June 5, 2002

Mr. Bryce L. Shriver
Senior Vice President and
Chief Nuclear Officer
PPL Susquehanna, LLC
Susquehanna Steam Electric Station
769 Salem Boulevard
Berwick, Pennsylvania 18603

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION - NRC INSPECTION REPORT 50-387/02-03, 50-388/02-03

Dear Mr. Shriver:

On May 11, 2002, the NRC completed an inspection at your Susquehanna Steam Electric Station Units 1 and 2. The enclosed report documents the inspection findings which were discussed on May 15, 2002, with Mr. B. Shriver, Vice President - Nuclear Site 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.

Based on the results of this inspection, the NRC identified two findings of very low safety significance (Green) that were a violation of NRC requirements. Additionally, a licensee identified violation of very low safety significance (Green) is listed in Section 4OA7 of this report. However, because of the very low safety significance and because these issues were entered into your corrective action program, the NRC is treating these issues as Non-cited Violations, in accordance with Section VI.A.1 of the NRC's Enforcement Policy. If you deny these Non-cited Violations, you should provide a response within 30 days of the date of this letter, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator Region I; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Susquehanna Steam Electric Station.

Immediately following the terrorist attacks on the World Trade Center and the Pentagon, the NRC issued an advisory recommending that nuclear power plant licensees go to the highest level of security, and all promptly did so. With continued uncertainty about the possibility of additional terrorist activities, the Nation's nuclear power plants remain at the highest level of security and the NRC continues to monitor the situation. This advisory was followed by additional advisories, and although the specific actions are not releasable to the public, they generally include increased patrols, augmented security forces and capabilities, additional security posts, heightened coordination with law enforcement and military authorities, and more limited access of personnel and vehicles to the sites. The NRC has conducted various audits of your response to these advisories and your ability to respond to terrorist attacks with the capabilities of the current design basis threat (DBT). On February 25, 2002, the NRC issued an Order to all nuclear power plant licensees, requiring them to take certain additional interim compensatory measures to address the generalized high-level threat environment. With the issuance of the Order, we will evaluate PPL's compliance with these interim requirements.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publically Available Records (PARS) component of 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).

If you have any questions please contact me at 610-337-5209.

Sincerely,

/RA/

Mohamed Shanbaky, Chief
Projects Branch 4
Division of Reactor Projects

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

Enclosure: Inspection Report 50-387/02-03, 50-388/02-03

Attachment 1 - Supplemental Information
Attachment 2 - PPL Slides from May 13, 2002 Management Meeting

cc w/encl: R. Anderson, General Manager - SSES Operations
R. L. Ceravolo, General Manager - Plant Support
A. J. Wrape III, General Manager - Nuclear Engineering
T. Harpster, Manager - Nuclear Regulatory Affairs
R. R. Sgarro, Supervisor, Nuclear Licensing - SSES
C. D. Markley, Supervisor - Nuclear Licensing
M. M. Golden, Manager - Nuclear Security
P. Nederostek, Nuclear Services Manager, General Electric
D. Roth, 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

Distribution w/encl: H. Miller, RA/J. Wiggins, DRA (1)
M. Shanbaky, DRP
D. Florek, DRP
J. Talieri, DRP
S. Iyer, DRP
R. Junod, DRP
S. Hansell, DRP - SRI Susquehanna
H. Nieh, RI EDO Coordinator
S. Richards, NRR (RidsNrrDipmlpdi)
E. Thomas, PM, NRR
D. Skay, PM, NRR (Backup)
Region I Docket Room (with concurrences)

DOCUMENT NAME: G:\BRANCH4\Susquehanna\Sus0203.wpd
After declaring this document "An Official Agency Record" it **will/will not** be released to the Public. **To receive a copy of this document, indicate in the box:** "**C**" = Copy without attachment/enclosure "**E**" = Copy with attachment/enclosure "**N**" = No copy

OFFICE	RI/DRP		RI/DRP		RI/DRP	
NAME	SHansell/DF for		DFlorek/DF		MShanbaky/DF for	
DATE	06/4/02		06/5/02		06/5/02	

OFFICIAL RECORD COPY

U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket Nos.: 05000387, 05000388

License Nos.: NPF-14, NPF-22

Report No.: 50-387/02-03, 50-388/02-03

Licensee: PPL Susquehanna, LLC

Facility: Susquehanna Steam Electric Station

Location: Post Office Box 35
Berwick, PA 18603

Dates: March 31, 2002 to May 11, 2002

Inspectors: S. Hansell, Senior Resident Inspector
J. Richmond, Resident Inspector
D. Florek, Senior Project Engineer

Approved by: Mohamed M. Shanbaky, Chief
Projects Branch 4
Division of Reactor Projects

SUMMARY OF FINDINGS

IR 05000387-02-03, IR 05000388-02-03; on 03/31-05/11/2002; PPL Susquehanna, LLC; Susquehanna Steam Electric Station; Units 1&2. Event Follow-up and Temporary Modifications.

The report covered a 6 week period of inspection by resident inspectors and a regional senior project engineer. The inspection identified two Green findings. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter 0609 "Significance Determination Process" (SDP). Findings for which the SDP does not apply are indicated by "No Color" or by a severity level of the applicable violation. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described at its Reactor Oversight Process web site at http://www.nrc.gov/reactors/operating/oversight.html.

A. Inspection Findings

Cornerstone: Initiating Events

- **Green**. The inspectors identified a Green non-cited violation of Technical Specification section 5.4.1, because Off Normal procedure ON-164-002, "Loss of Reactor Recirculation Flow," did not provide adequate directions to the operators to adequately determine total core flow following a single reactor recirculation pump trip at low reactor power conditions and, based on the total core flow readings, take the appropriate actions.

  The inadequacy of the procedure contributed to an actual impact on safety in that the reactor protection system was manually actuated. This finding was considered to have very low safety significance because the finding did not increase likelihood of a primary or secondary system LOCA initiator, did not contribute to the likelihood that mitigating equipment would not be available, and did not increase the likelihood of a fire or flood. In addition the reactor protection system and other plant systems responded as expected to the manual reactor shutdown and there were no indications of reactor core oscillations at the time of the reactor recirculation pump trip. (Section 4OA3)

Cornerstone: Mitigating Systems

- **Green**. The inspectors identified a Green non-cited violation of Technical Specification section 5.4.1, with two examples, because PPL did not implement their written procedures to control a temporary plant alteration associated with the use of blank flanges in the ESW system supply and return lines to the Unit 1 "A" TBCCW and "A" RBCCW heat exchangers. As a result, PPL did not remove the blank flanges prior to the Unit 1 restart from the refueling outage.

  This violation was of very low safety significance because there was no actual loss of cooling to the Unit 1 "A" TBCCW and "A" RBCCW heat exchangers. (Section 1R23)

B. Licensee Identified Violations

A violation of very low safety significance (Green) which was identified by PPL has been reviewed by the inspectors. Corrective actions taken or planned by PPL have been entered into PPL's corrective action program. This violation is listed in section 4OA7 of this report.

Report Details

Summary of Plant Status

Susquehanna Steam Electric Station (SSES) Unit 1 began the period shutdown in a maintenance and refueling outage. Operations restarted the unit on April 21, and achieved 20 percent power on April 22. A manual reactor scram was initiated on April 22 at 1:15 a.m. due to an unexpected shutdown of the "B" reactor recirculation pump (Section 4OA3). Operations restarted the unit on April 23, and achieved full power on April 27, and operated at or near full power for the remainder of the report period.

Unit 2 was operated at or near full power for the report period, with exceptions for control rod pattern adjustments and cooling tower makeup valve repairs.

1. REACTOR SAFETY
Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity [R]

1R04 Equipment Alignments (71111.04)

.1 Partial System Walk-downs

a. Inspection Scope

The inspectors performed partial system walk-downs to verify system and component alignment and to note any discrepancies that would impact system operability. The inspectors verified selected portions of redundant or backup systems or trains were available while certain system components were out of service. The inspectors reviewed selected valve positions, electrical power availability, and the general condition of major system components. The walk-downs included the following systems:

- Unit 1 turbine building closed cooling water system, on April 8th;
- Unit 1 and 2 service water systems after the U1 "A" service water pump discharge valve was found closed, on May 6th;
- Unit 1 un-interruptible power supply (UPS) 1D240 after the preferred power source breaker was found open, on May 1st.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05Q)

a. Inspection Scope

The inspectors reviewed PPL's Fire Protection Review Report and pre-fire plans 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. The areas and documents included:

Plant Areas and Fire Zones

- Unit 1 reactor feed pump turbine areas, fire zone 1-32I, on April 12
- Unit 1 main condenser area, fire zones 1-31D and 1-32D, on April 8
- Common station telephone switch room
- Unit 1 reactor building equipment room I-204, fire zones 1-3C-N, S, W
- Unit 1 upper and lower cable spreading rooms, fire zones 0-25E and 0-27C

Pre-fire Plans

- FP-113-221, "RFP Turbine A, B, C Rooms"
- FP-013-150, "Unit 1 Lower Cable Spreading Room"
- FP-013-163, "Unit 1 Upper Cable Spreading Room"
- FP-113-212,291, "Unit 1 Main Condenser Area"
- FP-113-112, "Unit 1 Equipment Room"

b. Findings

No findings of significance were identified.

1R12 Maintenance Rule Implementation (71111.12Q)

a. Inspection Scope

The inspectors evaluated the follow-up actions for selected system, structure, or component (SSC) issues and reviewed the performance history of these SSCs to assess the effectiveness of PPL's maintenance activities. 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(a)(1) and (a)(2), "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. The following issues were reviewed:

Equipment Issues

- Unit 1 reactor water cleanup (RWCU) isolation due to Riley module failure, on April 4
- Unit 1 reactor recirculation pump trip (CR 389663), on April 29

Procedures and Documents

- Maintenance Rule Basis Documents for RWCU
- System Health Reports for RWCU
- Maintenance Rule Basis Documents for Reactor Recirculation

- NDAP-QA-0413, "SSES Maintenance Rule Program"
- EC-RISK-0528, "Risk Significant SSCs for the Maintenance Rule"
- EC-RISK-1054, "Maintenance Rule SSC Availability Performance Criteria"
- EC-RISK-1060, "Risk Significant SSC Acceptable Failure Limits"

b. Findings

No significant observations or findings were identified.

1R13 Maintenance Risk Assessment and Emergent Work (71111.13)

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 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 verify whether risk management action threshold levels were correctly identified. The inspectors assessed those activities to evaluate whether appropriate implementation of risk management actions were performed in accordance with the following PPL procedures:

- NDAP-QA-1902, "Maintenance Rule Risk Assessment & Management Program"
- NDAP-QA-0340, "Protected Equipment Program"
- PSP-22, "Susquehanna Sentinel Program"
- SSES Team Manual

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 issue. The inspectors performed control room and field walk-downs to verify whether the compensatory measures identified by the risk assessments were appropriately performed. The selected maintenance activities included:

- Unit 1 reactor building sump valve pit > 1Rem/hour (CR 395764), on April 9
- Common Emergency Notification System and Emergency Response Data System telephone and data transmission system repairs, on April 4
- Unit 1 main turbine generator hydrogen leak, on April 26

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15)

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:

- Unit 1 “A” and “C” emergency diesel generator (EDG), for LOCA load sequence timers as-found out of tolerance, CR 394527, on April 8-10
- Unit 1 and 2 nuclear boiler instrumentation potential setpoint drift during a seismic event, CR 897414, on May 1-6
- Unit 1 “B” - reactor recirculation pump trip and core flow assessment, CR 398665, on April 22-26

b. Findings

No findings of significance were identified.

1R19 Post Maintenance Testing (71111.19)

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’s adequacy by comparing the test methodology to the scope of maintenance work performed. In addition, the inspectors evaluated the test acceptance criteria to verify whether the test demonstrated that the tested components satisfied the applicable design and licensing bases and the Technical Specification requirements. The inspectors reviewed the recorded test data to determine whether the acceptance criteria were satisfied. The maintenance activities reviewed included:

- Unit 1 standby liquid control operational pressure test and flow test after pump and pressure relief valve modification, WO319462, SO-153-003/4, on April 10

- Unit 1 emergency diesel generator LOCA load sequence timer re-test after relay replacement, WO 94531, WO 394530, and CR 94527
- Unit 1 scram time testing after control rod drive mechanism / control blade replacement, SE-100-002 and SR-155-004, on April 2
- Common monthly diesel and motor driven fire pump run was observed following the performance of work instruction 383570 on the motor driven fire pump discharge check valve 022020, on April 22.

b. Findings

No findings of significance were identified.

1R20 Unit 1 Refueling and Maintenance Outage Activities (71111.20)

.1 Control of Outage Activities

a. Inspection Scope

The inspectors observed selected maintenance, testing, and equipment restoration activities to verify whether component configuration management, test control, and post maintenance checks were performed in accordance with NRC requirements and PPL procedures. The inspectors reviewed unexpected plant conditions, emergent work, and system configuration control during testing and maintenance activities to evaluate whether the activities were performed in accordance with NRC requirements and PPL procedures.

The inspectors reviewed the ASME In-service inspection data and the surveillance test data, from the reactor coolant pressure boundary operational leakage test, to evaluate whether the test acceptance criteria were satisfied. In addition, the inspectors evaluated whether the activities were performed in accordance with NRC requirements and PPL approved procedures.

The inspectors observed operation of the supplemental decay heat removal system (SDHR, i.e., a temporary heat removal system) to verify that the system was operable during the time periods when the residual heat removal system was unavailable for shutdown cooling operation. The inspectors monitored the availability of reactor coolant emergency makeup water sources from the core spray system to verify whether PPL maintained a defense-in-depth commensurate with the outage risk management goals, and in accordance with the Technical Specification requirements. The following activities and documents were reviewed or observed:

Specific Activities

- LOCA-LOOP testing SE-124-A02 and SE-124-107
- Start-Up PORC on April 9, 2002
- Leading Edge Flow Meter installation for the feedwater system
- Removal of the temporary SDHR system, following RHR system restoration
- Start-up PORC Meetings on April 22, 2002

- ASME In-service inspections during reactor coolant pressure boundary leakage test
- Division-2 RHR Logic System Functional Test
- Division-1 LOCA-LOOP Testing
- Post-maintenance walkdown of primary containment (drywell) prior to final closeout
- Reactor cavity drain down

Procedures and Documents

- OP-011-001, "SDHR System"
- ON-249-001, "Loss of RHR Shutdown Cooling Mode"
- OI-TA-009, "Determination of Heat Removal Capacities and Vessel Heatup Rates"
- NDAP-QA-0507, "Conduct of Refuel Floor Operations"
- OP-037-003, "Refueling Water Transfer Systems"

b. Findings

No findings of significance were identified.

.2 Reactor Plant Startup Activities

a. Inspection Scope

The inspectors observed selected portions of the reactor startup from the control room to verify that Technical Specifications, license conditions, and administrative requirements were satisfied. The inspectors verified that reactor criticality occurred with the control rod positions within the allowed band predicted by the core design. The following activities and documents were reviewed or observed:

Plant Startup Activities

- Primary and secondary containment integrity established as required
- Startup preparations for mode change
- Control rod withdrawals and reactor criticality
- Average power range monitor adjustments at low power
- Reactor coolant system heat up
- HPCI and RCIC surveillance testing at low reactor pressure
- Thermal limits verification prior to exceeding 25% reactor power
- Core Flow Calibration (determination of recirculation loop drive flows and jet pump flows)
- HPCI surveillance test at 920 psig reactor pressure
- Reactivity manipulations with the reactor recirculation system
- Turbine generator excitation and synchronization to the grid

Procedures and Documents

- GO-100-002, Preps for “Mode 2"

- RPV rated pressure leak test
- GO-100-010, "ECCS and Decay Heat Removal in Modes 4 and 5"
- GO-100-002, "Plant Startup, Heat up, and Power Operations"

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors observed portions of selected surveillance test activities in the control room and in the field and reviewed the test data results. The inspectors compared the test result 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:

- Unit 1 125VDC and 250VDC battery modified capacity test discharge alternate testing justification, for SM-102-B04 and SM-102-A04, EWR-394317, WO 342470, on April 10
- Unit 1 SO-100-001, “Reactor Vessel Temperature and Pressure Recording,” for Rx vessel head flange bolt tensioning, on April 1
- Unit Common "D" emergency diesel generator - 4 kV Bus Loss of Offsite Power test, SE-124-002, with “D” EDG start time of 7.65 seconds, on April 2

b. Findings

No findings of significance were identified.

1R23 Temporary Plant Modifications (71111.23)

a. Inspection Scope

The inspectors reviewed a temporary plant alteration that installed blank flanges in the emergency service water (ESW) supply and return lines to the Unit 1 turbine building closed cooling water (TBCCW) "A" and "B" heat exchangers and the reactor building closed cooling water (RBCCW) "A" and "B" heat exchangers. The blank flanges were installed to perform maintenance on the Unit 1 service water system during the Unit 1 refueling outage. The inspectors evaluated whether the temporary change adversely affected 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 the Susquehanna Individual Plant Evaluation to assess the adequacy of the safety determination screening and risk evaluations.

The inspectors also assessed configuration control of the temporary change by reviewing selected drawings and procedures to verify whether appropriate updates had been made. The inspectors compared the actual installation to the temporary change

documents to determine whether the implemented change was consistent with the approved documents. The following documents were included in the review:

Procedures and Documents

- NDAP-QA-0302, "System Status and Equipment Control"
- NDAP-QA-1218, "Temporary Modifications"
- OP-111-001, "Service Water"
- ON-111-001, "Loss of Service Water"
- Clearance Orders 43730, 44897, and 45658
- Condition Reports 400840 and 401961

b. Findings

The inspectors identified a Green non-cited violation of Technical Specification section 5.4.1, with two examples, because PPL did not implement their written procedures to control a temporary plant alteration associated with the use of blank flanges in the ESW system supply and return lines to the Unit 1 "A" TBCCW and "A" RBCCW heat exchangers. As a result, PPL did not remove the blank flanges prior to the Unit 1 restart from the refueling outage.

On March 6, 2002, during the Unit 1 refueling outage, PPL installed blank flanges in the ESW system supply and return lines to the “A” TBCCW and “A” RBCCW heat exchangers under Work Order WO 302970. PPL also installed status control tags on the control room hand switches for the valves to supply ESW to the "A" TBCCW and "A" RBCCW heat exchangers to indicate that the blank flanges were installed. On March 27, a senior reactor operator authorized removal of the status control tags from the control room hand switches for the "A" TBCCW and "A" RBCCW heat exchangers when similar status control tags on the “B” TBCCW and “B” RBCCW heat exchangers were removed. On April 8, the inspectors identified that the status control tags for the "A" TBCCW and "A" RBCCW heat exchangers should not have been removed since the blank flanges were still installed in these ESW system lines. On April 9, 2002, PPL reinstalled the status control tags. On April 20, 2002, Unit 1 was restarted after the refueling outage was completed. On May 11, 2002, PPL removed the blank flanges under Work Order WO302971.

The inspector identified that between March 27 and April 9, the control room hand switches, used to supply ESW to the “A” TBCCW and “A” RBCCW heat exchangers, were not status control tagged as required by NDAP-QA-0302, "System Status and Equipment Control." NDAP-QA-0302 section 6.5, required, in part, that operators ensure that equipment is correctly returned-to-service prior to Status Control Tag removal. The inspectors determined that operators failed to follow procedures, in that the operators did not verify that the blank flange in the ESW supply and return flow paths had been removed prior to removing the status control tags. PPL re-applied the status control tags and placed this issue into their corrective action program as condition report 400840.

The inspector identified that PPL did not control the installation of the blank flanges as required by NDAP-QA-1218, "Temporary Modifications." NDAP-QA-1218 permits use of

work orders to perform temporary alterations provided that the alteration performed under the work order, prior to WO closure, restores the system to the required configuration. Contrary to the above, the work order to install the blank flanges (WO 302970) did not remove the blank flanges and so when the WO was closed on March 29, 2002, the system was not restored to the required configuration. The inspector concluded that between March 29 when the work order was closed and May 11 when the blank flanges were removed PPL had not controlled or approved the use of the blank flanges as required by NDAP-QA-1218, "Temporary Modifications." PPL had no work document, procedure, or other change mechanism which authorized this temporary plant alteration and PPL had not performed a 50.59 safety evaluation. PPL placed this issue into their corrective action program as condition report 401961.

The issue of PPL not implementing their written procedures to control a temporary plant alteration associated with the installation of the blank flanges was determined to be more than minor because it had a credible impact on safety. With the blank flanges still in place following Unit 1 restart, the operators would have been delayed in aligning ESW to restore cooling to a the “A” TBCCW and “A” RBCCW heat exchangers following a loss of service water cooling event as stated in ON-111-001, "Loss of Service Water." These heat exchangers support operation of systems such as control rod drive, Instrument air, electrohydraulic control, reactor water cleanup, and condensate, that can be used in response to emergency conditions. This finding affected the mitigating systems cornerstone because with the blank flanges installed, the “A” loops of TBCCW and RBCCW would not have been functional following a loss of service water cooling event. This finding was considered to have very low safety significance (Green) using the Significance Determination Processes for Reactor Inspection Findings for At-Power Situations because there was no actual loss of cooling to the “A” loops of TBCCW and RBCCW.

Technical Specification section 5.4.1 required, in part, that "Written procedures shall be established and implemented that meet the requirements of NRC's Regulatory Guide 1.33, Revision 2, February 1978." Contrary to the above, written procedures (NDAP-QA-1218, "Temporary Modifications and NDAP-QA-0302, "System Status and Equipment Control") were not implemented to control a temporary plant alteration which installed blank flanges in the ESW supply and return lines to the “A” TBCCW and “A” RBCCW heat exchangers which caused these blank flanges to remain in place after Unit 1 was restarted following the refueling outage. Because this violation was of very low safety significance and PPL entered this finding into their corrective actions program, this violation is being treated as a Non-Cited Violation (NCV), consistent with Section VI.A of the NRC Enforcement Policy. **(NCV 05000387/2002-003-01)**

4. OTHER ACTIVITIES

4OA3 Event Follow-up (71153)

.1 Unexpected Reactor Recirculation Pump Trip Results in Manual Reactor Shutdown

a. Inspection Scope

The inspectors reviewed an unexpected trip of the Unit 1 “B” reactor recirculation pump and subsequent manual actuation of the reactor protection system that occurred on April 22, 2002. The manual actuation of the reactor protection system was performed from about 20% reactor power at 1:15 a.m. after the “B” reactor recirculation pump tripped at 12:16 a.m. The pump tripped because the field breaker opened due to an overcurrent condition caused by an loose electrical fuse connection (unknown at the time of the scram).

The inspectors reviewed the operator actions, plant response, and plant procedures related to the “B” reactor recirculation pump trip and subsequent manual actuation of the reactor protection system. The review focused on the reactor core flow indications available to the operators and the operators’ understanding of the total core flow, “A” and “B” jet pump total loop flow, calibrated jet pump, and non-calibrated jet pump indications. The following documents were included in the review:

Procedures and Documents

- NDAP-QA-0338-10, "Unit One Power vs. Flow Map"
- ON-164-002, “Loss of Reactor Recirculation Flow"
- Unit 1 Control Room Operator Log
- Technical Specifications 3.4, “Reactor Coolant System”
- General Electric Service Information Letter (GE SIL) No. 516 Supplement 2, “Core Flow Indication in the Low-Flow Region,” dated January 19, 1996
- Event Notification No. 38870
- OP-AD-327, "Post Reactor Transient/Scram/Shutdown Evaluation"
- Piping and Instrumentation Diagram M-142, Nuclear Boiler Vessel Instrumentation”
- Condition Reports 399751, 399089, 398697, 398665 and 398663

b. Findings

The inspectors identified a Green non-cited violation of Technical Specification section 5.4.1, because Off Normal procedure ON-164-002, “Loss of Reactor Recirculation Flow,” did not provide adequate directions to the operators to adequately determine total core flow following a single reactor recirculation pump trip at low reactor power conditions, and based on the total core flow readings take the appropriate actions.

Off Normal procedure ON-164-002, “Loss of Reactor Recirculation Flow, section 3.3, provides the following written directions for one reactor recirculation pump trip:

3.3.1 If jet pump flow in the operating loop is <38 million lbm/hr, ADD the idle and operating loop flows together to determine actual core flow.

3.3.2 PLOT position on the Power/Flow Map, Form NDAP-QA-0338-10.

3.3.3 Perform appropriate action as specified on the power to Power/Flow Map.

Following the “B” recirculating pump trip, the jet pump flow in the operating loop indicated 27 million pounds mass per hour (lbm/hr) and the jet pump flow in the idle loop

indicated zero lbm/hr. When added together per the procedure, the plotted position on the Power/Flow Map was to the left of the natural circulation line on the Power/Flow Map. For this region on the Power/Flow Map, with one recirculation pump running, there was no action specified.

The operators' expected that the idle loop jet pump flow would read approximately 6 to 7 million lbm/hr due to natural circulation at the low power level. The operators expected that total core flow from the sum of the operating and idle loop jet pump flows would plot to the right of the natural circulation line and close to the single recirculation pump flow line. Because the procedures did not specify actions and the flow indications were not expected, the operators, following consultation with operations management, manually initiated the reactor protection system to shutdown the reactor.

The idle loop jet pump total flow indicator read zero lbm/hr because of a low flow cutoff circuit. The low flow cutoff circuit was designed to provide a zero output for the loop jet pump total flow when actual flow was less than 8 million lbm/hr. The low flow cutoff circuit was not referenced in the off normal procedure or understood by the operators. In addition, the 10 individual jet pump indications for the "B" reactor recirculation loop were not affected by the low flow cutoff circuit and would have provided valid core flow indication, but were not referenced in the procedure.

Off Normal procedure ON-164-002, "Loss of Reactor Recirculation Flow," was inadequate because PPL did not thoroughly evaluate General Electric Service Information Letter (GE SIL) No. 516 Supplement 2, "Core Flow Indication in the Low-Flow Region," issued January 19, 1996. The SIL described the uncertainty of flow indications and operation of BWRs to the left of the natural circulation line. GE recommended that utilities review and reconstruct the low-flow portions of the Power/Flow Map to more accurately reflect the possible indicated core flow range and to ensure that guidance to the operators includes desired actions if the flow indication is below the lower bound estimate. Because of the uncertainty of flow indications, the SIL also discussed use of alternate indications of core flow with a single recirculation pump trip such as by use of reactor core plate differential pressure indication. PPL's evaluation of the SIL concluded that no adjustment to ON-164 or the Power/Flow Map was necessary.

The inadequacy of procedure ON-164-002 was determined to be more than minor because the inadequate procedure contributed to an actual impact on safety in that the reactor protection system was manually actuated. An adequate procedure would have likely not required the manual actuation of the reactor protection system. This finding affected the initiating events cornerstone because the issue resulted in an initiating event, i.e., manual actuation of the reactor protection system. This finding was considered to have very low safety significance (Green) using the Significance Determination Process for Reactor Inspection Findings for At-Power Situations because this issue did not increase likelihood of a primary or secondary system LOCA initiator, did not contribute to the likelihood that mitigating equipment would not be available, and did not increase the likelihood of a fire or flood. In addition the reactor protection system and other plant systems responded as expected to the manual reactor shutdown and there were no indications of reactor core oscillations at the time of the reactor recirculation pump trip.

Technical Specification section 5.4.1 requires, in part, that "Written procedures shall be established and maintained that meet the requirements of NRC's Regulatory Guide 1.33, Revision 2, February 1978." Contrary to the above, written procedure ON-164-002 was not maintained for “Power Operations with less than Full Reactor Coolant Flow,” because it did not provide adequate directions to the operators to determine total core flow following a single reactor recirculation pump trip at low reactor power conditions and, based on the total core flow readings, take the appropriate actions. Because this violation was of very low safety significance and PPL entered this finding into their corrective actions program, this violation is being treated as a Non-Cited Violation (NCV), consistent with Section VI.A of the NRC Enforcement Policy. **(NCV 05000387/2002-003-02)**

4OA4 Cross-cutting Issues

a. Inspection Scope

The inspectors reviewed several inspection reports to determine if a pattern or trend was emerging which may not be captured in individual issues.

b. Findings

In Inspection Report 50-387,388/2002-002, Section 4OA4, the inspectors identified a performance trend regarding non-licensed plant operator (NPO) errors in the barrier integrity and mitigating systems safety cornerstone areas. The causal relationship of these NPO errors was that the NPOs did not follow operations procedures in each instance. During this inspection one additional example was identified of a NPO not following an operations procedure as well as an example of operations personnel not following station procedures.

- During this inspection, PPL identified that NPOs did not place the Unit 1 "A" service water pump in an automatic standby configuration (because the locally operated manual discharge valve was closed) with the “B” and “C” service water pumps in operation as required by operations procedure OP-111-001, "Service Water System." If either the “B” or “C” service water pumps tripped, the “A” pump would not have automatically supplied cooling to risk significant components. (Licensee identified NCV affecting the Mitigating Systems Cornerstone; see report section 4AO7)

- During this inspection, operators did not verify that blank flanges in the “A” ESW supply and return flow paths to the TBCCW and RBCCW heat exchangers had been removed prior to removing the status control tags on the control room hand switches as required by operations procedure NDAP-QA-0302, "System Status and Equipment Control." Based on the removal of the status control tags, the operators believed that the blank flanges were removed when they were not . (NCV affecting the Mitigating Systems Cornerstone; see report section 1R23)

4OA6 Meetings

.1 Exit Meeting Summary

On May 15, 2002, the resident inspectors presented the resident inspection results to Mr. B. Shriver, Vice President - Senior Vice President and Chief Nuclear Officer, and other members of PPL's staff, who acknowledged the findings.

The inspectors asked PPL whether any material examined during the inspection should be considered proprietary. No proprietary information was identified.

.2 Management Meeting

On May 13, 2002, representatives from PPL met with the NRC in the Region 1 offices in King of Prussia, PA to discuss emergency preparedness at Susquehanna. A copy of the slides presented by PPL can be found as an attachment to this report.

4OA7 Licensee Identified Non-Compliance

The following finding of very low significance (Green) were identified by PPL and is a violation of NRC requirements which meet the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600 for being dispositioned as Non-cited Violations (NCVs).

- **NCV 50-387/2002-003-03** The Unit 1 "A" service water pump was not placed in a automatic standby configuration as required by procedure. Technical Specification 5.4.1 stated, in part, "written procedures shall be established, implemented, and maintained" that meet the requirements of NRC Regulatory Guide 1.33, revision 2, Appendix A, February 1978. Operations procedure OP-111-001, "Service Water System," section 3.2.12.g requires, in part, that the third service water pump be placed in automatic standby with the pump discharge valve open, after the second pump had been started. On May 4, 2002, with the "B" and "C" service pumps in operation, the third service water pump ("A") was not in automatic standby because the discharge valve (109004) for the "A" pump was found in the closed position.

ATTACHMENT 1

a. List of Items Opened, Closed and Discussed

Opened

None

Opened and Closed

50-387/2002-003-01	NCV	Written procedures were not implemented to control a temporary plant alteration (Section 1R23)

50-387/2002-003-02	NCV	Written procedures were not maintained to provide plant operators with clear direction in response to a single reactor recirculation pump trip at low reactor power conditions (Section 4OA3)
50-387/2002-003-03	NCV	The Unit 1 "A" service water pump discharge valve was found in the closed position with the pump in the automatic standby configuration (Sections 1R04 and 4OA7)

Closed

None

Discussed

None

d. List of Acronyms

ASME	American Society of Mechanical Engineers
BWR	Boiling Water Reactor
CFR	Code of Federal Regulations
CR	Condition Report
DBT	Design Basis Threat
ECCS	Emergency Core Cooling System
EDG	Emergency Diesel Generator
ESW	Emergency Service Water
FSAR	[SSES] Final Safety Analysis Report
GE	General Electric
HPCI	High Pressure Coolant Injection
NCV	Non-cited Violation
NPO	Non-licensed Plant Operator
NRC	Nuclear Regulatory Commission
PPL	PPL Susquehanna, LLC
QA	Quality Assurance
RBCCW	Reactor Building Closed Cooling Water
RHR	Residual Heat Removal
SDHR	Supplemental Decay Heat Removal
SDP	[NRC] Significance Determination Process
SSC	Structure, System, or Component
SSES	Susquehanna Steam Electric Station
TBCCW	Turbine Building Closed Cooling Water
TRM	Technical Requirements Manual
TS	Technical Specification
WO	Work Order