine the potential for internally deposited radionuclides sufficient to prompt additional investigation.

The inspector verified that the system used in each bioassay had sufficient counting time/low background to ensure appropriate sensitivity for the potential radionuclides of interest. The inspector verified that the appropriate nuclide library was used. The inspector verified that any anomalous count peaks/nuclides indicated in each output spectra received appropriate disposition.

Special Bioassay

The inspector selected internal dose assessments obtained using in-vitro monitoring. The inspector reviewed and assessed the adequacy of PPL's program for in-vitro monitoring of radionuclides, including collection and storage of samples.

The inspector reviewed the adequacy of PPL's program for dose assessments based on airborne/derived air concentration (DAC) monitoring. The inspector verified that flow rates and/or collection times for fixed head air samplers or lapel breathing zone air samplers were adequate to ensure that appropriate lower limits of detection were obtained. The inspector reviewed the adequacy of procedural guidance used to assess dose when PPL applies protection factors. The inspector reviewed dose assessments performed using airborne/DAC monitoring. The inspector verified that PPL's DAC calculations were representative of the actual airborne radionuclide mixture, including hard-to-detect nuclides.

The inspector reviewed the adequacy of PPL's internal dose assessments for any actual internal exposure greater than 10 millirem committed effective dose equivalent. The inspector determined that the affected personnel were properly monitored with calibrated equipment and the data was analyzed and internal exposures properly assessed in accordance with licensee procedures.

Special Dosimetric Situations

Declared Pregnant Workers

The inspector verified that PPL informed workers, as appropriate, of the risks of radiation exposure to the embryo/fetus, the regulatory aspects of declaring a pregnancy, and the specific process to be used for declaring a pregnancy.

The inspector selected individuals who had declared their pregnancy during the current assessment period, and verified that PPL's radiological monitoring program for declared pregnant workers was technically adequate to assess the dose to the embryo/fetus. The inspector reviewed the exposure results and monitoring controls employed by PPL and with respect to the requirements of 10 CFR Part 20. The inspector reviewed the records of five declared pregnant workers.

Dosimeter Placement and Assessment of Effective Dose Equivalent for External Exposures

The inspector reviewed PPL's methodology for monitoring external dose in situations in which nonuniform fields are expected or large dose gradients exist. The inspector verified that PPL had established criteria for determining when alternate monitoring techniques were to be implemented.

The inspector reviewed dose assessments performed using multibadging during the current assessment period. The inspector verified that the assessment was performed consistently with PPL procedures and dosimetric standards.

Shallow Dose Equivalent (SDE)

The inspector reviewed SDE dose assessments for adequacy. The inspector evaluated PPL's method for calculating SDE from distributed skin contamination or discrete radioactive particles.

Neutron Dose Assessment

The inspector evaluated PPL's neutron dosimetry program, including dosimeter type(s) and/or survey instrumentation.

The inspector selected neutron exposure situations and verified that (a) dosimetry and/or instrumentation was appropriate for the expected neutron spectra, (b) there was sufficient sensitivity for low dose and/or dose rate measurement, and (c) neutron dosimetry was properly calibrated. The inspector verified that interference by gamma radiation had been accounted for in the calibration. The inspector verified that time and motion evaluations were representative of actual neutron exposure events, as applicable.

For the special dosimetric situations reviewed in this section, the inspector determined how PPL assigned dose of record for total effective dose equivalent, SDE, and lens dose equivalent.

Problem Identification and Resolution

The inspector verified that problems associated with occupational dose assessment were being identified by PPL at an appropriate threshold and were properly addressed for resolution in PPL's CAP. In addition, the inspector verified the appropriateness of the corrective actions for a selected sample of problems documented by PPL involving occupational dose assessment.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification

.1 Initiating Events (71151 - 4 samples)

a. Inspection Scope

The inspectors reviewed PPL's performance indicator (PI) data for the period of January 2010 through December 2010 to determine whether the PI data was accurate and complete. The inspectors examined selected samples of PI data, PI data summary reports, and plant records. The inspectors compared the PI data against the guidance contained in Nuclear Energy Institute (NEI) 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6. The following performance indicators were included in this review:

- Units 1 and 2, Unplanned Power Changes per 7000 Critical hours, IE03; and
- Units 1 and 2, Unplanned Scrams with Complications, IE04.

b. Findings

No findings were identified.

.2 Mitigating Systems (71151 - 2 samples)

a. Inspection Scope

The inspectors reviewed PPL's PI data for the period of April 2010 through December 2010 to determine whether the PI data was accurate and complete. The inspectors examined selected samples of PI data, PI data summary reports, and plant records. The inspectors compared the PI data against the guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6. The following performance indicators were included in this review:

- Units 1 and 2, Safety System Functional Failures, MS05.

b. Findings

No findings were identified.

4OA2 Identification and Resolution of Problems (71152)

.1 Review of Items Entered into the Corrective Action Program (CAP)

a. Inspection Scope

As required by Inspection Procedure 71152, "Identification and Resolution of Problems," and in order to help identify repetitive equipment failures or specific human performance issues for follow-up, the inspectors screened all items entered into Susquehanna's CAP. The inspectors accomplished this by reviewing each new condition report, attending management review committee meetings, and accessing PPL's computerized database.

b. Findings

No findings were identified.

.2 Annual Sample: Operator Workarounds (OWAs) (1 sample)

a. Inspection Scope

The inspectors conducted a review of the OWA program to verify that PPL was identifying OWAs at an appropriate threshold, was entering them into the CAP and proposing or implementing appropriate corrective actions. Specifically, the review was conducted to determine if any OWAs for mitigating systems affected their safety functions or affected operators' abilities to implement abnormal or EOPs. The inspectors also walked down panels, interviewed nuclear plant operators, and reviewed operator rounds and logs to determine whether routine compensatory actions should be categorized as OWAs or operator challenges.

b. Findings & Observations

No findings were identified.

The inspectors reviewed an Operations Bulletin dated January 21, 2011, regarding a procedure change to OI-AD-096, "Operator Burdens." The bulletin identified that, during a 2010 Site Wide Self-Assessment, "a walkdown of the Unit 1 and Common control boards identified nine deficiency tags that ...could be classified as a Control Room Deficiency IAW OI-AD-096" and that "inclusion of the 9 potential control room deficiencies would drive the performance indicator Red." The Operations Aggregate Index performance indicators for Unit 1 and Unit 2 were White and Green respectively in December 2010. The control room deficiencies performance indicators for Unit 1 and Unit 2 were Green and White respectively in December 2010.

Through interviews, the inspectors determined that details of the nine tags had not been captured in the CAP or field notes so that PPL could take action to incorporate them in the Operator Burdens program. On February 3, the inspectors noted there were 10 current deficiencies on the daily report. Through an independent review of control room deficiency tags, the inspectors identified an additional Operator Challenge and 16 control room deficiencies that were not being tracked in accordance with OI-AD-096, Revision 7. In response to this, the licensee added these to the report including an additional OWA

and six more deficiencies which PPL identified. PPL noted that the majority of the ARs, CRs, and work orders associated with the deficiencies had not been coded as required by the procedure thereby contributing to the inaccurate list and performance indicators. After incorporation of the operator burdens, the Operator Aggregate Index performance indicators for both units turned Red for February 2011. The inspectors also noted that a requirement of OI-AD-096, Revision 6, for a periodic review of the list had been removed with the recent revision.

The inspectors concluded that changes to the program had not been effectively managed and that identification of operator burdens was not complying with the associated procedure. The failure to comply with O1-AD-096 constitutes a violation of minor significance that is not subject to enforcement action in accordance with the NRC's Enforcement Policy since there were no safety consequences or impacts to PPL's response to an actual event. As corrective actions, PPL entered these issues into their CAP as 1356772 and 1334694 and scheduled those deficiencies requiring an outage for resolution as appropriate.

.3 Annual Sample: Review of Corrective Actions to Improve Simulator Fidelity (1 sample)

a. Inspection Scope

The inspectors reviewed the items generated in PPL's CAP for the simulator over the past four months. The inspectors focused their efforts on the Quality Assurance (QA) issue developed in October 2010 that documented the collective impact of simulator deficiencies on simulator performance and the potential impact on simulator fidelity. The inspectors reviewed the RCA and other evaluations developed to (1) determine the root cause(s) for the elevated simulator corrective action backlog, (2) assess the ability of the simulator to meet its regulatory requirements, and (3) evaluate the effectiveness of the corrective action process for recently identified performance issues.

In order to complete this scope, the inspectors reviewed the QA issue which identified the simulator backlog as a programmatic and regulatory deficiency and the RCA developed to assess the programmatic and organizational factors that led to the deficiency. The inspectors also reviewed additional condition reports developed to assess the fidelity of the simulator, identify additional simulator deficiencies and assess the modification and acceptance test process for the simulator. Additionally, the inspectors reviewed corrective actions to determine their effectiveness in addressing the identified deficiencies, the timeliness of the corrective actions, and the effectiveness of the corrective actions to fully address the QA identified issue.

b. Findings

The inspectors documented a licensee-identified violation of 10 CFR 55.46(c)(1), "Plant Referenced Simulators," because the Susquehanna simulator did not accurately model the response of the 4kV breakers in the residual heat removal (RHR) and other systems following their modification in 2007. This violation is discussed further in section 4OA7.

c. Observations

The inspectors determined that the QA issue adequately identified the scope and potential collective impact from the significant backlog of simulator deficiencies. The

inspectors also determined that the RCA adequately addressed the programmatic and organizational deficiencies that facilitated the growth of the backlog of simulator deficiencies to prioritize and correct the condition.

The inspectors noted that the corrective actions developed as part of the RCA allowed for improved identification of the actual impact of the simulator deficiencies on Operations Training and the corrective actions appeared to adequately establish a process for prioritizing and planning for the closure of the backlog of simulator deficiencies. Long term effectiveness could not be evaluated at the time of the inspection due to the short period of time the corrective actions had been in place.

Notwithstanding, inspectors noted several weaknesses in the implementation of CAP for the simulator.

- CR 1280753 / CR 1294476: The large backlog of simulator deficiencies was initially identified in July 2010 during a review of CAP Trend Codes which led to a common cause analysis being generated in August 2010. This common cause review documented the primary changes to the simulator that initiated a large percentage of the deficiencies but did not address (1) the potential for negative training from these deficiencies, (2) the impact to simulator fidelity, or (3) the regulatory impact from these deficiencies. The initial CR which requested the review of the simulator deficiencies did not identify any of these deficiencies and require these gaps to be closed by the common cause analysis or by a separate evaluation. The corrective actions recommended within the common cause analysis were determined to be adequate to address the simulator deficiency backlog when combined with the corrective actions from the RCA.

- CR 1313680: The QA issue documented in this CR identified that software modifications had been incorporated inappropriately into the "for-use baseline" and acceptance testing was not adequately identifying deficiencies which were resulting in problems with simulator performance. The effectiveness of acceptance testing in identifying issues and the process for the acceptance of changes to the simulator prior to training was not included in the scope of the RCA, nor was it evaluated separately in the CAP. The previous RCA of acceptance testing in the simulator for the ICS modification was narrowly focused on the ICS modification itself and did not adequately address modification and acceptance testing for the simulator for modifications and changes outside the ICS scope. This weakness was not addressed until an unrelated CR was developed in 2011 to generically address the modification and acceptance test process.

- CR 1324859: The inspectors also reviewed the ACE and corrective actions from the NRC-identified Green, NCV, 2010-004-03 (ML103160334). The inspectors noted that the evaluation of operating experience was limited and several examples of plants that had experience with flow instabilities and had them modeled in their simulator were not included in the evaluation. Additionally, the evaluation assumed that changes are not going to be required to be made to the simulator and therefore requested that an effectiveness review not be performed. Finally, the CR recommended performing testing in a configuration that is known to not cause flow instabilities as a means to collect data for the modeling of RCIC oscillations in the simulator. The inspectors noted that, even with the weaknesses noted in the evaluation of the NCV, the simulator had been changed to reflect oscillations in the

RCIC system and were being pursued for the HPCI system.

Additionally, some of the CRs had weaknesses in the extent of condition review or additional documentation was required to determine the level of review performed. Several CRs required additional detail to understand the scope of the CR or the actions taken. These are generic weaknesses in CAP that were determined to not have significantly impacted the results or initial determinations made. However, these weaknesses were prevalent in most CAP products reviewed for this issue.

.4 Annual Sample: Review of CS Chiller Performance (1 sample)

a. Inspection Scope

The NRC Integrated Inspection Report, IR 05000387;388/2009003 issued August 11, 2009 (ML092230158), identified a potential adverse trend related to ventilation system health. The report listed refrigerant leaks as being a lead contributor to equipment degradation. At the time, this was identified by three separate CRs documenting refrigerant leaks on the 'A' and 'B' CS chillers in the month of April. NRC Integrated Inspection Report, IR 05000387;388/2010003 issued August 13, 2010 (ML102250028) identified a Green NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," when PPL failed to identify and properly correct a CAQ. Specifically, PPL failed to replace the refrigerant low temperature cutout switch despite internal operating experience that the switch experienced setpoint drift following calibration. Additionally, there were four CRs generated during 2010 that identified adverse trends in chiller performance and refrigerant leaks.

This inspection reviewed the corrective actions developed by PPL to address the potential adverse trend in HVAC health, with specific focus on the CS chillers. The inspection consisted of a review of all evaluations and corrective actions to address the identified issues. In addition, the inspectors reviewed corrective action effectiveness subsequent to the inoperability of the 'B' CS chiller following identification of three refrigerant leaks on January 14, 2011. Additionally, the inspectors reviewed system Maintenance Rule performance and PPL's grading of chiller health as reported in the recent revision to the Station Health Report, concluding December 31, 2010.

b. Findings

1. Introduction: The inspectors identified a Green FIN of Susquehanna procedures for failure to evaluate the condition of the 'B' CS chiller after completion of SE-054-301, "ESW/CS Chilled Water System Leakage Test," Revision 12. Specifically, operations and maintenance personnel failed to evaluate system parameters to ensure they were restored to normal prior to restoring the chiller to an operable status and, when maintenance subsequently reported that refrigerant stacking was occurring, failed to appropriately evaluate the degraded condition with regard to equipment operability.

Description: On January 12, 2011, at 10:34 a.m. Unit 1 and 2 entered TS Limiting Conditions for Operation (LCOs) 3.7.3, "CREOAS," and 3.7.4, "CR Floor Cooling," while performing SE-054-301, "ESW/CS Chilled Water System Leakage Test," Revision 12. This surveillance runs ESW through the chiller condenser, per OP-030-001, "Control Structure Chiller Water System," Revision 31, or SO-030-B03, "Quarterly Control Structure Chilled Water Flow Verification Loop 'B'," Revision 16, and verifies operational

leakage meets specific acceptance criteria. Because the 'B' CS chiller was in standby at the time of testing, the actions necessary to start the internal circulating water pumps without starting the chiller and associated fans requires entering the TS action statements. ESW was run through the 'B' CS chiller for approximately 30 minutes during the test. After restoration from the surveillance, the TS LCOs were exited at 11:20 a.m.

NDAP-QA-0312, "Controls of LCOs, TROs, and Safety Function Determination Program," Revision 15, Section 6.5, states that the appropriate LCO/Technical Requirements for Operation (TRO) condition can be cleared when the inoperable equipment is restored to an operable status. NRC Part 9900: Technical Guidance "Operability Determinations and Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety," Appendix A, explains that "upon completion of the surveillance, the licensee should verify restoration to operable status of at least the parts of the SSCs or system features that were altered to accomplish the surveillance." In this particular case, operators should have verified that refrigerant level, which was specifically affected by the surveillance, had returned to normal.

As a separate maintenance task, electrical maintenance performed a weekly parameter check on the 'B' CS chiller later that day. At approximately 1:20 p.m., the technician noted that refrigerant level was not visible in the sight glass and reported the condition to the work control center. After discussion with operators, it was determined that the lack of refrigerant level was caused by passing ESW through the non-operating condenser of the CS chiller. Because of the abnormally low temperature of the ESW, the bulk of the refrigerant migrated to the condenser, a phenomenon known as "refrigerant stacking." The technician questioned the performance of this surveillance during the cold winter months due to the potential impact of not having refrigerant distributed throughout the system and its affect on the chiller's reliability. The next morning at approximately 8:30 a.m., the technician verified that refrigerant level had returned to the visible range, at approximately one inch in the lower sight glass, and wrote a CR describing the condition (CR 1341905). An immediate assessment of the condition with regards to chiller operability was not performed until January 14, 2011.

NRC Information Notice 94-82, "Concerns Regarding Essential Chiller Reliability During Periods of Low Cooling Water Temperature" alerted the industry that "over-cooling the condenser refrigerant for essential chilled water systems when condenser cooling water supply temperature is abnormally low may cause unstable chiller operation or actuate a self-protection feature that removes the chiller from service." Specifically, the chiller is susceptible to low refrigerant temperature trips due to a phenomenon known as stacking. Liquid refrigerant will remain in the condenser because there is insufficient refrigerant gas pressure to drive the liquid refrigerant from the condenser to the evaporator portion of the chiller. If this occurs and the chiller is started, the chiller's refrigerant temperature will continue to decrease to the low refrigerant temperature setpoint, resulting in loss of the chiller.

In this case, the cause of the refrigerant stacking was the 'B' CS chiller being supplied with abnormally low cooling water temperatures in a no-load condition, since the chiller was in a standby status. A review of external industry operating experience identified two instances where refrigerant stacking resulted in unreliability of the essential chiller.

After reviewing CR 1341905, the inspectors questioned the operability statement, which was marked "N/A" and amplified by a remark that "low refrigerant is not necessarily an operability issue." This operability determination was made, coincidentally, after the chiller had been declared inoperable as a result of a separate issue. Basing past operability of a system on the status at the time a condition is discovered is contrary to NDAP-QA-0703, "Operability Assessment and Requests for Enforcement Discretion," Revision 14, which states that the initial operability screening should be based on the degraded or non-conforming condition being assessed, not the status of the system at the time of discovery. This operability determination failed to assess operability for the period spanning from when the condition was identified on January 12 to when refrigerant level was verified visible on January 13, during which the reliability of the 'B' CS chiller was in question, and inappropriately marked the status as "N/A." Additionally, the timing of the prompt operability determination was inconsistent with NDAP-QA-0703 and NRC IMC Part 9900 in that a statement of operability was not made until two days after the condition was reported to control room personnel.

Additionally, an engineering evaluation of the condition concluded that there was no reason to believe the chiller was affected with a visible level in the sight glass. However, the evaluation did not consider the period of time when there was no visible level in the sight glass, as observed by the technician. Though it considered the concept of refrigerant stacking and its impact on chiller reliability, it failed to identify that the condition of stacking was still occurring after the plant operators were considering the chiller operable. During a similar test conducted on February 8, the evaluator observed refrigerant level recover to the visible range shortly after securing ESW flow, and while operations was still considering the equipment inoperable. Using this observation, the evaluation assessed that the chiller had been operable during the previous test on January 12. Because the evaluation failed to identify that the condition of refrigerant stacking was still occurring on January 12 after the chiller was considered operable, it inappropriately screened the condition as not adverse to quality (NAQ) and, therefore, did not assign any corrective actions.

Analysis: Failure to appropriately evaluate the effect of refrigerant stacking on CS chiller operability is a performance deficiency which was reasonably within PPL's ability to foresee and correct. The finding is more than minor because it is associated with the equipment performance 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, 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 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. (P.1(c))

Enforcement: There were two procedural issues associated with this finding. First, NDAP-QA-0312, "Controls of LCOs, TROs and Safety Function Determination Program" allows exiting an LCO when the inoperable equipment is restored to an operable status. Secondly, NDAP-QA-0703, "Operability Assessment and Requests for Enforcement Discretion," provides requirements for timeliness and quality of immediate operability determinations of degraded conditions. Contrary to the above, on January 12, 2011, the 'B' CS chiller was returned to an operable status and the associated LCOs exited despite still being subjected to refrigerant stacking. Additionally, operators inappropriately evaluated the degraded condition of refrigerant stacking with regard to CS chiller operability. This has been entered into PPL's corrective action program as CRs 1341905 and 1365759. Because this finding does not involve a violation since out of service time did not exceed Technical Specifications LCO action statement time limits and has very low safety significance, it is identified as a FIN **(FIN 05000387;388/2011-002-03, 'B' CS Chiller Inoperable due to Refrigerant Stacking)**

2. Introduction: An NRC-identified, Green NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Actions," occurred when PPL failed to correct a CAQ associated with the 'B' CS chiller.

   Description: On January 14, 2011, refrigerant leaks were identified on the 'B' CS chiller that impacted the ability of the chiller to operate for its 30-day mission time. Consequently, the chiller was declared inoperable per SSES Unit 1 and 2 TS LCO 3.7.3, "CREOAS" and 3.7.4, "Control Room Floor Cooling." In this case, the 'B' CS chiller was declared inoperable due to its inability to operate for its mission time. Despite this being the eleventh leak on a plant chiller in the previous eight months, the CR documenting the failure did not require any evaluation.

   The inspectors identified that there were numerous opportunities to identify a potential adverse trend in chiller performance, with specific emphasis associated with Freon leaks, and to take corrective actions to prevent the inoperability of the 'B' CS chiller in January 2011. NRC Integrated Inspection Report 05000387;388/2009003 (ML092230158) identified a potential adverse trend related to ventilation system health. This trend was identified, in part, because of several chiller refrigerant leaks identified on the CS chillers during the previous quarter. Additionally, there were four CRs generated during 2010 that identified adverse trends in chiller performance or refrigerant leaks.

   - July 2010 – CR 1281550 was generated to "review chiller Freon leaks to determine if there is a trend." Though the evaluation identified that a trend was occurring, it failed to adequately assess the trend, identify any causes or prescribe any corrective actions to correct the adverse trend.

   - August 2010 – CR 1292227 was generated identifying that five chillers had fallen into a required 30-day repair window over the previous twelve months. Though the evaluation of the CR identified that quarterly leak checks were not being scheduled per vendor guidance, it failed to evaluate past corrective actions of leaks to determine if they were effective. Additionally, it only scoped the reactor and TB chillers into the extent of condition review, excluding the safety-related CS chillers.

   - August 2010 – CR 1293592 was generated identifying an adverse trend in chiller reliability and a causal analysis was performed. Much of the analysis referenced previous evaluations and corrective actions. Specifically regarding chiller leaks, the

evaluation referenced that CR 600332 had required replacement of the filter/dryer lines of plant chillers and that the action had been completed. This evaluation referenced corrective actions taken for previous evaluations, but failed to provide any new corrective actions.

- November 2010 – CR 1326952 was generated identifying that "a review of CRs on various chillers shows a trend of Freon leaks over the years." Though the evaluation stated that a review of completed work orders (WOs) correcting Freon leaks over the last 11 years was performed, it failed to identify that the filter/dryer line was not replaced on the 'B' CS chiller as previously discussed.

While reviewing the issue, the inspectors identified a previous evaluation (CR 600332) of similar leaks on the RB chillers' refrigerant filter/dryer line that was completed in August 2004. The RB chiller is a similar Carrier model chiller to the CS chiller and both have the same refrigerant filter/dryer line. The evaluation concluded that these lines had been installed for over 20 years and insulation deterioration had allowed condensation to form and corrode the piping. As part of the review of extent of condition, WOs were generated to replace the refrigerant filter/dryer lines on all plant chillers by December 2006. Though many of the due dates were extended, this was completed on all plant chillers with the exception of the 'B' CS chiller. In the case of the 'B' CS chiller, WO 612503 was written to only require repairing known refrigerant leaks, as well as any leaks identified after the chiller was shutdown, and did not replace the entire filter/dryer line as required by the evaluation. The WO was completed in April 2009.

CR 600332 and related WOs were reviewed by two of the evaluations listed during 2010 listed above. However, neither evaluation identified that previous actions were not implemented as expected. The inspectors concluded that had the work been performed as required by the extent of condition review, it is unlikely that the 'B' CS chiller Freon leaks would have occurred as identified on January 14, 2011, and therefore operability and availability of the 'B' CS chiller would not have been affected. Despite numerous opportunities to identify and take actions to address an adverse trend in Freon leaks on plant chillers, leaks developed on the 'B' CS chiller resulting in 92 hours of unplanned unavailability.

Analysis: The inspectors determined that the failure to correct the condition adverse to quality, an adverse trend of Freon leaks, by identifying that previous WOs had not been implemented as required prior to new leaks occurring was a performance deficiency which was reasonably within PPL's ability to foresee and correct. 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 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. (P.1(c))

Enforcement: 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action" states, in part, "Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations... and non-conformances are promptly identified and corrected." Contrary to this, PPL failed to correct a condition adverse to quality, an adverse trend of refrigerant leaks, resulting in the failure of the 'B' CS chiller due to an inability to operate for its entire mission time during January 2011. Because the finding was of very low safety significance and because it was entered into PPL's CAP (1387934), this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. **(NCV 05000387;05000388/2011-002-04, Failure to Replace Piping on 'B' CS Chiller)**

c. Observations

Evaluation Weaknesses

The inspectors found that, in general, PPL appropriately identified issues associated with chiller performance in a timely manner commensurate with their safety significance. However, there were weaknesses identified in the evaluation of those issues to ensure that appropriate corrective actions were taken. CR 1281550, for example, identified a potential trend in Freon leaks. However, though the Level 3 evaluation that was conducted confirmed a trend existed, it was not performed per NDAP-00-0752, "Cause Analysis," Revision 7, and did not identify any corrective actions that would appropriately correct the trend identified. Additionally, an internal effectiveness review of the evaluation performed to support CR 1326952, identified that "the analysis was shallow and did not result in any actions that are likely to reduce the rate of chiller leaks."

As discussed in NRC Integrated Inspection Report 05000387;388/2010005, dated February 9, 2011 (ML110400284), corrective actions during 2010 to address a trend in lower tier evaluation weaknesses had not been fully implemented or proven to be effective. Specifically, a common cause evaluation (CR 1287298) was completed in the 4th quarter of 2010, with corrective actions being fully implemented by June 2011. The inspectors recognized that all of the evaluations referenced by the two findings referenced in this sample were conducted prior to implementation of corrective actions addressing the lower tier, Apparent Cause and Evaluation type CAP products.

The inspectors identified an emerging trend in the assessment of issues with regard to equipment operability. In addition to the examples described in section 4OA2.3.b1 above, the inspectors identified numerous examples where the thoroughness of evaluation and documentation to support safety-system operability required improvement. Though PPL had previously identified CAP weaknesses in the area of evaluations, they had failed to identify that these weaknesses extended to Operability Evaluations. This was entered into PPL's CAP as CR 1365759.

HVAC System Health

With regard to chiller performance, the inspectors reviewed actions prescribed to improve the trend in refrigerant leaks. The inspectors reviewed PPL's corrective actions and determined that they were generally appropriate to address the identified trend. Additionally, the inspectors noted that PPL is considering upgrade/replacement of the current chiller control systems, in addition to the chillers themselves, to address life-cycle management and long-term system health concerns. Inspectors will continue to follow progress in implementation of corrective actions to ensure they are timely and ensure continued reliability of the safety-related chillers.

4OA3 Event Followup (71153 – 5 samples)

.1 Single Point Vulnerability Discovered in Reactor Building HVAC

a. Inspection Scope

On January 3, 2011, Engineering discovered that a single point vulnerability existed in the RB HVAC system whose failure could result in a spurious steam leak detection (SLD) isolation causing simultaneous isolation of MSIVs, HPCI, and RCIC. The condition was reported to the NRC via the ENS as required by 10CFR50.72(b)(3)(v), for a condition that, at discovery, could have prevented fulfillment of a safety function needed to mitigate the consequences of an accident, and 10CFR50.72(b)(3)(ii), for an event that resulted in the nuclear power plant being in an unanalyzed condition (EN 46519).

The resident inspectors discussed the issue with PPL to ensure the vulnerability was understood and evaluated PPL actions to compensate. PPL evaluated that a failure of a single temperature controller coincident with outside air temperature less than 10 degrees Fahrenheit could result in a spurious SLD signal. PPL promptly took action to implement an engineering change to remove the vulnerability. Inspectors reviewed PPL's actions and walked down the SLD system to ensure the concern was fully addressed.

The classification of this event per 10CFR50.72(b)(3)(v) was retracted on March 1, 2011, when it was determined that, at the time of identification, sufficient environmental and plant conditions did not exist to impact, or potentially impact, the safety functions as originally reported. This event was further reported to the NRC as required by 10CFR50.73(a)(2)(ii)(B) on March 2, 2011. This Licensee Event Report (LER) will be reviewed and closed out in a future inspection report.

b. Findings

No findings were identified.

.2 Unit 1 Manual Reactor Scram for an Unisolable Extraction Steam Leak

a. Inspection Scope

On January 25, at 1:45 a.m., the Field Unit Supervisor (FUS) and Health Physics personnel responded to the '5C' Feedwater Heater Bay to a report of a potential steam

leak. At 4:43 a.m., the '1B' turbine building (TB) chiller tripped followed by an automatic start of the '1A' TB chiller. Coincident with the chiller swap, the control room received alarms indicating the 13.8 KV supply breaker to several TB non-safety related load centers had tripped. Field operators discovered water running out of an electrical junction box on Unit 1 TB elevation 762' and associated conduit down to Unit 1 TB elevation 729'. At 5:17 a.m., the FUS reported the steam leak in the '5C' Feedwater Heater Bay had worsened and appeared to be from extraction steam for the 'C' FWH. Reactor power was reduced to 71 percent RTP and extraction steam to the 5C FWH string was isolated in an attempt to isolate the steam leak. After observation showed that the steam leak was not isolated, plant operators scrammed the reactor from 60 percent RTP.

Unit 1 response to the manual scram was per design. Reactor water level dropped to a minimum of -30" on wide range level indication due to void collapse and RCIC automatically initiated and injected water into the reactor vessel. Level was restored with feedwater in addition to the inventory injected with RCIC. A resident inspector responded to the control room and observed the plant's response to the transient and associated operator actions during the response. Additionally, the inspectors reviewed the transient response post-event as well as reviewed work performed during the forced outage. Major work included repairs to the '5C' Feedwater Heater Extraction Steam BTV, which was determined to be the source of the steam leak, as well the 'B' and 'C' SRM.

The event was reported to the NRC via ENS as required by 10CFR50.72(b)(2)(iv)(B) for an RPS actuation while critical and 10CFR50.72(b)(3)(iv)(A) for RCIC actuation (EN 46569).

b. Findings

Introduction: A self-revealing FIN of very low safety significance (Green) was identified when PPL personnel did not have adequate procedures as required by NDAP-QA-0008, "Procedure Writer's Guide," Revision 8, to perform maintenance on a threaded connection on the '5C' FWH Extraction Steam, BTV10245C. 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.

Description: On January 25, 2011, the Operations FUS investigated reports of a steam leak in the Unit 1 'C' FWH bay. After entering the bay, it was determined that the leak was from the '5C' FWH Extraction Steam line and operators began attempts to isolate the steam leak. While these attempts were made, non-safety related electrical equipment exposed to the condensing steam began to malfunction. Specifically, a feeder breaker on the 13.8 kV Startup Bus 20 tripped due to ground fault, securing power to various non-safety related loads, including the running TB chiller. At 6:10 a.m., the Unit 1 reactor was manually scrammed due to an inability to isolate the steam leak without removing the main turbine from service and to prevent additional equipment damage. A subsequent walkdown identified that the valve cover plug for the '5C' FWH Extraction Steam BTV10245C, had been ejected.

BTVs are installed in the Extraction Steam Lines to the '3', '4' and '5' FWHs to provide turbine overspeed protection and prevent water from entering the main turbine. BTV10245C, the Unit 1 '5C' FWH Extraction Steam BTV, is a 16 inch swing check valve. In order to vent the valve during hydrostatic testing, the original equipment manufacturer created a vent hole in the center of the valve cover. After manufacturer testing, the threaded port was plugged using a ¼ inch National Standard Pipe Taper (NPT) threaded pipe plug. Since this plug was not used after initial manufacture, it was not included in any design drawings.

Since the valve was installed during initial plant construction, the valve cover had been removed to perform inspections of the check valve internals twice. Based on interviews with plant personnel, it was determined that, for the purpose of performing the internal inspection, the ¼ inch NPT plug was removed and a ½ inch Nation Standard Pipe Straight (NPS) threaded eyebolt was installed to facilitate easier rigging of the valve cover. In recreations performed by PPL's root cause team, noticeable deformations were observed on the ¼ inch NPT female threads. This deformation, likely caused by threading a straight thread eye bolt into the tapered hole, would have resulted in steam leakage and additional steam cutting of the pipe plug threads.

On February 3, 2010, a steam leak was identified from BTV10245C (ARs 1231175 and 1231214) and work orders were scheduled to repair the leak in the refueling outage two months later (WO 1251578). The work instructions stated "Repair/Replace pipe plug as needed in center of bonnet to correct steam leak. Valve print does not show pipe plug in center of bonnet. Return to planning for parts and additional instructions if needed." Prior to removing the plug, the technicians noted the ¼ inch plug was steam cut and approximately three threads were engaged. The technician used a ¼ inch pipe chase to chase the existing threads and installed a new plug with Copaltite thread sealant, noting that a maximum of four turns were achieved. The Copaltite thread sealant was not heat cured as required by manufacturer instructions and, based on discussion with the vendor, likely would have been ineffective at providing any sealing. The PMT was deferred to WO 1074054, which included a cumulative walkdown of all work areas following plant startup and heatup from the refueling outage. At the time of the PMT inspection, scaffolding for the valve had been removed and insulation reinstalled.

NDAP-QA-0008, "Procedure Writer's Guide," Revision 8, states that maintenance procedures "contain enough detail to permit the maintenance work to be performed correctly and safely." ANSI/ASME B1.20.1, "Pipe Threads, General Purpose," 1983, states that tapered pipe threads are required to be made up wrench tight with a sealant whenever a pressure-tight joint is required. It also specifies the number of threads required for adequate engagement. When the ¼ inch NPT pipe plug is tightened 7.2 turns, as required by ANSI/ASME B1.20.1, a clearance remains between the crests and roots of the threads, resulting in a leakage around this spiral. Because of this leakage path, NPT fittings must be made leak-free with the use of a thread sealant compound. In the case of the repair performed under PCWO 1231214, work instructions were inadequate to ensure that technicians achieved adequate thread engagement and cured the sealant with adequate heat as required by the Copaltite instructions for use.

Analysis: The inspectors determined that having inadequate procedures to ensure the threaded connection on BTV10245C was reinstalled properly following maintenance was a performance deficiency within PPL's ability to foresee and prevent. The inspectors

screened the performance deficiency in accordance with IMC 0612, Appendix B, "Issue Screening." The performance deficiency was determined to be 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. (H.2(c))

Enforcement: NDAP-QA-0008, "Procedure Writer's Guide," Revision 8, states that maintenance procedures "contain enough detail to permit the maintenance work to be performed correctly and safely." ANSI/ASME B1.20.1, "Pipe Threads, General Purpose," 1983, specifies that tapered pipe threads are required to be made up wrench tight with a sealant whenever a pressure-tight joint is required and also specifies the requirement for adequate thread engagement. Contrary to above, on January 25, 2011, maintenance instructions were inadequate to ensure the pipe plug on the '5C' FWH extraction steam bleeder trip valve, BTV10245C, was reinstalled correctly following maintenance. These issues are identified in the PPL's CAP in CR 1346952. The bleeder trip valve is not safety-related and this finding does not involve enforcement action because no violation of regulatory requirements was identified. Because this finding does not involve a violation and has very low safety significance, it is identified as a FIN. **(FIN 05000387/2011002-05, Inadequate Maintenance Procedure Results in Steam Leak and Manual Scram)**

.3 (Closed) Licensee Event Report (LER) 05000387/2010-002-01, Automatic Reactor Scrams Occur during Post-Modification Testing of the Digital Feedwater Integrated Control System

On April 22, 2010, Unit 1 experienced an automatic reactor scram on low reactor water level during planned testing of a new digital feedwater ICS. On May 14, 2010, Unit 1 automatically scrammed due to a main turbine trip on high reactor water level during a license-condition required condensate pump trip test. There were no actual adverse consequences as a result of this event. PPL attributed both scrams to less than adequate engineering rigor applied during the development and implementation of the ICS gains and tuning factors. Inspectors had previously documented a self-revealing Green NCV because the Susquehanna simulator had not accurately modeled ICS response to reactor level transients (IR 05000387;388/2010004). The inspectors reviewed this LER and the corrective actions associated with these events. No further findings of significance were identified. This LER is closed.

.4 (Closed) Licensee Event Report (LER) 05000387/2010-003-01, Unit 1 Manual Reactor Scram due to Leakage from the Unit 1 Circulating Water (CW) System and Subsequent Flooding of the Unit 1 Condenser Bay

On July 16, 2010, Unit 1 received a condenser bay flood alarm. Plant operators verified that flooding was occurring into the 656' elevation of the condenser bay. Reactor power was reduced to 40 percent RTP via control rod insertions and a reactor recirculation pump runback. Operator attempts to isolate condenser waterboxes remotely were unsuccessful. Unit 1 was subsequently manually scrammed, Main Steam Isolation Valves (MSIVs) were shut, and the main condenser was isolated so that the CW system could be shutdown. Concurrently, plant operators manually closed waterbox isolation valves and isolated the leak. The NRC issued a White Finding related to the flooding event and inadequate procedures. This finding is documented in IR 05000387;388/2010004 (preliminary White) and 05000387/2010008 (Final White).

The inspectors reviewed this LER during the 4th Quarter of 2010 and identified that an unexpected ICS system response to this transient was not discussed in the LER as required. This was documented in NRC IR 05000387;388/2010005. PPL entered the issue into their CAP (CR 1334323) and revised the LER. This revised LER was reviewed by the inspectors and no further issues were identified. This LER is closed.

4OA5 Other Activities

.1 TI 2515/179 Verification of Licensee Responses to NRC Requirement for Inventories of Materials Tracked in the National Source Tracking System Pursuant to Title 10, Code of Federal Regulations, Part 20.2207 (10 CFR 20.2207)

a. Inspection Scope

The inspector verified the information listed on PPL's inventory record by performing a physical inventory, at PPL's facility and visually identified each item listed on PPL's inventory.

During the physical inventory, the inspector examined the physical condition of devices and/or containers containing nationally tracked sources; evaluated the effectiveness of PPL's procedures for secure storage and handling of nationally tracked sources; discussed PPL's maintenance of devices containing nationally tracked sources, including leak tests, and verified that PPL is performing maintenance as required; and determined that the posting and labeling of nationally tracked sources was adequate.

The inspector reviewed PPL's records documenting transactions of subject sources, and compared these records with the data from the PPL's NSTS inventory. The inspector evaluated the effectiveness of PPL's procedures for updating inventory records.

b. Findings and Observations

No findings were identified.

4OA6 Meetings, Including Exit

On March 25, 2011, the inspector presented inspection results to Mr. J. Helsel and other members of his staff. PPL acknowledged the findings.

On April 28, 2011, during the 1st quarter 2011 integrated report exit meeting, the inspectors presented inspection results to Mr. T. Rausch and other members of his staff. PPL acknowledged the findings. No proprietary information is included in this report.

4OA7 Licensee-Identified Violations

The following violations of very low safety significance (Green) were identified by PPL and are violations of NRC requirements which meet the criteria of the NRC Enforcement Policy, for being dispositioned as non-cited violations:

- On January 25, 2011, PPL commenced maintenance on the U2 RHR swing bus transfer switch, which resulted in the entire loop of RHR being inoperable due to a loss of power to the associated loads powered by the swing bus. Although the impacts were understood by Operations personnel and the appropriate Technical Specification (TS) LCO was entered, an additional clearance for status control was applied without the Work Week Manager's awareness that rendered the B RHR loop unavailable. When the RHR loop was included in the risk assessment, it was determined that plant risk was Yellow, previously calculated and communicated to the station as Green. This issue was determined to be a violation of 10 CFR 50.65 (a)(4), for failure to ensure work was properly modeled and evaluated for online plant risk. This finding is more than minor because it is similar to example 7.e. in NRC IMC 0612 Appendix E, "Examples of Minor Issues." This example states, in part, that failure to perform an adequate risk assessment when required by 10 CFR 50.65 (a)(4) is not minor if the overall elevated plant risk would put the plant into a higher licensee established risk category. This finding was evaluated using IMC 0609, Appendix K, "Maintenance Risk Assessment and Risk Management Significance Determination Process." In accordance with flow chart 1, the finding was determined to be Green since the risk deficit did not exceed the threshold for incremental core damage probability or incremental large early release probability. The issue was entered into PPL's CAP as CR 1347508.

- PPL's CR 1220346 (December 30, 2009) identified that the anti-pumping feature of the RHR breakers was not modeled correctly in the simulator. Specifically, the breakers would cycle continuously open and closed when an open and closed signal was present. In actuality, the breakers would attempt to cycle once if both signals were present but then would trip and remain open until the anti-pumping circuit is reset and the breaker would have the ability to be closed. This error had been present in the simulator since 2007, when the RHR and other 4kV system breakers were modified to a new style of breaker. This violation occurred due to incorrect evaluation of the modification that installed the breakers in 2007. During the evaluation of the modification, the impact to the simulator from the anti-pumping feature of the breaker circuitry was initially installed in the simulator but was removed due to incorrect print reading and evaluation of the simulator changes by the licensee. The inspectors determined that PPL took corrective action to correct the simulator prior to providing scheduled training in 2010.

  This error in the simulator is a violation of 10 CFR 55.46(c)(1), "Plant Referenced Simulators," because negative training was provided to the licensed operators since the SSES simulator did not accurately model the performance of RHR and other system breakers during plant transients where the breakers had at least momentary simultaneous open and close signals. Additionally, the incorrect modeling in the simulator helped prevent presenting the appropriate mitigative actions required by the licensed operators to restore equipment to service after the equipment remained tripped

due to the anti-pumping feature of the effected breakers. The inspectors determined that PP&L's inaccurate modeling of the effected 4kV breakers was within PPL's ability to foresee and correct since the initial impact to the simulator was evaluated correctly and later made incorrect due to errors by the licensee staff. The finding 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 inspectors evaluated the finding in accordance with IMC 0609, Appendix I, "Licensed Operator Requalification SDP." The finding was determined to be of very low safety significance (Green) because it is not related to the failure rate of licensed operators on the overall annual examinations or during the operating portion of the annual examination. The finding was also not related to the licensee's grading of the annual operating examination, the quality of the biennial written examination nor was it related to an individual operating examination. The finding is related to simulator fidelity, and a deviation between the plant and the simulator that could have a negative impact on operator actions.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

M. Diltz, Operations Training Manager
C. Dodge, Supervising Engineer
A. Fitch, Site Training Manager
J. Ganter, I&C Technician
J. Goodbred Jr., Operations Manager
R. Hollands, HVAC System Engineer
T. Illiadis, General Manager Operations
G. Maertz, Mechanical Systems Engineering Supervisor
M. Murphy, Mechanical Systems Engineering Supervisor
B. O'Rourke, Senior Engineer - Nuclear Regulatory Affairs
J. Petrilla, Supervisor Regulatory Affairs
T. Rausch, Site Vice President and Chief Nuclear Officer
B. Rigotti, HVAC System Engineer
T. Roth, I&C Maintenance Manager
V. Schuman, Radiation Protection Manager
K. Griffith, Requal Supervisor

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened
None.

Opened/Closed

05000387;388/2011002-01	FIN	RWST Level Transmitter Failure Not Entered in CAP (1R13)
05000387/2011002-02	FIN	Inadequate Corrective Actions Result in Loss of Drywell Cooling and Downpower (1R19)
05000387;388/2011002-03	FIN	'B' CS Chiller Inoperable due to Refrigerant Stacking (4OA2.4.1)
05000387;388/2011002-04	NCV	Failure to Replace Piping on 'B' CS Chiller (4OA2.4.2)
05000387/2011002-05	FIN	Inadequate Maintenance Procedure Results in Steam Leak and Manual Scram (4OA3.2)

Closed		
05000387/2010-002-01	LER	Unit 1 Automatic Reactor Scrams Occur During Post-Modification Testing of the Digital Feedwater Integrated Control System (4OA3.3)
05000387/2010-003-01	LER	Unit 2 Manual Reactor Scram due to Leakage from the Unit 1 Circulating Water System and Subsequent Flooding of the Unit 1 Condenser Bay (4OA3.4)
TI 2515/179	TI	Verification of Licensee Responses to NRC Requirement for Inventories of Materials Tracked in the National Source Tracking System Pursuant to Title 10, Code of Federal Regulations, Part 20.2207 (10 CFR 20.2207) (4OA5)

LIST OF DOCUMENTS REVIEWED
(Not Referenced in the Report)

Section 1R01: Adverse Weather Protection

Procedures:
NDAP-00-0030, Severe Weather Preparation (Winter Storm, Hurricane), Revision 3

Drawings:
MI-C72-4, "Unit 2 Elementary Diagram RPS MG 5 pt Control," Revision 9
M-147, "P&ID Control Rod Drive Part – B," Sheet 1, Revision 38
M-147, "P&ID Control Rod Drive Part – B," Sheet 2, Revision 12

Section 1R04: Equipment Alignment

Condition Reports (* NRC identified):
1337940, 1351837*, 1351982*, 1383189*

Procedures:
OP-251-001, Normal Setup of Core Spray for Automatic Response, Revision 3
CL-251-0018, Unit 2 Core Spray System Common Mechanical, Revision 3
DC-B5B-001, Spraying/Makeup to the Spent Fuel Pools Using Portable Pump Truck or Offsite Fire Truck with Aerial Apparatus", Revision 5
OP-281-001, Refueling Platform Operation, Revision 33
EO-100-030, Unit 1 Response to Station Blackout, Revision 25
EO-200-030, Unit 2 Response to Station Blackout, Revision 21

Drawings:
J-456, "NSSS Loop Diagram Steam Leak Detection System for HPCI System," Revision 5
E-168, "Block Diagram Steam Leak Detection System, Unit 2," Revision 4

E106458, Sheet 1, "Heating and Ventilation RB Unit 2 Area 33 Plan of Elevation 654'-0"," Revision 13
E106453, Sheet 1, "Heating and Ventilation RB Unit 1 Area 2B Plan of Elevation 683'-0"," Revision 17
E106458, Sheet 3, "Heating and Ventilation RB Unit 2 Area 33 Plan of Elevation 683'-0"," Revision 13
E106455, Sheet 1, "Heating and Ventilation RB Unit 2 Area 30 Plan of Elevation 645'-0"," Revision 8

Other:
TM-OP-059B-ST, "Primary Containment Isolation," Revision 6
TM-OP-034-ST, "Secondary Containment, Revision 7

Section 1R05: Fire Protection

Condition Reports (*NRC identified):
1356637

Procedures:
FP-213-263, H & V Equipment Room (11-612), (11-613), (11-6-14), Exhaust Fan Room (11-616) Fire Zone 2-6D, Elevation 779', Revision 8
FP-213-279, Lower Switchgear Room (II-220) Fire Zone 2-33A, Elevation 699'-0", Revision 5
FP-213-287, Upper Switchgear Room (II-301) Fire Zone 2-34A, Elevation 714'-0", Revision 5
FP-113-113, Containment Access Area (1-401, 1-404, 1-405) Fire Zones 1-4A-N,S,W, Elevation 719'-0", Revision 6
FP-113-100, Drywell (1-400, 1-516, 1-607) Fire Zone 1-4F, Elevation 704' through 807', Revision 3

Drawings:
E 205995, Sheet 1, "Units 1 and 2 Control Structure Fire Zone Plan Elevation 806'-0", Revision 5
E205995, Sheet 2, "Units 1 and 2 Control Structure Fire Doors and Fire Drawings Elevations 806'-0", Revision 5

Work Order:
1368045*

Other:

Drill Critique Form dated February 8, 2011 and February 9, 2011

Section 1R11: Licensed Operator Requalification Program

Procedures:
OP-AD-33, "Reactivity Manipulation Standards and Communication Requirements, Revision 14
OP-193-001, "Main Turbine Operation," Revision 38
SO-131-001, RWM Operability Demonstration Startup Following System Failure, Revision 10
GO-100-002, "Plant Startup Heatup and Power Operation," Revision 71

Section 1R12: Maintenance Effectiveness

Condition Reports (*NRC identified):
1334425*, 1243436, 1335631, 1259153, 855957, 868164, 1195381, 1268450, 1028121, 1334946, 868163, 320683, 1046044, 1260878, 1194033, 1352925*

Procedures:
NDAP-QA-0413, "Maintenance Rule Program," Revision 9
NDAP-00-0752, Cause Analysis, Revision 7
NDAP-QA-0412, Leakage Rate Test Program, Revision 12
SE-159-026, LLRT of Feedwater Line Penetration Number X-9A and Check Valve Operability Test (SCBL), Revision 16, April 12, 2008, Revision 15, March 25, 2006
SE-159-045, LLRT of Containment Spray Penetration Number X-39B, Revision 12, April 11, 2010

Work Orders:
1181786, 591626, 793851

Other:
EC-RISK-1060, "Acceptable Number of Failures for Selected Systems in Scope of the Maintenance Rule," Revision 2
Maintenance Rule Basis Document – System 30 – Control Structure HVAC
PM Template Chill-1 (Chillers), dated December 6, 2000
NUMARC 93-01, "Industry Guideline for Monitoring Effectiveness of Maintenance at Nuclear Power Plants," Revision 2
LER 50-388/2007-001-00, Unit 2, Secondary Containment Bypass Leakage Exceeded
EC-059-1024, Design Requirements for and Evaluation of Potential Secondary Containment Bypass Leakage (SCBL)
PLA-6392, SSES TS Change to TS 3.6.1.3 to increase the Maximum Allowable Secondary Containment Bypass Leakage Limit, July 31, 2008
FSAR Table 6.2-15
SSES U1-16RIO Post-Outage Containment Leakage Testing Report
LER 05000387/2010-001-00, Unit 1 Secondary Containment Bypass Leakage Exceeded
Maintenance Rule Basis Document – System 59 and System 45

Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Condition Report (*NRC identified):
1350392, 1347508, 1360069*

Procedures:
NDAP-QA-1902, "Maintenance Rule Risk Assessment and Management Program," Revision 2
NDAP-QA-0340, Protected Equipment Program, Revision 8

Other:
Risk Profiles for Week of January 23, 2011
Operations Directive 11-01, "Compensatory Measures for Operations Regarding Maintenance of Work on Risk Significant Equipment, Dated January 31, 2011
Units 1 and 2 Risk Profiles for Emergency B EDG Work
PSP-26, Online and Shutdown Nuclear Risk Assessment Program, Revision 7

RG 1.182, Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants, May, 2000
Risk Profile for Week of February 27, 2011
EOOS Risk Profiles for Unit 1, Weekend of March 4, 2011
Shutdown Risk Model for Unit 1 for Weekend of March 4, 2011 (Planned)
Shutdown Risk Model for Unit 1 for Weekend of March 4, 2011 (Revised)
LER 05000387/1990-005-00.

Engineering Work Requests (*NRC identified):

825151, 1308351, 1330121*,1330270

Section 1R15: Operability Evaluations

Condition Reports (* NRC-identified):
1323393, 1289830, 1221000, 1291709, 1343228,121942, 1344108, 1122916, 1127887, 1292369, 1348282, 1327925, 1350977, 1340448*, 1341965*, 1340470*, 1339728, 1340454, 1340445, 883500, 1337940, 1338070, 1338069, 905857, 1360417, 1360527*, 1359877, 1358189, 1222313, 447967, 1365959*, 1372081, 1371594*, 1381475*

Procedures:
SO-282-001, "Monthly Turbine Bypass Valve Cycling,: Revision 17
FSAR Table 7.5-5
FSAR 9.2.5, 7.5.1.6.6
ON-104-201, Loss of 4 kV ESS Bus 1A (1A201), Revision 13
TM-OP-059B-ST, Primary Containment Isolation, Revision 6
DBD041, "Design Basis Document – Reactor Core Isolation Cooling (RCIC)," Revision 2
DBD004, "HPCI System," Revision 5
TM-OP-050-ST, "RCIC," Revision 4
TM-OP-052-ST, "High Pressure Coolant Injection (HPCI),"
TM-OP-052-ST, "Secondary Containment, Revision 7
EO-000-104, "Secondary Containment Control," Revision 6
OP-273-001, Containment Atmosphere Control System, Revision 40
FSAR 6.2.4, 7.3.2a

Drawings:
VC-175, Sheet 1, "P&ID HVAC Control Diagram, RB Zone III," Revision 22
J-456, Sheet 1, "NSSS LOOP Diagram SLD System for HPCI System, Revision 5
E-168, Sheet 4, "Block Diagram Steam Leak Detection System, Unit 2," Revision 4
E-171, Sheet 138, Atmospheric Monitoring IB Valves – Unit 2 Division 1, 2 CB220A, Revision 9
M-2123, Sheet 10, Process Sampling, Revision 14
M-2157, Sheet 2, Containment Atmosphere Control, Revision 34
M-2157, Sheet 1, Containment Atmosphere Control, Revision 31
M-111, Sheet 3, "P&ID Emergency Service Water System"

Other:
EC-INST-1802, "I&C Maintenance Calculation for PSH-C72-2N003A," Revision 2
EC-INST-1806, "I&C Maintenance Calculation for PSH-C72-2N003A," Revision 4
EC-058-1016, "Turbine 1st Storage Pressure vs. Reactor Power for Surveillance Testing, Revision 6
EC-058-1001, "Turbine Valve Closure SCRAM Bypass Setpoint," Revision 4

TS 3.7.2
TSB 3.7.2
Control Room Deficiencies Report as of January 19, 2011
TRO 3.7.1
OI-AD-096, Operator Burdens, Revision 7
TS 3.6.1.3 and Bases
TS 3.6.1.1
TRO 3.3.4, 3.6.4, "Turbine Valve Closure Scram Bypass Setpoint"
ASME Code Case N-513-3, dated January 26, 2009

Section 1R18: Permanent Plant Modifications

Condition Reports (* NRC identified):
1338570, 1338391, 1339365

Other:
50.59 SD01000, "Deletion of Steam Leak Detection Differential Temperature Isolation," Revision 0
LDCN 4910, "Deletion of Steam Leak Detection Differential Temperature Isolation in TRM Section 3.3.6, Revision 0

Section 1R19: Post-Maintenance Testing

Condition Reports (*NRC-identified):
1279776, 1311522, 1338078, 1338108, 1338396, 1355642, 1356597, 1359394*, 1359946*, 1360088*, 1359940*, 1347146, 1366164, 1328644, 1347683, 1286595, 1366315, 1361189, 1361274, 1367793, 1249783, 1361411, 1361393, 1370768*, 1370755*, 1370753*, 1370732*, 1372934*, 1372753*, 1372780, 1381163*, 1381169*, 1383070*

Procedures:
SO-251-B02, "Quarterly Core Spray Flow Verification," Revision 17
SE-259-400, "RHR/Core Spray/HPCI/RCIC Component Post-Maintenance "Closed System" Testing," Revision 5
EC-037-1006, "Determination of Minimum Pressure Required to Assure ECCS and RCIC Pump Discharge Lines are Filled with water," Revision 2
EC-059-1022, "Design and Testing Requirements for "Closed Systems" Outside of Primary Containment," Revision 5
OP-024-001, DGs, Troubleshooting Control Form, "Shutdown of an EDG, Incomplete Sequence Immediately After SD Button Pushed," Revision 56
AR-015-001, 13.8/4 kV Switchgear Distribution and DG A,B,&C OC653, Revision 36
OP-234-002, RB HVAC Zones 2 and 3, Revision 40
SO-234-005A, Quarterly Emergency Switchgear and Load Center Rooms Cooling Units Valve Exercising LOOP A, Revision 1
SI-178-215C, "SRM Functional test," Revision 5
IC-178-001, "Nuclear Instrumentation Cable and Detector Test," Revision 13
MT-GE-010, Control, Instrumentation Cable, Lower Range Power Circuit Wire Terminations and Cable Jacket Repair, Revision 28
SE-159-029, LLRT of Steam to HPCI Turbine Penetration Number X-11, Revision 16
SI-283-312, "Quarterly Calibration of Main Steam Line Pressure Channels PS6-B21-2ND15 A,B,C,D (Mode 1)
ES-002-001, "Supplying 125VDC Loads With Portable DG," Revision 13

OP-002-001, "Station Portable DG," Revision 15
Drawings:
M2172, Emergency Switchgear Room Cooling, Revision 21

Work Orders:
1355698, 1149056, 1274200, 1262648, 1274200, 1224452, 1224453, 1337968, 1291114, 1054892, 1364232, 1162130, 1356723,

Other:
Operator Logs February 14, 2011
Engineering Change 1345277
DBD 004, High Pressure Coolant Injection System, Section 2.2.3.3.20, Revision 5
IOM-75, Flex Wedge Gate and Globe and Check Valves, Revision 8
Unit 1 Operator Logs, February 25, 2011
OPS 1-5, "Quality Assurance for Station Blackout," Revision 2
GDS-OB, "Design Standard For Station Blackout," Revision 12

Section 1R20: Refueling and Other Outage Activities

Condition Reports (*NRC identified):
1349805, 1348784, 1347365, 1347054, 1328644, 1346976, 1346893, 1347412, 1348170, 1347828, 1349176, 1349177, 1349448, 1348961, 1348784, 1348752, 1348548, 1348355, 1348361, 1347928, 1347298, 1289136, 1347848, 1347114, 1346937, 1346867, 1346865, 1365693*, 1368031*, 1368074*, 1368077*, 1368186*, 1369276, 1369346, 1369202, 1368470, 1369118, 1370571, 1369883, 1369699, 1369588, 1372718, 1372242, 1373989, 1373992, 1374031*

Procedures:
GO-100-002, "Plant Startup and Heatup," Revision 69
GO-000-001, Reactor Vessel Level Control During Maintenance, Revision 13
OP-149-002, RHR Shutdown Cooling, Revision 45
GO-100-002, Plant Startup, Heatup, and Power Operation, Revision 70

Other:
Control Rod Pull Sheets
Clearance Order 52-001-1361213-0
Clearance Order 52-001-1292740-0
Work Hour Summaries for Maintenance and Operations Departments for January 2011.
Startup PORC Meeting Presentation and attachments for Start Up PORC on January 25 and 26
Post Event Review Report for January 24, 2011, Unit 1 Reactor Scram

Section 1R22: Surveillance Testing

Condition Reports (* NRC identified):
1353937*, 1249396, 1251898, 1259052, 1258061, 778954, 1258061, 1277961, 446929

Procedures:
SI-258-301, "Quarterly Calibration of Drywell Pressure (Primary Containment) High Pressure Channels PSH-C72-2N002A,B,C,D," Revision 21
SO-131-001, RWM Operability Demonstration Startup Following System Failure, Revision 10
NDAP-QA-0722, "Surveillance Testing Program," Revision 16

SE-024-A01, Diesel Generator A, Integrated Surveillance Test, Revision 5
SO-024-001A, Monthly Diesel Generator "A" Operability Test, Revision 7
SO-100-006, Shiftly Surveillance Operating Log, Revision 77
ON-100-005, Excess Drywell Leakage Identification, Revisions 15 and 16
SE-159-099, "LLRT of RCIC Vacuum Breaker Penetration," Revision 16

Other:
PSP-29-56, "Post Maintenance Testing," Revision 1

Section 2RS1: Radiological Hazard Assessment and Exposure Controls:

Condition Reports:
1330935; 1334556; 1345026; 1345707; 1365630

Procedure:
NDAP-QA-0626, Radiologically Controlled Area Access and Radiation Work Permit System

Section 2RS2: Occupational ALARA Planning and Controls:

Condition Reports:
1329937; 1339305; 1339528; 1341880; 1342563; 1354139; 1365518; 1367463; 1371486

Section 2RS4: Occupational Dose Assessment:

Condition Report
1347035

Procedures:
HP-TP-222, Special Dosimetry Issuance and Criteria
NDAP-QA-0625, Personnel Radiation Exposure Monitoring Program
HP-TP-221, External Dose Investigations and Evaluations

Other:
NVLAP On-Site Assessment Report for Laboratory # 100554-0, August 19, 2010
NVLAP Proficiency Testing for Laboratory # 100554-0, 2009
Panasonic Model UD710A Readers, No. 1 & 2, Quality Control Tests, March 2011
Whole Body Counter System Performance Verification for HP-628B APF Fastscan, March 31, 2010 and December 22, 2010
Whole Body Counter System Performance Verification for HP-627B Site Fastscan, March 30 2010
Calibration of the Canberra Fastscan System at the Susquehanna Steam Electric Generating Station, S&A Building, February 2, 2011

Section 4OA1: Performance Indicator Verification

Condition Reports (* NRC identified):
1357237

Other:
NEI 99-02, Regulatory Assessment Performance Indicator Guideline, Revision 6
Performance Indicators for First Quarter 2009 through Fourth Quarter 2010 for Units 1 and 2 for Unplanned Power Changes per 7000 Critical Hours from www.nrc.gov

Section 4OA2: Identification and Resolution of Problems

Condition Reports (* NRC identified):
1344525*, 1364079*, 1367748*, 1282706, 1232712, 1327896, 1176842, 891320, 1170719, 1344202, 1336020, 1330331, 1330330, 1330354, 1330355, 1330356, 1309527, 1275510, 1345330, 1332232, 1333256, 1333186, 1318814, 1146053, 1356772, 1323393, 1363344, 1363347, 1370448, 1220346, 1268819, 1280753, 1340919, 1342517, 1366097, 1280753, 1288755, 1294270, 1294476, 1313680, 1318030, 1324859, 1340919, 1342275, 1342517, 1342829, 1345367, 1348910, 1360485, 0739371, 0959670, 1072113, 590939, 600332, 782565, 1194685, 1275573, 1281550, 1291181, 1292227, 1293592, 1313704, 1325965, 1326952, 1329391, 1329401, 1334462, 1341905, 1342410, 1342562, 1344504, 1344532, 1360999, 1365759*, 1371493*, 1374208*, 1378110*, 1382448, 1380318*, 1380319*, 1380704*, 1380705*, 1380706*

Performance Indicators:
SL5 – Unit 1/GWE 27-U1 for December 2010
SL5 – Unit 2/GWE 27-U2 for December 2010
SL6 – for December 2010
SL7 – for December 2010

Procedures:
ON-117-001, Loss of Instrument Bus, Revision 32
ON-147-001, Loss of Feedwater Heater Extraction Steam, Revision 23
ON-155-001, Control Rod Problems, Revision 34
ON-193-001, Turbine EHC System Malfunction, Revision16
ON-156-001, Unanticipated Reactivity Change, Revision 23
OP-164-001, Reactor Recirculation System, Revision 57
ON-164-002, Loss of Recirculation Flow, Revision 33
ON-143-001, Main Condenser Vacuum and Offgas System Off-Normal Operation, Revision 30
ON-100-101, Scram-Scram Imminent, Revision 25
EO-000-103, Primary Containment Control, Revision 7
EO-000-113, Level/Power Control, Revision 8
EO-000-102, RPV Control, Revision 8
EO-000-112, Rapid Depressurization, Revision 5
NDAP-QA-0752, "Cause Analysis", Revision 7
NDAP-QA-0702, "Action Request and Condition Report Process", Revision 30
OP-030-001, "Control Structure Chilled Water System", Revision 31
SE-054-301, "Emergency Service Water/Control Structure Chilled Water System Leakage Test, Revision 12
SO-030-B03, "Quarterly Control Structure Chilled Water Flow Verification Loop 'B'", Revision 16
NDAP-QA-0312, "Controls of LCOs, TROs and Safety Function Determination Program", Revision 15
NDAP-QA-0722, "Surveillance Testing", Revision 17
NDAP-QA-0703, "Operability Assessment and Requests for Enforcement Discretion", Revision 14

Work Orders:
1313704, 612503, 1349816, 1349814, 716679

Other:
ANSI/ANS 3.5-1985, "Nuclear Power Plant Simulators for use in Operator Training"
Control Room Deficiencies Listing on February 3, 2011
Operator Challenges Listing on February 3, 2011
Operations Bulletin OI-AD-096, Procedure Change Summary (January 21, 2011)
Training Performance Indicators – Simulator Performance Indicators
Simulator Computer Status Reports – October 2010
Operator Log Entries from 05/14/2010
Plant Transient Data from 05/14/2010 Post SCRAM
Training Material for Thermal Stratification Training for Licensed Operator Requalification
Preventative Maintenance Template, CHILL-1 (Chillers), dated December 6, 2000
"HVAC Equipment Aging and Reliability Issues at Commercial Nuclear Power Plants", D Ghosh and R Campbell, Presented at 28th Nuclear Air Cleaning Conference
Station Health Report, September 1, 2010 – December 31, 2010
NRC Information Notice 94-82, "Concerns Regarding Essential Chiller Reliability During Periods of Low Cooling Water Temperature"
Unit 1 Operator Logs Dated January 12, 2011
Part 9900: Technical Guidance "Operability Determinations & Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety"

Section 4OA3: Event Followup

Condition Reports (*NRC identified):
1257781, 1284522, 1351992, 1346952, 1346761, 1347520, 1347120, 1347066, 1347112, 1347115, 1346911, 1347116, 1347141, 1346998, 1346761, 1334425*, 1243436, 1335631, 1259153, 855957, 868164, 1195381, 1268450, 1028121, 1334946, 868163, 320683, 1046044, 1260878, 1194033, 1352925*, 1358808, 1346952, 1389395*

Procedures:
OP-AD-327, "Post Reactor Transient/SCRAM/Shutdown Evaluation
OI-TA-001, "Event Report Data Collection and Retention, Revision 5
NDAP-00-0752, Cause Analysis, Revision 7
NDAP-QA-0720, "Station Report Matrix and Reportability Evaluation Guidance," Revision 15
NDAP-QA-0412, Leakage Rate Test Program, Revision 12
SE-159-026, LLRT of Feedwater Line Penetration Number X-9A and Check Valve Operability Test (SCBL), Revision 16, April 12, 2008, Revision 15, March 25, 2006
SE-159-045, LLRT of Containment Spray Penetration Number X-39B, Revision 12, April 11, 2010
NDAP-QA-0008, "Procedure Writer's Guide," Revision 8

Work Orders:
1181786, 591626, 793851

Other:
LER 05000387/2010-002-00
LER 05000387/2010-002-01

LER 05000387/2010-003-01
ENs 45688, 45930, 46103
Post Event Review Report for July 16, 2010 Unit 1 Reactor Scram
Post Event Review Report for May, 14, 2010 Unit 1Reactor Scram
Post Event Review Report for April 22, 2010 Unit 1 Reactor Scram
NUREG 1022, "Event Reporting Guidelines: 10 CFR 50.72 and 50.73", Revision 2
Reactor SCRAM Event Summary (SCRAM January 1, 2001))
Post-Event Review Report (Event SC011101)
Operator Logs – Unit 1 January 24 and 25, 2011
Plant Operational Review Committee Agenda/Resources for Meeting dated January 26, 2011
Maintenance Rule Basis Document – System 59 and System 45
ANSI/ASME B1.20.1-1983, "Pipe Threads, General Purpose (Inch)"
PSP-29, "Post-Maintenance Testing Metric," Revision 7

LIST OF ACRONYMS

ACE	Apparent Cause Evaluation
ADAMS	Agencywide Document and Access Management System
ALARA	As Low As Is Reasonably Achievable
AR	Action Report
ASME	American Society of Mechanical Engineers
BTV	Bleeder Trip Valve
CAP	Corrective Action Program
CFR	Code of Federal Regulations
CAQ	Condition Adverse to Quality
CDF	Core Damage Frequency
CR	Condition Report
CREOAS	Control Room Emergency Outside Air Supply
CS	Control Structure
CST	Condensate Storage Tank
CW	Circulating Water
DAC	Derived Air Concentration
ECCS	Emergency Core Cooling System
ECOT	Employee Concerns Oversite Team
ECP	Employee Concerns Program
ED	Electronic Dosimeter
EDG	Emergency Diesel Generator
EHC	Electrohydraulic Control
ENS	Emergency Notification System
EOP	Emergency Operating Procedure
EPA	Electrical Protective Assembly
EPU	Extended Power Uprate
ESS	Engineering Safeguard System
ESW	Emergency Service Water
FIN	Finding
FSAR	[SSES] Final Safety Analysis Report
FUS	Field Unit Supervisor
FWH	Feedwater Heater
GE	General Electric

GPM	Gallons Per Minute
GWE	General Work Environment
HPCI	High Pressure Coolant Injection
HVAC	Heating, Ventilation and Air-Conditioning
ICS	Integrated Control System
I&C	Instrumentation and Controls
IMC	Inspection Manual Chapter
IPI	Installed Plant Instrumentation
IR	NRC Inspection Report
ISI	Inservice Inspection
IST	Inservice Testing
IVVI/IST	In Vessel Visual Inspection/Inservice Testing
JP	Jet Pump
kV	Kilovolts
KVAR	Kilovolt AMPS Reactive
LCO	Limiting Condition for Operation
LER	Licensee Event Report
LERF	Large Early Relief Frequency
LLRT	Local leak Rate Test
LOOP	Loss of Offsite Power
MG	Motor Generator
MRFF	Maintenance Rule Functional Failures
MT	Magnetic Particle Testing
NA	Not Applicable
NAQ	Not Adverse to Quality
NCV	Non-Cited Violation
MDA	Minimum Detectable Activity
NDAP	Nuclear Department Administrative Procedure
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
NPS	National Standard Pipe Straight
NPT	National Standard Pipe Taper
NVLAP	National Voluntary Laboratory Accreditation Program
OA	Other Activities
ODM	Operational Decision Making
OOS	Out-of-Service
OWA	Operator Workarounds
PARS	Publicly Available Records
PI	[NRC] Performance Indicator
PI&R	Problem Identification and Resolution
PMT	Post-Maintenance Test
PPL	PPL Susquehanna, LLC
PRA	Probabilistic Risk Assessment
PS	Planning Standard
QA	Quality Assurance
RB	Reactor Building
RCA	Radiologically Controlled Area
RCA	Root Cause Analysis
RCIC	Reactor Core Isolation Cooling
RCS	Reactor Coolant System
RG	[NRC] Regulatory Guide

RHR	Residual Heat Removal
RPS	Reactor Protection System
RPV	Reactor Pressure Vessel
RTP	Rated Thermal Power
RWST	Refueling Water Storage Tank
SCBL	Secondary Containment Bypass Leakage
SBO	Station Blackout
SDE	Shallow Dose Equivalent
SDP	Significance Determination Process
SE	Safety Evaluation
SGTS	Standby Gas Treatment System
SLD	Steam Leak Detection
SOW	System Outage Window
SPAR	Standardized Plant Analysis Risk
SRA	Senior Reactor Analyst
SRM	Source Range Neutron Monitoring
SSC	Structures, Systems and Components
SSES	Susquehanna Steam Electric Station
TB	Turbine Building
TLD	Thermoluminescence Dosimeter
TRM	Technical Requirements Manual
TS	Technical Specifications
WO	Work Order