



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

July 24, 2007

Mr. Britt T. McKinney
Senior Vice President, and
Chief Nuclear Officer
PPL Susquehanna, LLC
769 Salem Boulevard - NUCSB3
Berwick, PA 18603-0467

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION - NRC INTEGRATED
INSPECTION REPORT 05000387/2007003 AND 05000388/2007003

Dear Mr. McKinney:

On June 30, 2007, the United States Nuclear Regulatory Commission (NRC) completed an inspection at your Susquehanna Steam Electric Station Units 1 and 2. The enclosed integrated inspection report documents the inspection results, which were discussed on July 12, 2007, with Mr. C. Gannon, Vice President - Nuclear Operations and other members of your staff.

This inspection examined activities conducted 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 two NRC-identified findings and three self-revealing findings of very low safety significance (Green). Three of these findings were determined to involve violations of NRC requirements. Additionally, a licensee-identified violation which was determined to be of very low safety significance is listed in this report. However, because of the very low safety significance and because they are entered into your corrective action program, the NRC is treating these findings as non-cited violations (NCVs), consistent with Section VI.A.1 of the NRC 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 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,

/RA/

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 05000387/2007003 and 05000388/2007003
Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket Nos.: 50-387, 50-388

License Nos.: NPF-14, NPF-22

Report No.: 05000387/2007003 and 05000388/2007003

Licensee: PPL Susquehanna, LLC

Facility: Susquehanna Steam Electric Station, Units 1 and 2

Location: Berwick, Pennsylvania

Dates: April 1, 2007 through June 30, 2007

Inspectors: A. Blamey, Senior Resident Inspector
F. Jaxheimer, Resident Inspector
K. Young, Senior Reactor Inspector
J. Furia, Senior Health Physicist
B. Haagensen, Operations Engineer
P. Presby, Operations Engineer

Approved by: Paul G. Krohn, Chief
Reactor Projects Branch 4
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SUMMARY OF FINDINGS

IR 05000387/2007003, 05000388/2007003; 04/01/2007 - 06/30/2007; Susquehanna Steam Electric Station, Units 1 and 2; Post-Maintenance Testing, ALARA Planning and Controls, and Radioactive Material Processing and Shipping.

The report covered a 3-month period of inspection by resident inspectors and announced inspections by a regional senior health physicist, senior reactor inspector, and two operations engineers. Five Green findings, three of which were non-cited violations (NCVs), were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). 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.

A. NRC Identified Findings and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. The inspectors identified a non-cited violation (NCV) of Title 10 of the Code of Federal Regulations (CFR), Part 50, Appendix B, Criterion XVI, "Corrective Action," when PPL did not correct a condition adverse to quality, associated with a jacket water supply header leak on the "E" emergency diesel generator (EDG) 3R (right) engine cylinder. Inspectors identified that PPL had several opportunities to correct this leak before the condition impacted safety system reliability and availability. PPL identified the jacket water leak during a diesel generator surveillance test on December 2, 2005 and entered this condition into the corrective action system. Although, the leak was small and did not originally impact system operability or reliability, PPL rescheduled, delayed, and deferred the repair work for this gasket connection until the condition resulted in a leak of approximately 12 gallons per hour during a March 28, 2007 surveillance test. Due to the rate of jacket water coolant inventory loss, PPL shutdown the engine and declared the "E" emergency diesel inoperable. PPL repaired the leak and entered the issue into the corrective action program.

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

Cornerstone: Occupational Radiation Safety

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

Summary of Findings (cont'd)

The performance deficiency that resulted in the exposure overrun was due to significantly increased hours to perform the work (budgeted for 308 person-hours, actual was 1081 person-hours when the work was suspended). The root cause of the overrun was determined to be poor initial welding on the piping, which required extensive rework. Susquehanna's three-year rolling average is 101 person-rem, which is below the SDP criteria of 240 person-rem for boiling water reactors (BWRs), therefore, overall ALARA performance has been effective and this finding is of very low safety significance (Green). A contributing cause of this finding was related to the Work Practice Oversight aspect of the Human Performance cross-cutting area because the contracted vendor utilized inexperienced workers without providing additional supervisory oversight and PPL did not ensure adequate supervisory and management oversight of the work activities. H.4.c (Section 2OS2.1)

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

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

Cornerstone: Public Radiation Safety

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

Code of Federal Regulations 10 CFR 71.5 requires that each licensee who transports licensed material shall comply with the applicable requirements of the Department of Transportation (DOT) regulations in 49 CFR Parts 171 through 180. 49 CFR 173.448 requires that each shipment of Class 7 materials must be secured to prevent shifting during normal transportation conditions. 49 CFR 173.410 requires that each package used for the shipment of Class 7 materials be designed so that the package will be capable of withstanding the effects of any acceleration, vibration or vibration resonance that may arise under normal conditions of transport without any

Summary of Findings (cont'd)

deterioration in the integrity of the package. Contrary to these requirements, PPL failed to properly block and brace the contents of a sealand container, resulting in the loss of package integrity. This finding has a cross-cutting aspect in the area of human performance (work practices) because the contracted vendor did not have established instructions for proper loading and bracing of the shipment and PPL did not ensure adequate supervisory and management oversight of the work activities. (H.4.c) (Section 2PS2.1)

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

Code of Federal Regulations 10 CFR 71.5 requires that each licensee who transports licensed material shall comply with the applicable requirements of the DOT regulations in 49 CFR Parts 171 through 180. 49 CFR 172.203(d)(3) requires that the shipping papers for Class 7 materials include the activity contained in the shipment. Contrary to these requirements, PPL failed to properly account for the activity contained in a shipment due to the inclusion of the wrong item in the shipment. This finding has a cross-cutting aspect in the area of human performance (work practices) because the contracted vendor did not follow established instructions for proper loading of the shipment and the licensee did not ensure adequate supervisory and management oversight of the work activities. (H.4.c) (Section 2PS2.2)

B. Licensee-Identified Violations

Violations of very low safety significance, that were identified by the licensee have been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. 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 full Rated Thermal Power (RTP) and operated at full power for the inspection period except for power reductions to approximately 75 percent power for control rod sequence exchanges on April 23 and June 15, 2007.

Unit 2 began the inspection period shutdown in a refueling outage (2RI013) and returned to full power operation on April 23, 2007. Reactor power was reduced to approximately 80 percent to perform a control rod sequence exchange on June 10, 2007. Unit 2 operated at full RTP power for the remainder of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01 - 1 Sample)

.1 Adverse Weather - Extreme Weather Conditions

a. Inspection Scope

During the week of May 13, 2007, the inspectors reviewed system operations during high wind/thunderstorm conditions. Plant walkdowns for selected structures, systems, and components (SSCs) were performed to determine the adequacy of PPL's weather protection features. Inspectors reviewed operator actions to address potential failures of equipment and compensatory actions during high wind conditions. The inspectors also reviewed and evaluated plant conditions resulting from the high wind and reviewed considerations in PPL's risk assessment. Additional documents that were reviewed are listed in the Attachment.

- Common, high winds tornado loads and missiles design basis for secondary containment, emergency diesel generator building, and the emergency service water pump house.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment (71111.04Q - 4 Samples)

.1 Partial Walkdown

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 other system components were out of service. The inspectors reviewed selected valve positions, electrical power availability, and the general condition of major system components. The

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walkdowns included the following systems:

- Common, "B" and "D" emergency diesel generators (EDGs) while performing the "C" EDG integrated surveillance test;
- Unit 1, high pressure coolant injection (HPCI) system during a yellow risk condition for the station blackout diesel;
- Unit 2, standby liquid control (SLC) system; and
- Unit 2, turbine building closed cooling water (TBCCW) following a flow transient.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05Q - 9 Samples)

.1 Fire Protection - Tours

a. Inspection Scope

The inspectors reviewed PPL's fire protection program to determine the required fire protection design features, fire area boundaries, and combustible loading requirements for selected areas. The inspectors walked down those 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 to assess PPL's fire protection program in those areas. The inspected areas included:

- Common, emergency system service water pump house, fire zone 0-51, 0-52;
- Common, control room and technical support center, fire zones 026H and 026N;
- Common, circulating water pumphouse, fire zones 0-00, FP-013-203;
- Units 1 and 2, main auxiliary and startup transformers, fire zone 0-00, FP-013-370;
- Unit 1, Reactor Building SLC area and circulation space, fire zones 1-513, FP-113-119;
- Unit 1, uninterrupted power supply (UPS) panel and lower relay room, fire zones 0-24C, FP-013-138;
- Unit 1, upper relay room, fire zone 0-27E, FP-013-164;
- Unit 2, turbine building 656 foot elevation, fire zones 2-31D & E; and
- Unit 2, reactor feed pump turbine rooms, 699 foot elevation, FP-213-278.

b. Findings

No findings of significance were identified.

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

a. Inspection Scope

On June 6, 2007, the inspectors observed an unannounced fire brigade drill in the Unit 2 turbine building reactor feedwater pump area. The drill was a simulated fire of leaking turbine lubricating oil at the "A" reactor feed pump turbine skid. The inspector assessed PPL's

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strategy to fight the simulated fire in this plant location and the general readiness of PPL to respond to fires. The drill included demonstrating fire fighting actions, search and rescue response, and smoke removal activities.

The inspectors observed the fire brigade response to the fire scene. Inspectors verified that the fire brigade demonstrated sufficient knowledge, skill, and available resources including the sufficient and proper equipment for combating the postulated fire. Inspectors verified that the fire brigade responded in accordance with procedures, and utilized the approved fire pre-plan. The inspectors observed communications between the brigade leader, brigade members, and the control room. Inspectors attended and reviewed the post-drill critique to evaluate whether drill performance met the established acceptance criteria.

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures (71111.06 - 1 Sample)

.1 Internal Flooding

a. Inspection Scope

The inspectors reviewed documents, interviewed plant personnel, and walked down 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, and 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. The following risk significant area was reviewed:

- Common, emergency service water (ESW)/residual heat removal service water (RHRSW) vaults, LA-0529-001, spray pond valve vaults sump flooding design (both divisions).

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification Program (71111.11Q - 1 Sample)

a. Inspection Scope

During the weeks of May 13, and May 20, 2007, the inspectors observed licensed operator simulator training during routine operator requalification training. The inspectors compared their observations to Technical Specifications, emergency plan implementation, 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. The following training was observed:

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- OP002, 07-04-09C, "Explosion in Reactor Building, loss of coolant accident and containment breach.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12Q - 1 Sample)

a. Inspection Scope

The inspectors evaluated PPL's work practices and 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 problem identification and resolution 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. In addition, the inspectors performed field walkdowns and interviewed PPL staff to verify whether the identified actions were appropriate and to verify that known performance problems were included and evaluated in accordance with the PPL Maintenance Rule program and the corrective action process. The following issues were reviewed:

- Units 1 and 2, control rod drive (CRD) hydraulic system yellow health status.

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 - 8 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 required 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 verify whether the compensatory measures identified by the risk assessments were appropriately performed. The selected maintenance activities included:

- Units 1 and 2, Yellow Risk due to station blackout diesel maintenance, RTPM 823848;
- Units 1 and 2, Yellow Risk due to Division I ultimate heat sink (UHS) out-of-service (OOS) for spray pond bypass valve replacement;
- Units 1 and 2, unplanned loss of secondary containment Zone 3;
- Units 1 and 2, Yellow Risk due to Division II of UHS OOS for spray pond bypass valve replacement;
- Unit 1, residual heat removal (RHR) Division II minimum flow valve with "B" RHRSW pump and service water pump OOS on June 12, 2007, CR 881757;
- Unit 2, Integrated Leak Rate Test (ILRT), Orange Risk, AR 768736, Revision 2;
- Unit 2, plant operations at 40 percent reactor power with a high offgas flow rate of 230 scfm, CR 868726; and
- Unit 2, risk assessment for crane work on the control room emergency outside air system (CREOAS), CR 867821.

b. Findings

No findings of significance were identified.

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 the Technical Specifications. In addition, the inspectors reviewed the selected operability determinations to verify whether the determinations were performed in accordance with NDAP-QA-0703, "Operability Assessments." The inspectors used the Technical Specifications, Technical Requirements Manual, Final Safety Analysis Report (FSAR), and associated Design Basis Documents as references during these reviews. The issues reviewed included:

- Common, operability determination for "D" EDG volt regulator problem (OFR 866356);
- Common, secondary containment outer siding removal for modification work, EWR 879454;
- Unit 1, operability for HV151F007B RHR minimum flow valve operator (EWR 864154);
- Unit 2, "C" inboard MSIV, Quality Inspection Report 858421;
- Unit 2, operation with offgas pretreatment radiation monitors flow rates 200-250 scfm, CR 868267 and CR 868868; and
- Unit 2, drywell temperature element TE 25798A, CR 870468 and CR 879017.

b. Findings

No findings of significance were identified.

1R17 Permanent Plant Modifications (71111.17 - 2 Samples)a. Inspection Scope

The inspectors reviewed the system design package and the associated design and licensing documents for two Division I modifications. Field implementation activities were observed and compared to the design requirements and installation standards. The inspectors reviewed the results of post-modification testing and verified that the affected procedures and design basis documents were appropriately updated.

- Unit 2, ensure positive seating of RHR check valves, HV251F050A/B, EC 730624; and
- Unit 2, suppression pool temperature monitoring system, EC 514705.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing (71111.19 - 7 Samples)a. Inspection Scope

The inspectors observed portions of post-maintenance testing 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 Technical Specification requirements. The inspectors reviewed the recorded test data to determine whether the acceptance criteria were satisfied. The post-maintenance testing activities reviewed included:

- Common, "E" EDG after 3R jacket water leak repair;
- Common, "C" EDG after two year overhaul, CR 880338;
- Common, "1B" RHRSW pump motor replacement and pump refurbishment;
- Common, CREOAS operability test following preventive maintenance, SO-030-01;
- Common, station portable diesel generator testing after preventative maintenance; OP-002-001, "Station Portable Diesel Generator" (CR 876427);
- Unit 2, main generator open circuit stability tuning; and
- Unit 2, CRD 14-31 withdrawal on insert, PCWO 878165.

b. Findings

Introduction: Inspectors identified a Green non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," because PPL did not correct a condition adverse to quality associated with a jacket water supply header leak at the "E" EDG 3R (right) engine cylinder.

Description: PPL identified a jacket water flange leak during a diesel generator surveillance test on December 2, 2005 and entered this condition into the corrective action system. Although, the leak was small and did not originally impact system operability or reliability,

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PPL rescheduled, delayed, and deferred the repair work for this gasket connection until the degraded joint caused a leak of 12 gallons per hour during a March 28, 2007 surveillance test. Due to the increased rate of jacket water coolant inventory loss and the difficulty quantifying the leakage rate, PPL shut down the engine and declared the "E" EDG inoperable. This caused a Technical Specification EDG to be unavailable and station calculated risk to increase.

Inspectors identified that PPL had several opportunities to correct the "E" EDG jacket water connection before the degraded condition adversely impacted safety system reliability and availability. Inspectors found that the leak was first entered in the corrective action system (CR 731119) on December 2, 2005. PPL prepared the work package to repair the jacket water leak and maintenance staff performed the required walkdown verifying that parts were available on May 17, 2006. By June 8, 2006, the work package had become overdue and it was reviewed by the Backlog Overview Group (BLOG) and rescheduled for the July 2006 diesel overhaul work window. On July 21, 2006, the BLOG deferred the "E" EDG work window to December 2006 as part of PPL strike contingency planning. At the end of the "E" diesel overhaul on January 10, 2007, the work package documents for the 3R cylinder jacket water leak repair were sent back from the field with no actions taken. On January 12, 2007, PPL rescheduled the jacket water leak repair work for December 2007.

On February 8, 2007, PPL observed an active jacket water leak at the 3R cylinder that was approximately 2 drops per minute. An additional Condition Report (CR 848574) was written and engineering recommended the corrective action be scheduled for the July 2008 overhaul. On March 28, 2007 the "E" EDG was substituted for the "D" EDG and run for surveillance testing. The jacket water leak at the 3R cylinder increased noticeably to at least 1 gallon every five minutes (12 gallons/hour). Operators stopped the "E" EDG and declared the "E" EDG inoperable. The performance deficiency is that PPL did not correct a condition adverse to quality in a timely manner despite several opportunities to correct the condition, including a planned diesel maintenance overhaul in January of 2007.

Analysis: This finding is more than minor because it is associated with the equipment performance attribute and negatively affected the Mitigating Systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This finding was determined to be of very low safety significance (Green) based on subsequent engineering calculations which demonstrated that while a large portion of the net positive suction head design margin for jacket water cooling pumps was lost, the emergency diesel remained capable of performing the intended safety function. PPL performed a risk calculation for a 30-day time period when the "E" EDG was substituted for the "B" EDG. This risk evaluation conservatively assumed that the "E" EDG would become inoperable after nine hours of operation. Inspectors reviewed both the NRC Standard Plant Analysis Risk model and PPL risk assessment results, and concluded that even with higher leakage rates that would make the "E" EDG inoperable, the incremental station risk would remain below the $1E-6$ core damage frequency (CDF) threshold.

A contributing cause of this finding was related to the Corrective Action aspect of the Problem Identification and Resolution cross-cutting area because PPL did not take actions to correct the jacket water leak in a timely manner, commensurate with the safety significance. [P.1.(d)]

Enclosure

Enforcement: 10 CFR 50, Appendix B, Criterion XVI states, in part, that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected. Contrary to this requirement and site procedures, between December 2, 2005, and March 28, 2007, PPL did not correct a leaking flange connection on the “E” EDG jacket water cooling supply to the engine 3R cylinder despite several opportunities including a diesel overhaul. The failure to correct the condition adverse to quality resulted in an inoperable Technical Specification emergency diesel generator. Because this violation is of very low safety significance and entered into the Corrective Action system (CR 889966), it is being treated as a non-cited violation consistent with section VI.A. of the NRC enforcement policy. **(NCV 05000387, 388/2007003-01, “Failure to Take Timely Corrective Actions for an “E” Emergency Diesel Generator Jacket Water Leak”)**

1R20 Refueling and Other Outage Activities (71111.20 - 1 Sample previously reported)

.1 Refueling Outage

a. Inspection Scope

The inspectors monitored major system restoration activities, testing, and restart activities that were conducted at the completion of the Unit 2 refueling outage during April 1, 2007 through April 12, 2007. Other portions of this sample are documented in IR 05000388/2007002. The inspectors observed and reviewed the following:

- Reactor coolant system hydrostatic test;
- Primary containment integrated leak rate test;
- Plant response to a large circulating water system leak;
- Control rod testing;
- Main turbine startup; and
- Automatic voltage regulator testing.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22 - 6 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 Technical Specification or Technical Requirements Manual operability and surveillance requirements to evaluate whether the systems were capable of performing their intended safety functions. The observed or reviewed surveillance tests included:

- Common, emergency diesel generator “C” integrated surveillance test, SE-024-C01, and gain adjustment factor discrepancy, RTSV838113;
- Unit 1, standby liquid control flow verification, SO-153-004;
- Unit 2, primary containment integrated leak rate test, SE-200-003;

- Unit 2, recirculation pump flow mismatch, SR 3.4.1.1, SO-250-002;
- Unit 2, RCIC pump, valve and flow surveillance, SO-250-002; and
- Unit 2, reactor coolant system (RCS) hydrostatic test, SE-200-002.

b. Findings

No findings of significance were identified.

1R23 Temporary Plant Modifications (71111.23 - 1 Sample)

a. Inspection Scope

The inspectors reviewed a temporary plant modification to determine whether the temporary change 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, Technical Specifications, and assessed the adequacy of the safety determination screenings and evaluations. The inspectors also assessed configuration control of the temporary changes by reviewing selected drawings and procedures to verify whether appropriate revisions had been made. The inspectors compared the actual installations to the temporary modification documents to determine whether the implemented changes were consistent with the approved documents. The inspectors reviewed selected post installation test results to determine whether the actual impact of the temporary changes had been adequately demonstrated by the test. The following temporary modification and documents were included in the review:

- Unit 1, RHRSW pump breaker truck operated contacts (TOC) jumpers, EC 882347.

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Cornerstone: Occupational Radiation Safety

2OS1 Access Control to Radiologically Significant Areas (71121.01 - 7 Samples)

a. Inspection Scope

The inspectors reviewed Radiation Work Permits for airborne radioactivity areas with the potential for individual worker internal exposures of >50 mrem Committed Effective Dose Equivalent [CEDE] (20 DAC-hrs). The inspectors verified barrier integrity and engineering controls performance.

The inspectors reviewed and assessed the adequacy of PPL's internal dose assessment for any actual internal exposure greater than 50 mrem CEDE.

The inspectors examined PPL's physical and programmatic controls for highly activated or contaminated materials (non-fuel) stored within spent fuel and other storage pools.

Enclosure

The inspectors reviewed corrective action reports related to access controls. This review included 2-3 high radiation area radiological incidents (non-PIs, identified by PPL) in high radiation areas <1R/hr that have occurred since the last inspection in this area.

For repetitive deficiencies or significant individual deficiencies in problem identification and resolution identified above, the inspectors determined if PPL's self-assessment activities were also identifying and addressing these deficiencies.

The inspectors discussed with the Radiation Protection Manager high dose rate-high radiation area, and very high radiation area (VHRA) controls and procedures. The inspectors verified that any changes to licensee procedures did not substantially reduce the effectiveness and level of worker protection.

The inspectors discussed with first-line Health Physics (HP) supervisors the controls in place for special areas that have the potential to become VHRA during certain plant operations. The inspectors determined if these plant operations required communication beforehand with the HP group, so as to allow corresponding timely actions to properly post and control the radiation hazards.

b. Findings

No findings of significance were identified.

2OS2 ALARA Planning and Controls (71121.02 - 3 Samples)

a. Inspection Scope

Based on scheduled work activities and associated exposure estimates, the inspectors selected two work activities in radiation areas, airborne radioactivity areas, or high radiation areas for observation. The inspectors evaluated PPL's use of as low as reasonably achievable (ALARA) controls for these work activities by performing the following: evaluated PPL's use of engineering controls to achieve dose reductions; evaluated procedures and controls for consistency with PPL's ALARA reviews; determined if sufficient shielding of radiation sources was provided for; and reviewed the dose expended to install/remove the shielding to determine if it exceed the dose reduction benefits afforded by the shielding.

The inspectors observed radiation worker and radiation protection technician performance during work activities being performed in radiation areas, airborne radioactivity areas, or high radiation areas. The inspectors determined if workers demonstrated the ALARA philosophy in practice and whether there were any procedure compliance issues. Also, the inspectors observed radiation worker performance to determine whether the training/skill level was sufficient with respect to the radiological hazards and the work involved.

b. Findings

.1 Failure to Maintain Occupational Radiation Exposure As Low As Reasonably Achievable (ALARA) During Reactor Water Cleanup Pipe Replacement Activities

Introduction: A Green self-revealing finding for not maintaining radiation dose ALARA was identified during the Susquehanna Unit 2 refueling outage (2RIO13) because replacement of the reactor water cleanup (RWCU) piping exceeded its collective dose estimate by over 50 percent. This additional collective exposure was principally the result of poor initial welding that required extensive rework.

Description: During 2RIO13, the replacement of the RWCU piping significantly exceeded its collective dose estimate. The replacement of the RWCU piping was planned and the estimated collective exposure for this work was 2.070 person-rem. The actual collective exposure for the job was 7.742 person-rem, which was more than 50 percent above the dose goal. The performance deficiency that resulted in the exposure overrun was due to a significant increase in hours to perform the work (budgeted for 308 person-hours, actual was 1081 person-hours when the work was suspended). The increase was the result of poor initial welding that was performed by inexperienced workers and required extensive rework. PPL has documented this issue in CR 860299.

Analysis: The occupational radiation safety significance determination defines a performance deficiency as one in which the licensee fails to meet a standard and the cause was reasonably within the licensee's ability to foresee or correct. The person-hours required for this work would have been significantly lower had the initial welding been properly performed. The finding is associated with the ALARA planning attribute of the radiation safety cornerstone, and affects the objective of providing adequate protection of the worker from exposure to radiation. Susquehanna's three-year-rolling-average is 101 person-rem, which is below the significance determination process (SDP) criteria of 240 person-rem for BWRs, therefore, this finding is of very low safety significance (Green).

A contributing cause of this finding was related to the Work Practice Oversight aspect of the Human Performance cross-cutting area because the contracted vendor utilized inexperienced workers without providing additional supervisory oversight and PPL did not ensure adequate supervisory and management oversight of the work activities. [H.4.c]

Enforcement: The ALARA rule contained in 10 CFR 20.1101(b), Statements of Consideration, indicates that compliance with the ALARA requirement will be judged on whether the licensee has incorporated measures to track and, if necessary, to reduce exposures and not whether exposures and doses represent an absolute minimum or whether the licensee has used all possible methods to reduce exposures. The overall exposure performance of the nuclear power plant is used to determine compliance with the ALARA rule. Since Susquehanna is below the three-year-rolling-average of 240 person-rem, no violation of 10CFR20.1101(b) has occurred. **(FIN 05000388/2007003-02, "Failure to Maintain Occupational Radiation Exposure As Low As Reasonably Achievable During Reactor Water Cleanup Pipe Replacement Activities")**

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

Introduction: A Green self-revealing finding for not maintaining radiation dose ALARA was identified during the Susquehanna Unit 2 refueling outage (2RIO13) because inservice inspection of the reactor pressure vessel and nozzles exceeded its collective dose estimate by over 50 percent. This additional collective exposure was principally the result a significant increase in the hours needed to perform the work.

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Description: During 2RIO13, the inspection of the reactor pressure vessel and nozzles exceeded its collective dose estimate. The inservice inspection of the reactor pressure vessel and nozzles was planned, and the estimated collective exposure for this work was 6.536 person-rem. Actual collective exposure for the job was 10.684 person-rem, more than 50 percent above the dose goal. The performance deficiency that resulted in the exposure overrun was due a significant increase in hours to perform the work (budgeted for 654 person-hours, actual was 1517 person-hours). The increased person-hours required to perform the work was attributed to the use of a number of inexperienced workers for this task. PPL has documented this issue in CR 858603.

Analysis: The occupational radiation safety significance determination defines a performance deficiency as one in which the licensee fails to meet a standard and the cause was reasonably within the licensee's ability to foresee or correct. The increased person-hours required to perform the work was attributed to the use of a number of inexperienced workers for this task. The finding is associated with the ALARA planning attribute of the radiation safety cornerstone, and affects the objective of providing adequate protection of the worker from exposure to radiation. Susquehanna's three-year-rolling-average is 101 person-rem, which is below the SDP criteria of 240 person-rem for BWRs, therefore, this finding is of very low safety significance (Green).

A contributing cause of this finding was related to the Work Practice Oversight aspect of the Human Performance cross-cutting area because the contracted vendor utilized inexperienced workers without providing additional supervisory oversight and PPL did not ensure adequate supervisory and management oversight of the work activities. [H.4.c]

Enforcement: The ALARA rule contained in 10 CFR 20.1101(b) Statements of Consideration indicates that compliance with the ALARA requirement will be judged on whether the licensee has incorporated measures to track and, if necessary, to reduce exposures and not whether exposures and doses represent an absolute minimum or whether the licensee has used all possible methods to reduce exposures. The overall exposure performance of the nuclear power plant is used to determine compliance with the ALARA rule. Since Susquehanna is below the three-year-rolling-average of 240 person-rem, no violation of 10CFR20.1101(b) has occurred. **(FIN 05000388/2007003-03, "Failure to Maintain Occupational Radiation Exposure ALARA during Outage Inservice Inspection of Reactor Pressure Vessel")**

2OS3 Radiation Monitoring Instrumentation (71121.03 - 1 Sample)

a. Inspection Scope

The inspectors reviewed PPL's self-assessments, audits, and Licensee Event Reports and focused on radiological incidents that involved personnel contamination monitor alarms due to personnel internal exposures. For internal exposures >50 mrem CEDE, the inspectors determined if the affected personnel were properly monitored utilizing calibrated equipment and if the data was analyzed and internal exposures properly assessed in accordance with licensee procedures. There were no uptakes of this magnitude during the assessment period.

b. Findings

No findings of significance were identified.

Cornerstone: Public Radiation Safety (OS)

2PS1 Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems (71122.01)

a. Inspection Scope (1 Sample)

The inspectors assessed PPL's understanding of the location and construction of underground pipes and tanks, and storage pools that contain radioactive contaminated liquids. The inspectors evaluated if PPL may have potential unmonitored leakage of contaminated fluids to the groundwater as a result of degrading material conditions or aging of facilities. The inspectors appraised the licensee's capabilities of detecting spills or leaks and of identifying groundwater radiological contamination both on-site and beyond the owner controlled area. The inspectors reviewed PPL's technical bases for its onsite groundwater monitoring program. The inspectors discussed with PPL staff their understanding of groundwater flow patterns for the site, and in the event of a spill or leak of radioactive material, verified that PPL staff can estimate the pathway of a plume of contaminated fluid both on-site and beyond the owner controlled area.

b. Findings

No findings of significance were identified.

2PS2 Radioactive Materials Processing and Shipping (71122.02)

.1 Inadequately Secured Transport of Condensate Pump Motors

a. Inspection Scope

The inspectors reviewed the circumstances surrounding a shipment of Class 7 material to Memphis, TN, on March 20, 2007 which was discovered, upon receipt, to have several holes in its packaging.

b. Findings

Introduction: The inspectors identified a Green non-cited violation of 10 CFR 71.5 because PPL did not properly secure two condensate pump motors, with surface contamination, in a sealand container for shipment. This resulted in the pump motors shifting and penetrating the shipping container during transport; however, there was no loss of radioactive material.

Description: On March 20, 2007, Susquehanna shipped two condensate pump motors in a sealand container as Class 7 material, surface contaminated objects to a vendor in Memphis, TN. Upon receipt at the vendor on March 22, 2007, it was identified that there had been a breach of the package during transit, in that several holes were in the side wall of the sealand container. Subsequent investigation at the vendor revealed that one of the pumps was not properly blocked and braced inside the sealand container, allowing it to move and impact the walls of the container, causing holes. 10 CFR 71.5 requires that each

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licensee who transports licensed material shall comply with the applicable requirements of the Department of Transportation (DOT) regulations in 49 CFR Parts 171 through 180. 49 CFR 173.448 requires that each shipment of Class 7 materials must be secured to prevent shifting during normal transportation conditions. 49 CFR 173.410 requires that each package used for the shipment of Class 7 materials be designed so that the package will be capable of withstanding the effects of any acceleration, vibration, or vibration resonance that may arise under normal conditions of transport without any deterioration in the integrity of the package. The failure to properly block and brace a shipment of Class 7 materials is a performance deficiency whose cause was reasonably within PPL's ability to foresee and prevent.

Analysis: The issue is not subject to traditional enforcement in that there was no actual safety consequence (loss of radioactive material), it did not have the potential for impacting the NRC's ability to perform its regulatory function, and there were no willful aspects to the violation. The finding is more than minor because it is associated with the public radiation safety cornerstone attribute of exposure control and affected the cornerstone objective of providing adequate protection of workers from exposure to radiation. Specifically, the loss of package integrity during transport is not in compliance with Title 49 CFR. The finding is not related to any of the maintenance risk assessment or risk management areas.

Since this occurrence involved the radioactive material control program, the finding was evaluated with the public radiation safety significance determination process. The inspector determined that the finding was of very low safety significance (Green), because it did not involve (1) the effluent release program, or (2) the environmental monitoring program. The finding did involve the transportation of radioactive material. The finding did not involve: (1) radiation limits being exceeded; (2) a certificate of compliance; (3) low level burial ground nonconformance; or (4) a failure to make notifications or provide emergency information. The finding did involve a breach of package during transit, but the contents were less than a type A quantity, and did not involve the loss of package contents. The finding was entered into PPL's corrective action program (CR 860408).

This finding has a cross-cutting aspect in the area of human performance (work practices) because the contracted vendor did not have established instructions for proper loading and bracing of the shipment and PPL did not ensure adequate supervisory and management oversight of the work activities. [H.4.c]

Enforcement: 10 CFR 71.5 requires that each licensee who transports licensed material shall comply with the applicable requirements of the DOT regulations in 49 CFR Parts 171 through 180. 49 CFR 173.448 requires that each shipment of Class 7 materials must be secured to prevent shifting during normal transportation conditions. 49 CFR 173.410 requires that each package used for the shipment of Class 7 materials be designed so that the package will be capable of withstanding the effects of any acceleration, vibration, or vibration resonance that may arise under normal conditions of transport without any deterioration in the integrity of the package. Contrary to these requirements, PPL failed to properly block and brace the contents of a sealand container, resulting in the loss of package integrity. Because this finding was of very low safety significance (Green), and Susquehanna entered this finding into its corrective action program (CR 860408), this violation is being treated as an NCV consistent with Section VI.A of the NRC Enforcement Policy, NUREG-1600. **(NCV 05000387, 388/2007003-04, "Violation of 10 CFR 71.5 for Inadequately Secured Transport of Condensate Pump Motors (Class 7 Material))."**

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.2 Failure to Properly Account for Activity in a Shipment of Irradiated Fuel Channels

a. Inspection Scope

The inspectors reviewed the circumstances surrounding the shipment of irradiated fuel channels to the Barnwell Disposal facility in South Carolina, specifically, one shipment that contained an incorrect fuel channel.

b. Findings

Introduction: A self-revealing Green finding was identified due to a deficiency in the radioactive material control program. On June 22, 2007, while preparing to load fuel channels in a disposal liner (liner #12), Susquehanna identified that a liner of irradiated fuel channels previously shipped to the Barnwell Disposal facility in South Carolina (liner #5) contained an incorrect fuel channel for that shipment. 10 CFR 71.5 requires that each licensee who transports licensed material shall comply with the applicable requirements of the DOT regulations in 49 CFR Parts 171 through 180. 49 CFR 172.203(d)(3) requires that the shipping papers for Class 7 materials include the activity contained in the shipment. Contrary to these requirements, the licensee failed to properly account for the activity contained in a shipment due to the inclusion of the wrong item in the shipment.

Description: On June 22, 2007, while preparing to load fuel channels in a disposal liner (liner #12), Susquehanna identified that a liner of irradiated fuel channels previously shipped to the Barnwell Disposal facility in South Carolina (liner #5) contained an incorrect fuel channel for that shipment. Subsequent investigation revealed that the channel shipped had not been dose profiled, and also that a second fuel channel had been improperly loaded into liner #9, however, this liner had not yet been shipped. The failure to properly load materials for a shipment of Class 7 materials is a performance deficiency whose cause was reasonably within the licensee's ability to foresee and correct and which should have been prevented.

Analysis: The issue is not subject to traditional enforcement in that there was no actual safety consequence (loss of radioactive material), it did not have the potential for impacting the NRC's ability to perform its regulatory function, and there were no willful aspects to the violation. The finding is more than minor because it is associated with the public radiation safety cornerstone attribute of exposure control and affected the cornerstone objective of providing adequate protection of workers from exposure to radiation. Specifically, the failure to load the correct items into the shipment resulted in incorrect shipping papers for the shipment and is not in compliance with 49 CFR. The finding is not related to any of the maintenance risk assessment or risk management areas.

Since this occurrence involved the radioactive material control program, the finding was evaluated with the public radiation safety significance determination process. The inspector determined that the finding was of very low safety significance (Green), because it did not involve (1) the effluent release program, or (2) the environmental monitoring program. The finding did involve the transportation of radioactive material. The finding did not involve: (1) radiation limits being exceeded; (2) a certificate of compliance; (3) low level burial ground nonconformance; (4) a breach of package during transit; or (5) a failure to make notifications or provide emergency information. The finding did involve the failure to correctly manifest a shipment of Class 7 material and the contents were a type B quantity,

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but correctly manifesting the shipment would not have changed the DOT proper shipping name, nor the NRC waste classification for the disposed materials. The finding was entered into the licensee's corrective action program (CR 883987).

This finding has a cross-cutting aspect in the area of human performance (work practices) because the contracted vendor did not follow established instructions for proper loading of the shipment and the licensee did not ensure adequate supervisory and management oversight of the work activities. [H.4.c]

Enforcement: 10 CFR 71.5 requires that each licensee who transports licensed material shall comply with the applicable requirements of the DOT regulations in 49 CFR Parts 171 through 180. 49 CFR 172.203(d)(3) requires that the shipping papers for Class 7 materials include the activity contained in the shipment. Contrary to these requirements, PPL failed to properly account for the activity contained in a shipment due to the inclusion of the wrong item in the shipment. Because this finding was of very low safety significance (Green), and PPL entered this finding into its corrective action program (CR 883987), this violation is being treated as a Non-Cited Violation (NCV) consistent with Section VI.A of the NRC Enforcement Policy, NUREG-1600. **NCV 05000387, 388/2007003-05, "Violation of 10 CFR 71.5 for Inadequately Accounting for Activity in a Shipment of Irradiated Fuel Channels."**

2PS3 Radiological Environmental Monitoring Program (REMP)

a. Inspection Scope (10 Samples)

The inspectors reviewed the current Annual Environmental Monitoring Report, and PPL assessment results, to verify that the REMP was implemented as required by technical specifications (TS) and the offsite dose calculation manual (ODCM). The review included changes to the ODCM with respect to environmental monitoring commitments in terms of sampling locations, monitoring and measurement frequencies, land use census, interlaboratory comparison program, and analysis of data. The inspector also reviewed the ODCM to identify environmental monitoring stations. In addition, the inspector reviewed: PPL self-assessments and audits, licensee event reports, interlaboratory comparison program results, the final safety analysis report (FSAR) for information regarding the environmental monitoring program and meteorological monitoring instrumentation, and the scope of the audit program to verify that it met the requirements of 10 CFR 20.1101c.

The inspectors walked down six air particulate and iodine sampling stations; four groundwater stations; four surface water stations; and, 26 thermoluminescent dosimeter (TLD) monitoring locations and determined that they were located as described in the ODCM and determined the equipment material condition to be acceptable. The inspectors also observed PPL's receipt of six sediment samples from a vendor.

The inspectors observed the collection and preparation of a variety of environmental samples (listed above) and verified that environmental sampling was representative of the release pathways as specified in the ODCM and that sampling techniques were in accordance with procedures.

Based on direct observation and review of records, the inspectors verified that the meteorological instruments were operable, calibrated, and maintained in accordance with

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guidance contained in the FSAR, NRC Safety Guide 23, and PPL procedures. The inspector verified that the meteorological data readout and recording instruments in the control room and at the tower were operable.

The inspectors reviewed each event documented in the Annual Environmental Monitoring Report which involved a missed sample, inoperable sampler, lost TLD, or anomalous measurement for the cause and corrective actions. The inspectors conducted a review of the licensee's assessment of any positive sample results.

The inspectors reviewed any significant changes made to the ODCM as the result of changes to the land census or sampler station modifications since the last inspection. The inspectors also reviewed technical justifications for any changed sampling locations and verified that PPL performed the reviews required to ensure that the changes did not affect its ability to monitor the impacts of radioactive effluent releases on the environment.

The inspectors reviewed the calibration and maintenance records for air samplers. The inspectors reviewed: the results of the licensee's interlaboratory comparison program to verify the adequacy of environmental sample analyses performed by the licensee; the licensee's quality control evaluation of the interlaboratory comparison program and the corrective actions for any deficiencies; PPL's determination of any bias to the data and the overall effect on the REMP; and quality assurance (QA) audit results of the program to determine whether TS/ODCM requirements were met. The inspectors verified that the appropriate detection sensitivities with respect to TS/ODCM are utilized for counting samples and reviewed the results of the quality control program including the interlaboratory comparison program to verify the adequacy of the program.

The inspectors observed several locations where PPL monitors potentially contaminated material leaving the radiologically controlled area (RCA), and inspected the methods used for control, survey, and release from these areas, including observing the performance of personnel surveying and releasing material for unrestricted use verifying that the work is performed in accordance with plant procedures.

The inspectors verified that the radiation monitoring instrumentation was appropriate for the radiation types present and was calibrated with appropriate radiation sources. The inspectors reviewed PPL's criteria for the survey and release of potentially contaminated material; verified that there was guidance on how to respond to an alarm which indicates the presence of licensed radioactive material; and reviewed the licensee's equipment to ensure the radiation detection sensitivities were consistent with the NRC guidance contained in IE Circular 81-07 and IE Information Notice 85-92 for surface contamination and HPPOS-221 for volumetrically contaminated material. The inspectors also 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 and verified that PPL has not established a "release limit" by altering the instrument's typical sensitivity through such methods as raising the energy discriminator level or locating the instrument in a high radiation background area.

The inspectors reviewed Licensee Event Reports, Special Reports, and audits related to the radiological environmental monitoring program performed since the last inspection to determine whether identified problems were entered into the corrective action program for resolution. The inspector also reviewed corrective actions affecting environmental

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sampling, sample analysis, or meteorological monitoring instrumentation.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems (71152 - 1 Semi-Annual Sample and 2 Annual Samples)

.1 Review of Items Entered into the Corrective Action Program

a. Inspection Scope

As required by Inspection Procedure (IP) 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 performed screening of all items entered into PPL's corrective action program. This was accomplished by reviewing the description of each new action request/condition report and attending daily management meetings.

b. Findings

No findings of significance were identified.

.2 Semi-Annual Review to Identify Trends

a. Inspection Scope

As required by IP71152, Identification and Resolution of Problems, the inspectors performed a review of PPL's corrective action program and associated documents to identify trends that could indicate the existence of a more significant safety issue. This trend review considered the results of daily inspector corrective action program item screening discussed in Section 4OA2.1. The review also included issues described in system health reports, corrective maintenance work orders, PPL management meetings, inspector exit meetings, and maintenance rule assessments. This review concentrated on the six-month period of December 2006 through June 2007, although some examples were prior to this time period to confirm potential trends. The inspectors compared and contrasted their results with the results in PPL's latest integrated quarterly assessment report. Corrective actions that were initiated in response to inspector observations and the issues identified in PPL trend reports were reviewed.

b. Assessment and Observations

No findings of significance were identified.

Control of Station Work and Work Package Quality

The inspectors identified a potential adverse trend in control of field work and work package quality. Specifically, inspectors found an increase in the number of work control issues

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encountered through baseline inspection activities. Work control performance issues were observed across multiple work groups and in several areas. This identified trend was characterized and communicated to PPL as a set of seventeen examples that had the following similarities:

- Physical work activities in the field not completed as stated in the work plan; and
- Written work instructions not specific enough to achieve the desired results.

PPL documented this NRC-identified trend in Action Request 870781. PPL has determined that near misses and event precursors have resulted from: less than adequate detail and quality in plant procedures, instructions, and work plans; less than adequate adherence to written instructions; and less than adequate supervisory oversight. PPL has developed an action plan to achieve improvements in the following three key programmatic areas of work control: (1) quality written instructions, procedures, and work plans; (2) training and qualification of workers; and (3) supervision reinforcing the use of station standards and expectations.

PPL identified and documented shortfalls in the area of worker radiation protection and also identified numerous examples of maintenance worker practices which caused errors that affected personal safety and/or plant equipment performance. PPL's review and evaluation of significant condition reports (Level 1 and 2) from September 2006 to May 2007, recommended that work control (work practice expectations) be a focus area for the station.

One inspector identified work control issue involving risk significant plant equipment involved a start failure of the Station Blackout Diesel Generator on May 15, 2007. Inspectors reviewed the troubleshooting efforts for the previous start failure of this component on September 27, 2006. Inspectors identified that the initial work order packages did not contain any troubleshooting instructions that were specified in the vendor manual nor those specified by the engineering cause analysis for this evaluated maintenance rule functional failure. The Station Blackout Diesel continued to pass surveillance tests; however, inspectors observed that PPL did not have replacement parts to support the maintenance efforts and inspectors observed that the risk significance of the Station Blackout Diesel did not result in establishing a high priority for the work effort.

PPL issued an internal communication (Hot Box 07-07) on June 29, 2007, to increase worker awareness of the observed trend in human performance issues related to procedural compliance and usage. The inspectors identified several minor violations of regulatory requirements. One of these examples was from inspectors witnessing non-licensed operators aligning the "E" EDG without utilizing one of the established step-by-step operating procedures. Inspectors identified other examples of procedure and work instruction non-compliance during June 2007. Inspectors identified a quality control hold point that was not performed during a safety-related plant modification to a 4 kilovolt breaker, stator water coolant valve replacement work that was not completed in accordance with the issued work instructions, and removal of the outer wall of the reactor building without the shift manager's knowledge or approval. Also, during June 2007, a breakdown of procedure and work instruction controls led to a loss of fuel channel inventory and proper dose characterization of related radiological shipments. (Green NCV, Section 2PS2.2)

This PI&R trend review documents an identified adverse trend regarding the control of field work and work package quality at Susquehanna. PPL has confirmed this trend and has

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developed an action plan to improve performance. PPL's action plan is documented in Condition Report 886646.

Reduced Control Rod Drive (CRD) System Performance

PPL identified an adverse trend in CRD system performance. The adverse trend challenges the operation staff by making it more difficult to move control rods and respond to an increased number of CRD high temperature and hydraulic control unit alarms. Specifically, in 2006, PPL noted that there were eight control rod double notch events on Unit 1 and twelve events on Unit 2. The number of events was above the industry average of four per year. Double notching events can result from crud buildup on the drive seals in the CRD mechanism. This changes the control rod drive speed and can result in double notches. PPL plans to accelerate the number of CRD mechanisms changed out each outage. PPL also plans to replace all directional control valve filters in the next refueling outage on both units, and develop and implement a more thorough CRD flushing procedure.

In 2006, PPL experienced more than five hundred (506 on Unit 1 and 532 on Unit 2) CRD accumulator alarms which is approximately four times the industry average. PPL determined that the increase in the alarms is due to degradation of the original equipment CRD accumulators. The degradation increased water leakage through the piston seal and resulted in accumulator alarms due to water accumulation. PPL has not increased the rate of accumulator replacement because of competing priorities. PPL plans to have approximately 85 percent of the accumulators replaced with new stainless steel accumulators by 2012 on Unit 1 and by 2013 on Unit 2.

This PI&R trend review documents the identified adverse trend regarding the control rod drive system performance at Susquehanna. PPL has developed an action plan to improve system performance. PPL's action plan is documented in CR 848199. The inspectors verified that there was no immediate safety concern and all system safety-related functions could be performed as required.

.3 Review of Auto Voltage Regulator Issues (Annual Sample)

a. Inspection Scope

The inspectors selected CR 828330 and CR 681673 as a problem identification and resolution (PI&R) sample for a detailed follow-up review. CR 828330 documented a Unit 1 automatic reactor shutdown due to an apparent main generator load reject on November 25, 2006. CR 681673 documented a Unit 2 automatic reactor shutdown due to a main generator loss of field on June 6, 2005. Both events were initiated due to grid disturbances external to the plant.

The inspectors assessed PPL's problem identification threshold, cause analyses, extent-of-condition reviews, operability determinations, and the prioritization and timeliness of PPL's corrective actions to determine whether PPL was appropriately identifying, characterizing, and correcting problems associated with this issue and whether the planned or completed corrective actions were appropriate.

b. Findings and Observations

No findings of significance were identified.

The inspectors determined that PPL properly implemented their corrective action process based on the information they had on both generator trips. Root cause analyses were detailed. Although no definitive root cause was identified, PPL identified corrective actions to reduce the potential of recurrence. PPL continued to implement corrective actions at the time of this inspection. The operability review of placing both voltage regulators in manual following the November 25, 2006, event was adequate. PPL implemented corrective actions including implementation of vendor guidance, ensuring excitation field resistance measurements were within acceptable limits, implementing dynamic response testing of the minimum exciter low voltage limit, and revising maintenance activities to reduce the potential of recurrence. The inspectors noted that PPL did not perform an analysis that included having the vendor model the June 5, 2005, event, because of the limited information obtained during the event and PPL's belief that the modeling approach would not have been effective.

.4 Annual Sample: Review of Safety Conscious Work Environment (SCWE)

a. Inspection Scope

The inspectors reviewed licensee actions associated with the SCWE at Susquehanna. The inspection activities included a review of relevant documents (including the latest Organizational Culture Survey), 24 scheduled individual interviews, 10 unscheduled interviews, one focus group interview, and five behavioral observations of meetings or other plant activities. These activities covered all four pillars of SCWE (i.e., willingness to raise concerns, normal problem resolution process, employee concerns program, and detection and prevention of retaliation).

The inspector did not pursue specific allegation-related issues during this inspection.

b. Findings and Observations

No findings of significance were identified.

The inspector noted that, outside of the specific allegations which are not covered in this inspection, there was no wide-spread indication that workers were reluctant to report safety concerns. There was some evidence of organizational discord in the area of the general working environment in a small percentage of work groups. This problem had previously been identified and characterized by the licensee's organizational culture survey and the licensee appeared to be taking corrective actions to remedy the specific issues.

It was also noted that Susquehanna has a relatively large percentage of workers who have spent the majority of their career at the site. This demographic has engendered an organization where the norms and rules are well understood and followed by most workers. While this demographic can help to create an experienced work force, it can also present change management challenges when new standards and expectations are introduced.

.1 (Closed) LER 05000388/2007-001-00, Unit 2 Secondary Containment Bypass Leakage Exceeded

On March 9, 2007, it was identified that the Susquehanna Unit 2 as-found minimum pathway Secondary Containment Bypass Leakage (SCBL) Technical Specification limit had been exceeded during regularly scheduled Local Leakage Rate Testing (LLRT). The higher than desired leak rate was experienced at the "A" Residual Heat Removal Containment Spray penetration and was primarily attributed to a leaking test boundary valve. Although PPL had the opportunity to obtain a second as-found leak rate for this penetration, work coordination issues resulted in the isolation valve (HV251F016A) being lubricated and stroked before the test boundary repairs were attempted. PPL's maintenance work on the isolation valve, HV251F016A, removed the opportunity to re-perform an as-found test. The original test results (before maintenance work) had to be accepted as the as-found condition of HV251F016A.

This LER was reviewed by the inspectors and no findings of significance were identified. The inspectors found that this issue was properly captured in PPL's corrective action process with actions to address the apparent cause related to field work coordination. The inspectors learned that if PPL had reworked the boundary valves first and obtained a second as-found leak rate for HV251F016A, the Unit 2 SCBL value would have likely been less than the limit required in Technical Specification SR 3.6.1.3.11. PPL restored compliance with SCBL Technical Specification limits before Unit 2 restarted and corrective actions to address the cause are in CR 855957. This LER is closed.

4OA6 Meetings, Including Exit

On July 12, 2007, the resident inspectors presented the inspection results to Mr. C. Gannon, Vice President - Nuclear Operations, and other members of his staff, who acknowledged the findings. The inspectors confirmed that proprietary information was not provided or examined during the inspection.

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 Section VI of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as a Non-Cited Violation.

- TS 5.7.1, "High Radiation Areas", requires that each high radiation area shall be barricaded and conspicuously posted. On April 6, 2007, the area postings and boundary ropes on the 683 foot elevation of the Unit 2 Reactor Building were moved without permission of health physicists creating an unbarricaded and unmarked high radiation area. The event is documented in PPL's corrective action program, CR 865423. The finding is of very low safety significance (Green) because it did not involve a very high radiation area or personnel over-exposure.

ATTACHMENT: SUPPLEMENTAL INFORMATION

Enclosure

SUPPLEMENTAL INFORMATION**KEY POINTS OF CONTACT**Licensee Personnel

P. Brady, Supervisor - Electrical & I&C, PPL Allentown
 D. Brophy - Regulatory Affairs
 S. Brylinsky, Supervisor - Relay Testing, PPL Electric Utilities
 P. Capotosto, Supervisor - Electrical
 J. Hufford, Operations - Shift Manager
 R. Kessler, Senior Health Physicist - ALARA
 M. Micca, Health Physicist - Waste Shipping
 E. Miller - Regulatory Affairs
 R. Pagoden, General Manager - Engineering
 V. Schuman, radiological Protection - Manager
 R. Stigers, Senior Health Physicist - Waste Processing
 D. Szatkowski, Systems Engineer - Electrical

NRC Personnel

A. Blamey, Senior Resident Inspector
 F. Jaxheimer, Resident Inspector
 J. Furia, Senior Health Physicist
 P. Presby, Operations Engineer
 B. Haagensen, Operations Engineer

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSEDOpened

None

Opened and Closed

05000387, 388/2007003-01	NCV	Failure to Take timely Corrective Actions for an "E" Emergency Diesel Generator Jacket Water Leak (Section 1R19)
05000388/2007003-02	FIN	Failure to Maintain Occupational Radiation Exposure As Low As Reasonably Achievable during Reactor Water Cleanup Pipe Replacement Activities (Section 2OS2.1)
05000388/2007003-03	FIN	Failure to Maintain Occupational Radiation Exposure ALARA during Outage Inservice Inspection of Reactor Pressure Vessel (Section 2OS2.2)
05000387, 388/2007003-04	NCV	Violation of 10 CFR 71.5 for Inadequately Secured Transport of Condensate Pump Motors (Class 7 Material) (Section 2PS2.1)

Attachment

05000387, 388/2007003-05	NCV	Violation of 10 CFR 71.5 for Inadequately Accounting for Activity in a Shipment of Irradiated Fuel Channels (Section 2PS2.2)
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Closed

05000388/2007-001-00	LER	Unit 2 Secondary Containment Bypass Leakage Exceeded (Section 4OA3.1)
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LIST OF DOCUMENTS REVIEWED
(Not Referenced in the Report)

Section 1R15: Operability Evaluations

CR 866153, "VARS Went Negative on "D" DG Run"
OFR 866356, "Operability Followup Request for "D" DG"
IOM-222, "DG Voltage Regulator Technical Manual"

Section 1R17: Permanent Plant Modifications

EC 730624, "Ensure Positive Seating of RHR Injection Check Valves"
CN 4390, "Unit 1 HV251F050 A and B"
CN 4395, "Unit 2 HV252F050 A and B"
Engineering Calculation EC-049-0001, "Pressure Drops in the RHR System for Various Modes of Operation," Revision 5
TP-259-031, Unit 2, suppression pool temperature monitoring system (SPOTMOS) site acceptance test
T.S. 3.3.3.1 and T.S. 3.3.3.2
TRM 3.6.3, "Suppression Pool Alarm Instrumentation"
EC 514705, "Suppression Pool Water Temperature Monitoring System Replacement Division I," Safety Assessment for the Engineering Change EC 514-705

Section 1R19: Post Maintenance Testing

Calculation, EC-024-1028, Evaluate Operability of Diesel Generator E with Jacket Water Leak identified in AR 862230
Work Plan E2099-51, Unit 2 Main Generator Alterex Excitation system voltage regulating control and protection circuitry. (Open Circuit Stability Tuning)

Section 1R20: Refueling and Other Outage Activities

GO-200-002, Plant Startup Heatup and Power Operation
SE-000-017, ASME Leak Inspection for Class 1, 2, and 3 Piping
NDAP-QA-0480, ASME Section XI and Component Pressure Testing

Section 1R23: Temporary Plant Modifications

PCWO 882331, Install jumpers for TOC switch in accordance with EC 882347 in 4 KV breaker 1A 20408
MT-GE-010, control, instrumentation cable, lower range power circuit wire terminations

Attachment

Sections 2OS1, 2OS2, 2OS3, 2PS2: Access Control to Radiologically Significant Areas, ALARA Planning and Controls, Radiation Monitoring Instrumentation and Protective Equipment, and Radioactive Material Processing and Transportation

Condition Reports

869801; 853358; 858603; 860299; 860408; 865423; 859482; 869317; 865054; 865282; 861732; 860408; 859130; 859063

Radioactive Material Shipment Manifest 07-045

ALARA In-Process Reviews: 20072123; 20072370

ALARA Post Job Review: 20072002; 20072320; 20072352; 20072360

2PS3 Radiological Environmental Monitoring Program (REMP)

Susquehanna Steam Electric Station Units 1 & 2 Annual Radiological Environmental Operating Report, 2006

ODCM-QA-001, Revision 2, ODCM Introduction

ODCM-QA-002, Revision 3, ODCM Review and Revision Control

ODCM-QA-006, Revision 2, Total Dose Calculations

ODCM-QA-008, Revision 9, Radiological Environmental Monitoring Program

ODCM-QA-009, Revision 2, Dose Assessment Policy Statements

Procedures

SI-099-315, Revision 14, Semi-Annual Calibration - Meteorological Tower Wind Speed (10 meters)

SI-099-313, Revision 14, Semi-Annual Calibration - Meteorological Tower Wind Speed (60 meters)

I-099-316, Revision 12, Semi-Annual Calibration - Meteorological Tower Wind Direction (10 meters)

SI-099-314, Revision 14, Semi-Annual Calibration - Meteorological Tower Wind Direction (60 meters)

SI-099-317, Revision 13, Semi-Annual Calibration - Meteorological Tower Delta Temperature Channel 1 (10-60 meters)

SI-099-318, Revision 13, Semi-Annual Calibration - Meteorological Tower Delta Temperature Channel 2 (10-60 meters)

CH-AD-001, Revision 4, Chemical Sampling Analysis and Work Schedule

HP-TP-600, Revision 10, Analysis of Free Flowing Solids

HP-TP-602, Revision 27, Free Release Surveys

NDAP-QA-1180, Revision 3, Radiological Effluent Monitoring and Control

SC-099-002, Revision 1, Preparation of Radioactive Effluent Release Report

Hydro Geologic Investigation Work Plan, April 2007

Groundwater Monitoring Project - Fast Track Project Plan, May 2007

Section 4OA2: Identification and Resolution of Problems

Procedures

NDAP-QA-0702, Action Request and Condition Report Process, Revision 15

NDAP-QA-0702, Action Request and Condition Report Process, Revision 19

Drawings

D107261, Shts. 1-4, Schematic Diagram Main Generator Excitation and Regulation Unit 1 and Unit 2
E107150, Sh. 1, Unit 1 & 2 Single Line Diagram Station, Revision 33
E107150, Sh. 1A, Unit 1 & 2 Single Line Diagram Station, Revision 1
44C309622, Sh. 2, Alterrex Excitation System With S.C.R. Regulator, Revision 1
44C309622, Sh. 5, Alterrex Excitation System With S.C.R. Regulator, Revision 2
44C309622, Sh. 6 Alterrex Excitation System With S.C.R. Regulator, Revision 3

Engineering Change Proposals

829005

Operability Determination

ODM 828330

Condition Reports

AR 839568, CR 681673, CR 832096, CR 828330, and CR 838612

Work Orders

681698, 828377, 828394, and 870890

Miscellaneous

CARB Meeting Minutes, 1/16/2007 and 1/18/2007
GE TIL No. 961-3, Field Enhancements for Alterrex Enhancements
LER 50-388/2005-005-01, U2 Reactor Automatic Scram Due to a Main Generator Lockout
LER 50-387/2006-006-00, U1 Automatic SCRAM Due to Generator Lockout
OE24070, Main Generator Excitation System Failed to Recover from a Grid Disturbance Resulting in Reactor Shutdown
Operations Directive, 06-10 Operable Unit 1 & Unit 2 Main Generator Voltage Regulators in Manual, Revision 3
Susquehanna, E. Palmerton & Siegfried - E. Palmerton 230 KV Lines Tripping Event Faulted 230 KV Tie CB at E. Palmerton; 11/25/06, 2/2007
Vendor Manual, IOM240-2, GEK-14870C, Alterrex Excitation System Static Control, 5/29/87

4OA3: Event Follow-up

Calculation EC-059-1024, Design Requirements for Evaluation of Potential Secondary Containment Bypass Leakage (SCBL) Pathways
Unit 2 Refueling outage Valve leakage summary from Engineering Programs Group

LIST OF ACRONYMS

ALARA	As Low As Is Reasonably Achievable
ASME	American Society of Mechanical Engineers
BLOG	Backlog Overview Group
BWR	Boiling Water Reactor
CDF	Core Damage Frequency
CFR	Code of Federal Regulations
CEDE	Committed Effective Dose Equivalent
CR	Condition Report
CRD	Control Rod Drive
CREOAS	Control Room Emergency Outside Air System
DOT	Department of Transportation
EDG	Emergency Diesel Generator
EP	Emergency Preparedness
ESW	Emergency Service Water
FSAR	[SSES] Final Safety Analysis Report
GE	General Electric
HP	Health Physics
HPCI	High Pressure Coolant Injection
ILRT	Integrated Leak Rate Test
IMC	Inspection Manual Chapter
IP	Inspection Procedure
ISI	Inservice Inspection
KV	Kilovolts
LER	Licensee Event Report
LLRT	Local Leakage Rate Testing
MSIV	Main Steam Isolation Valve
NCV	Non-cited Violation
NDAP	Nuclear Department Administrative Procedure
NRC	Nuclear Regulatory Commission
OA	Other Activities
ODCM	Offsite Dose Calculation Manual
OOS	Out-of-Service
PI	[NRC] Performance Indicator
PI&R	Problem Identification and Resolution
PPL	PPL Susquehanna, LLC
QA	Quality Assurance
RB	Reactor Building
RCA	Radiologically Controlled Area
RCIC	Reactor Core Isolation Cooling
RCS	Reactor Coolant System
REMP	Radiological Environmental Monitoring Program
RG	[NRC] Regulatory Guide
RHR	Residual Heat Removal
RHRSW	Residual heat Removal Service Water
RTP	Rated Thermal Power
RWCU	Reactor Water Clean Up
RWP	Radiation Work Permit
SCWE	Safety Conscious Work Environment
SDP	Significant Determination Process

SLC	Standby Liquid Control
SPDG	Station Portable Diesel Generator
SSC	Structures, Systems and Components
SSES	Susquehanna Steam Electric Station
TBCCW	Turbine Building Closed Cooling Water
TLD	Thermoluminescent Dosimeter
TS	Technical Specifications
UHS	Ultimate Heat Sink
UPS	Uninterrupted Power Supply
UT	Ultrasonic Test
VHRA	Very High Radiation Area
VT	Visual Examination
WO	Work Order