

March 8, 2002

Mr. Robert G. Byram  
Senior Vice President and  
Chief Nuclear Officer  
PPL Susquehanna, LLC  
Susquehanna Steam Electric Station  
2 North Ninth Street  
Allentown, Pennsylvania 18101

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION - NRC INSPECTION REPORT  
50-387/01-013, 50-388/01-013

Dear Mr. Byram:

On February 1, 2002, the NRC completed a team inspection at the Susquehanna Steam Electric Station Units 1 and 2. The enclosed report documents the inspection results, which were discussed on February 1, 2002, with you, Mr. James H. Miller, President, PPL - Generation, LLC, and members of your staff.

The inspection was an examination of activities conducted under your license as they relate to the identification and resolution of problems, your compliance with the Commission's rules and regulations, and the conditions of your operating license. Within these areas, the inspection involved selected examination of procedures and representative records, observations of activities, and interviews with personnel.

On the basis of the sample selected for review, there were no findings of significance identified during this inspection. The team concluded that problems were properly identified, evaluated and resolved within the problem identification and resolution programs. However, the team noted that your corrective actions to address human performance issues have not been fully effective.

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Sincerely,

**/RA/**

David C. Lew, Chief  
Performance Evaluation Branch  
Division of Reactor Safety

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

Enclosure: NRC Inspection Report 50-387/01-013, 50-388/01-013  
cc w/encl:  
B. L. Shriver, Vice President - Nuclear Site Operations

Mr. Robert G. Byram

2

R. Anderson, General Manager - SSES Operations  
R. L. Ceravolo, General Manager - Plant Support  
G. A. Williams, General Manager - Nuclear Assurance  
A. J. Wrape III, General Manager - Nuclear Engineering  
T. Harpster, Manager - Regulatory Affairs  
R. R. Sgarro, Supervisor, Nuclear Licensing - SSES  
C. D. Markley, Supervisor - Nuclear Licensing  
M. M. Golden, Manager - Nuclear Security  
P. Niderostek, Nuclear Services Manager, General Electric  
A. M. Male, Manager, Quality Assurance  
H. D. Woodeshick, Special Assistant to the President  
G. DallaPalu, PP&L Nuclear Records  
R. W. Osborne, Vice President, Supply & Engineering  
Allegheny Electric Cooperative, Inc.  
Commonwealth of Pennsylvania

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D. Florek, DRP

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G. Vissing, PM, NRR

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**U.S. NUCLEAR REGULATORY COMMISSION**

REGION I

Docket Nos.: 50-387, 50-388

License Nos.: NPF-14, NPF-22

Report Nos.: 50-387/01-013, 50-388/01-013

Licensee: PPL Susquehanna, LLC

Facility: Susquehanna Steam Electric Station

Location: Post Office Box 35  
Berwick, PA 18603

Dates: January 14, 2002 to February 1, 2002

Inspectors: S. Pindale, Reactor Inspector  
F. Arner, Reactor Inspector  
J. Richmond, Resident Inspector

Approved by: D. Lew, Chief  
Performance Evaluation Branch  
Division of Reactor Safety

## SUMMARY OF FINDINGS

IR 05000387/01-013, 05000388/01-013; on 01/14-02/01/2002; PPL Susquehanna, LLC; Susquehanna Steam Electric Station; Units 1&2. Annual baseline inspection of the Identification and Resolution of Problems.

The inspection was conducted by two regional inspectors and one resident inspector. No findings of significance were identified. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described at its Reactor Oversight Process website at <http://www.nrc.gov/reactors/operating/oversight.html>.

### Identification and Resolution of Problems

The team concluded that, based on the samples reviewed, the overall implementation of the corrective action program at Susquehanna was acceptable. The licensee was identifying problems at an appropriate threshold and entering them into their corrective action program. The backlog of corrective actions was adequately managed, however, corrective action due dates were frequently extended. The actions taken for identified problems were adequate to correct the problem and prevent recurrence. The licensee's evaluations of problems were of adequate depth to identify the causes and appropriately broad in considering the extent of condition. However, the team noted a number of personnel errors at both units within the last year. The type of errors included wrong unit, wrong equipment, and missed procedure steps. While PPL management recognized that a performance issue was apparent in this area and initiated several efforts to decrease the errors, the team noted that these efforts to date have not been fully effective.

#### A. Inspection Findings

No findings of significance were identified.

## Report Details

### **4. OTHER ACTIVITIES (OA)**

#### 4OA2 Problem Identification and Resolution (71152)

##### a. Effectiveness of Problem Identification

###### (1) Inspection Scope

The team reviewed the corrective action program (CAP) procedures to understand the licensee's program for problem identification and resolution. The licensee identifies problems by initiating action reports. Action reports that involve items such as conditions adverse to quality, plant equipment deficiencies, industrial or radiological safety concerns, and human performance errors become condition reports (CR). Condition reports identifying problems are subsequently screened for operability, categorized by significance level (1 through 3) and evaluation type (i.e., root cause, apparent cause), and assigned to personnel to evaluate the problem.

The team selected and reviewed a sample of condition reports at each significance level to determine the licensee's threshold for problem identification. A listing of this sample is attached to this report. The samples were generally chosen to cover the time frame from the last problem identification inspection in December 2000 to the present. The team observed daily meetings where licensee personnel screened incoming condition reports.

The team reviewed items from the licensee's operations, maintenance, engineering, and quality assessment processes to determine if personnel were appropriately initiating CRs when problems were identified via these processes. For selected risk significant systems, the team reviewed applicable system health reports, work requests, plant log entries, and recurring maintenance task lists. For these selected systems, the team also interviewed the cognizant station personnel and walked down portions of these systems.

###### (2) Findings and Issues

No findings of significance were identified. The team determined that the licensee was identifying problems and entering them into the CAP at an appropriate threshold. However, the team noted PPL's Independent Safety Engineering Group (ISEG) did not evaluate their findings to determine whether specific issues should have been entered into the CAP, and did not require the responsible group to resolve or correct the condition prior to item closure in the ISEG tracking database. PPL initiated CR 378629 to evaluate this item.

##### b. Prioritization and Evaluation of Issues

###### (1) Inspection Scope

The team selected a sample of CRs, covering significance levels 1 through 3, to determine whether the licensee was properly evaluating and resolving problems adverse to quality. The sample was selected using risk insights from the licensee's Individual Plant Examination study. For each CR selected, the team reviewed the appropriateness of the assigned significance level, the scope and depth of the licensee's root or apparent cause evaluation, and the priority assigned to evaluating the problem. The licensee's investigation into the extent of each problem was also reviewed. Some CRs were selected that evaluated problems involving previously identified NRC Violations. The team also reviewed the licensee's operability and reportability assessments completed for these problems.

(2) Findings and Issues

No findings of significance were identified. Overall, the team concluded the licensee prioritized and evaluated issues entered into the CAP in a timely fashion, commensurate with the potential risk significance. The team determined the licensee's evaluations were generally of adequate depth to identify the causes and were appropriately broad in considering the extent of the condition. The licensee's assessments properly considered operability and reportability requirements. The backlog of CRs and associated corrective actions was adequately managed based upon significance. However, the team found that station personnel frequently extended CR action due dates (approved by department manager). The team identified some minor examples where problems were not sufficiently evaluated to determine cause, or where the extent of the problem was not considered.

- Unexpected High Turbine Bearing Vibration During Testing

The team found that PPL missed opportunities to take substantial action to prevent the occurrence of a potential plant transient at Unit 2 after information was available regarding turbine bearing vibration. Specifically, turbine valve testing on June 19, 2001, nearly resulted in a turbine trip/reactor scram due to high vibration of the No. 2 turbine bearing. In addition, control room operators conducting the test initially were not fully aware that actual vibration was within 0.25 mils of the trip setpoint. System engineering initially underestimated the expected peak although turbine vibration baseline values were higher than the prior operating cycle. The higher vibration baseline for two of the turbine bearings were identified in CRs 337396 and CR 337397.

Following the June 2001 test, engineering evaluated the available data. Again, the vibration peak was underestimated by system engineering as the subsequent test in September 2001 yielded a high vibration level. It was not until after this second test that PPL instituted substantial corrective actions (temporarily bypassing this automatic turbine trip during the test while closely monitoring vibration levels).

- Safety System Control System

In the area of prioritization of issues, the team questioned the prioritization of planned work related to the high pressure coolant injection (HPCI) and reactor

core isolation cooling (RCIC) governor control systems. A 10 CFR Part 21 Report, No. 10CFR21-0082, and a vendor service information letter (SIL 640) had been issued and determined by PPL to be applicable to Susquehanna. PPL engineers determined that the HPCI and RCIC installed governors exceeded the recommended replacement interval of both the manufacturer and industry guidelines documented in technical report 112175, "Electrolytic Capacitor Life Prediction Guidelines." One of the planned corrective actions for this issue was to replace this type governor with refurbished ones that have new capacitors. PPL's targeted due date was June 2004 for Unit 1 and June 2003 for Unit 2. However, the SIL had recommended replacement at the first available opportunity without impacting plant operations or system availability. Although a four day planned Unit 2 HPCI outage had been performed during this inspection and there was an upcoming Unit 2 refueling outage in March 2002, PPL had not fully evaluated whether this work should have been scoped into the outage windows. While the team did not have an immediate operability concern due to the demonstrated operability during testing and engineering judgement, the team noted that the thoroughness of PPL's review was not consistent with 1) the fact that the installed components already exceeded the expected life and 2) risk significance of the systems was high. PPL stated they planned to re-evaluate their plan with respect to the time frame of replacement of the affected components.

- Failure to Consider Potential Operator and Procedure Performance Issues

The team determined that PPL did not consider potential human and procedure performance issues associated with CRs 357618 (September 24, 2001) and 363410 (October 25, 2001), which were related to unexpected responses in the reactor building closed cooling water (RBCCW) system. Both CRs discussed low RBCCW pressure conditions where the operators believed the standby RBCCW pump did not automatically start as expected.

The responses for both CRs indicated that there were no equipment deficiencies, and no further evaluation was planned. The team reviewed both condition reports and found that PPL did not consider whether there were any possible human or procedure performance deficiencies. It appeared that the operators may have responded to an initial low RBCCW pressure signal (an anticipatory signal) in a fashion inconsistent with the associated alarm response procedure (AR-123-001; window E04). In addition, the team found that a procedure reference by the alarm response procedure, ON-114-001, "Loss of RBCCW," contained some ambiguous guidance regarding the expected automatic actions. Based on the team's observations, PPL initiated CR action 383600 for further evaluation.

c. Effectiveness of Corrective Actions

(1) Inspection Scope

The team reviewed the licensee's corrective actions associated with CRs to determine whether the actions addressed the identified causes of the problems. The team also reviewed the licensee's timeliness in implementing corrective actions and their effectiveness in preventing recurrence of significant conditions adverse to quality. For selected risk significant systems, the team reviewed the backlog of corrective actions, both tracked within CRs and in work requests, to determine whether there were corrective actions that individually or collectively were of risk significance to plant safety.

(2) Findings and Issues

No findings of significance were identified. The team determined that the actions taken for the reviewed CRs were adequate to correct each of the problems specified in their evaluations and to prevent recurrence. The team also noted that the licensee appropriately scheduled and tracked these corrective actions to completion. The team did not identify items in the backlog that represented an adverse effect on plant risk.

However, the team noted some examples where corrective actions for problems were not fully effective in the area of human performance. Several personnel errors occurred at both units within the last year, which included wrong unit, wrong equipment manipulated, and missed procedure steps. While the team did not identify significant deficiencies associated with the condition reports, the team concluded that the continued occurrence of human errors was indicative of less than fully effective evaluation and corrective actions for the individual errors. As an example, CR 263459 was written in May 2000 to document a continuing trend with respect to wrong unit events. While many actions were developed and implemented, there was no effectiveness review planned or completed.

PPL management recognized the continued adverse performance in this area, and has initiated several efforts to decrease the number of errors. A recent series of human performance related events occurred since the beginning of January 2002. PPL initiated CR 384462 to address this series of errors, and planned a station "stand-down" for February 4, 2002, to discuss the nature and number of the recent performance errors with station workers.

d. Assessment of Safety-Conscious Work Environment

(1) Inspection Scope

During the conduct of inspection activities, the team was attentive to indications which could result in workers becoming hesitant to use the corrective action program to identify safety problems.

(2) Findings

No findings of significance were identified.

4OA6 Meetings

Exit Meeting Summary

The team presented the inspection results to Mr. James H. Miller, President, PPL - Generation, LLC and members of licensee management and staff at the conclusion of the inspection on February 1, 2002. The licensee acknowledged the findings presented. The licensee did not indicate that any of the information presented at the exit meeting was proprietary.

Attachments:

- Partial List of Personnel Contacted
- List of Acronyms
- List of Documents Reviewed

## PARTIAL LIST OF PERSONNEL CONTACTED

**Licensee:**

M. Adelizzi	Senior Engineer, Systems Analysis
R. Byram	Senior Vice President & Chief Nuclear Officer
R. Ceravolo	General Manager, Plant Support
K. Daly	System Engineer
A. Dominguez	Project Engineer, Programs & Testing
J. Greiswood	Emergency Preparedness Supervisor
T. Harpster	Manager, Regulatory Affairs
R. Henry	Supervisor, NAS
T. Kirwin	Manager, Corrective Action
G. Maertz	System Engineering Supervisor
M. Manosky	Senior Engineer, Special Projects
M. McCarthy	Manager Radiation Protection & Chemistry
J. Meter	Regulatory Affairs Engineer
J. Miller	President, PPL - Generation, LLC
G. Ruppert	Supervisor, Operations Engineering
M. Rochester	Employee Concerns Program Site Representative
R. Saccone	Manager, Nuclear Operations
R. Schechterly	OE Supervisor
B. Shriver	Vice President, Nuclear Site Operations
R. Smith	Radiation Protection Manager
T. Tonkinson	OES Supervisor
J. Vandenberg	System Engineer
G. Williams	General Manager, NAS

**NRC:**

S. Hansell	Senior Resident Inspector
D. Lew	Chief, Performance Evaluation Branch

## LIST OF ACRONYMS

CAP	Corrective Action Program
CFR	Code of Federal Regulations
CR	Condition Report
DBD	Design Basis Document
EQ	Environmental Qualification
EWR	Engineering Work Request
GE	General Electric
HPCI	High Pressure Coolant Injection
ISEG	Independent Safety Engineering Group
IST	Inservice Test
MSIV	Main Steam Isolation Valve
NAS	Nuclear Assurance Services
NQA	Nuclear Quality Assurance
NRC	Nuclear Regulatory Commission
OEF	Operating Experience Services
PCWO	Plant Component Work Order
PPL	PPL Susquehanna, LLC
RBCCW	Reactor Building Closed Cooling Water
RCIC	Reactor Core Isolation Cooling
RHR	Residual Heat Removal
SE	Safety Evaluation
SIL	Service Information Letter
SRC	Susquehanna Review Committee
UFSAR	Updated Final Safety Analysis Report

## LIST OF DOCUMENTS REVIEWED

**Condition Reports**

92809	309820	330812
236909	310478	331266
246483	310810	332600
246527	311171	335772
246650	311223	336304
249615	311239	337946
250590	311835	338781
260241	311992	338205
272262	312015	341568
274819	312049	341703
276635	312057	344576
288518	313614	345060
293456	315019	347298
295626	315493	348811
297422	315606	350272
298413	317616	352418
299462	316780	352571
299879	316967	354630
301379	319656	355637
301575	319927	356444
301763	320045	358664
302673	320683	361210
302850	320968	363410
303627	321762	369450
305722	327430	372127
306947	330078	372167
307847	330188	970162

**Procedures**

AR-123-001	Alarm Response Procedure (E03 & E04), Rev. 16
NDAP-QA-0702	Action Request and Condition Report Process, Rev. 11
NDAP-00-0745	Nuclear Department Self-Assessment Program, Rev. 0
ON-100-009	Control Room Evacuation, Rev. 5
ON-114-001	Loss of RBCCW, Rev. 14
OP-149-002	RHR Shutdown Cooling, Rev. 29
OP-249-005	RHR Suppression Pool Cooling, Rev. 22

**Security Incident Reports**

01-01-11, 01-01-24, 01-04-27, 01-08-01, and 01-10-11 (related reports)  
 01-03-16, 01-04-11, and 01-09-10 (related reports)  
 01-02-13  
 01-04-01  
 01-04-31  
 01-06-12  
 01-07-01

**Non-Cited Violations and Finding**

2000-06-01 Failed to identify cause of relay failures to preclude recurrence of a subsequent relay failure affecting the RHR system  
 2000-06 Inadequate corrective actions for repetitive protective relay (grey box) failures  
 2000-08-01 Main steam safety relief valves did not open at required setpoint  
 2000-09-01 Failure to Perform Risk Assessment Prior to Planned Maintenance  
 2000-09-04 Technical specification interpretation was incorrect  
 2000-09-05 Failure to Post a High Radiation Area  
 2000-09 HPCI suction swap after an MSIV closure transient  
 2001-02-01 Failure to complete technical specification required actions during RCIC maintenance.  
 2001-05-01 Failure perform valve testing in IST Program  
 2001-06-01 No procedure to maintain EQ motor T-drains inside primary containment

**QA & ISEG Audits, Surveillances, and Reports**

ISEG Report 1-01, Summary Assessment Report of Calendar Year 2000  
 ISEG Recommendations 296358 and 296809  
 ISEG Recommendations 297329, 290392, 290393, 292619, 357288  
 NQA Audit 2000-09, "Measurement & Test Equipment Program,"  
 NQA Audit 2001-009, "Fitness for Duty & Access Authorization Program,"  
 NQA Surveillance 2001-18, "Post Modification Testing,"  
 NQA Surveillance 2001-022, "Review of Security Actions on 8-23-01  
 NQA Finding 294531, "Security Watch Standing Practices"  
 NQA Finding 353675, "Security Incident CP-2-4.3"  
 NQA Finding 354830, "Temporary Unescorted Access"  
 NQA Recommendation 300285, "Standby Liquid Control System Test Control"  
 NQA Recommendation 354836, "Access Control Event Log Keeping"  
 NQA Recommendation 358679, "Security Plan Training for Emergency Directors"  
 SRC Audit 2000-010, "Security Plan and Procedures,"  
 SRC Audit 2001-012, "Security Plant Procedures,"

**Other**

CALC-EC-SBWR-0505	Evaluation of HPCI and RCIC Room Temperatures
DBD Open Item 014.008	RHR Containment Spray
DBD Open Item 014.025	RHR Heat Exchanger Design Specification
EWR 306055	Extend frequency of heat exchanger swapping due transients
EWR 359407	Radio systems onsite are degraded
SIL 496	EPA Logic Card Power Supply
GE SIL 614	Backup Pressure Regulator
GE SIL 623	Single Failure Turbine Control
IN 97-90	Safety Related Pump Testing
PCWO 352617	Backseat feedwater valve to step leakage at packing leakoff plug.
SE NL-99-080	Backseating Feedwater Valve HV-241F032B, Rev. 0

Operability Assessment for CR 203574

Susquehanna Review Committee Meeting Minutes for January/February 2001

Plant Control Operator Narrative Logs

UFSAR