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REGION I

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Licensee:	Pennsylvania Power and Light Company 2 North Ninth Street Allentown, Pennsylvania 19101
Facility:	Susquehanna Steam Electric Station
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Dates:	January 20, 1998 through March 16, 1998
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EXECUTIVE SUMMARY

Susquehanna Steam Electric Station (SSES), Units 1 & 2
NRC Inspection Report 50-387/98-01,50-388/98-01

This integrated inspection included aspects of Pennsylvania Power and Light Company's (PP&L's) operations, engineering, maintenance, and plant support at SSES. The report covers an 8-week period of resident inspection; in addition, it includes the results of announced inspections by a regional operator licensing inspector, and a regional radiation specialist.

Operations

- Operator communications were observed to be clear, concise, formal, and in compliance with SSES operations department procedures. Shift turnovers were detailed and complete. In general, communications between plant control operators and nuclear plant operators were observed to be of good quality. (section O1.1)

- A PP&L management decision, to reduce power in response to a main generator isophase bus duct cooler leak, was well communicated within the operations department and was conservative. The licensee initiated appropriate corrective actions, no violations of NRC requirements occurred, and the failure was documented for maintenance rule tracking purposes. (section O1.2)

- Operators were observed to respond well to control room alarmed conditions. Appropriate SSES procedures were adhered to, operability and impact on plant equipment were controlled, and actions were adequately announced and documented. Operators identified a slow speed drift of one reactor recirculation pump, on two separate occasions, and responded well to these anomalies. (section O1.3)

- The licensee's approach to the establishment of alarm setpoints for safety relief valves (SRVs), compensatory measures for a Notice of Enforcement Discretion on the "S" SRV, and the control of SRV operability, were acceptable. (section O2.1)

- PP&L's corrective actions for three procedure violations, associated with the June 1996 "E" emergency diesel generator circuit breaker misalignment, were acceptable. Corrective actions focused on improving operator performance, management oversight, and independent assessment. Subsequent licensee audits of operator performance were acceptable and appropriate actions were taken to validate and verify the quality of computer data used to assess operator performance. (section 04.2)

- The inspector concluded that Susquehanna's licensed operator re-qualification training program was satisfactory overall. The written examinations were adequate, but a section for five of six written examinations were weak. Examination administration was good, and operator performance was generally good with some individual operator deficiencies identified for followup. (section O5.1)

- A selection of Plant Operations Review Committee (PORC) and Susquehanna Review Committee (SRC) activities, covering a 3 month period, were reviewed. NRC determined PORC and SRC, in general, conducted in-depth reviews and demonstrated a conservative and safe approach. (section O7.2)

Maintenance

- Four planned maintenance activities, reviewed during this period, were found to be appropriately conducted and controlled. Interviews with maintenance personnel showed the individuals involved in these activities were knowledgeable, appropriately qualified, and capable of explaining their activities. (section M1.1)

- The surveillance activities observed were adequately performed and appropriately controlled. The activities were accomplished by qualified and trained personnel. No violations of NRC requirements were identified. (section M1.2)

- The "B" Emergency Diesel Generator (EDG) test run was discontinued following receipt of an unexpected turbocharger lube oil low pressure alarm. The cause was adequately identified, and the EDG was repaired and returned to service within the time period allowed by Technical Specification. Overall, maintenance activities were adequate. (section M2.1)

- The licensee implemented several actions, in response to NRC and SSES self assessment identified issues, in the maintenance and work control programs. The performance issues include, in part, work control effectiveness, outstanding work backlog, and maintenance activity control. These actions have not been in place for a sufficient period of time to show improvement in the maintenance area. (section M7.1)

- NRC review of additional information, regarding the Unit 1 standby liquid control system (SLCS) operability, between September 10, 1997, and November 25, 1997, identified three apparent violations. The apparent violations contributed to the SLCS being degraded and potentially inoperable. These apparent violations are being considered as escalated enforcement items, in accordance with the NRC Enforcement Policy. (section M8.1)

- Emergency Service Water system hot tapping maintenance activities were governed by procedures with contradictions in the method and depth of drilling and the method of foreign material exclusion. As a result, the activities were not adequately controlled by procedure. The licensee's response to the issue was acceptable and the safety impact of the inadequate maintenance practices was low. In this specific instance, the failure to provide adequate procedures for control of maintenance activities is considered a violation of minor significance, and is being treated as a non-cited violation. (section M3.1)

Engineering

- NRC identified three control room annunciators which alarm after Technical Specification (TS) Limiting Condition for Operation (LCO) action levels are exceeded. The issue was discussed with operations management and it was determined the general issue of annunciator conservatism, including LCO action statement start time, was being addressed in the PP&L corrective action system. Several examples of unalarmed TS entries were identified by the NRC, but no violations of the TS allowed outage time were identified. (section E1.1)

- On February 2, 1998, SSES requested and received a Notice of Enforcement Discretion (NOED) for containment penetration leak rate tests that were not performed when required. The licensee's request and immediate corrective actions for the issues were adequate. The licensee's initial NOED commitments were verified to be complete and an unresolved item was opened, pending information on the circumstances which led to this event. (section E1.2)

- The inspectors identified a floor hatch in the reactor building which was maintained open for many years. In response to the inspectors questions, PP&L determined the site tornado analysis assumed the hatch was closed. No safety evaluation was performed prior to placing the hatch in other than the analyzed position. A subsequent PP&L calculation determined the result of the tornado analysis was not adversely affected by hatch position. The failure to perform a safety evaluation prior to changing the hatch position was a violation of minor significance and is being treated as a non-cited violation. (section E8.1)

- Auxiliary System Operators were not consistently performing radwaste control room panel alarm tests and PCO performance issues were identified regarding performance of main control room annunciator alarm tests in the same time period when VIO 50-387, 388/96-270-01022was issued. These issues are being treated as a non-cited violation (Section E2.3 and E2.4).

Plant Support

- The as-low-as-reasonably-achievable (ALARA) organization was effectively evaluating and implementing radiation dose reduction measures and the health physics staff effectively used the employee ALARA concern program. Although ALARA initiatives to minimize the radiological impact of hydrogen water chemistry (HWC) appeared comprehensive including the implementation of condensate filtration, shielding up-grades, contingencies for chemical decontamination, and improvements in work practices and scheduling, continued vigilance to assess and mitigate the radiological impact of HWC is warranted. A strong commitment to reducing plant contamination was evidenced by the reduction of recoverable-contaminated areas in 1997 from 9.4 to 6.2 percent and performance of a self-assessment in contamination controls. Health physics equipment and facilities were well maintained. Housekeeping and material conditions of plant structures and equipment were good. The condition reporting system was effectively used to identify, evaluate, and resolve radiological control program deficiencies. (section R)

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Report Details

Summary of Plant Status

Susquehanna Steam Electric Station (SSES) Unit 1 operated at 100% power throughout the inspection period, except for four minor power reductions and one larger power reduction. On February 6, 1998, power was reduced to approximately 75% for a control rod sequence exchange, and modification work on the reactor feed pumps; power returned to 100% on February 7, 1998.

SSES Unit 2 was operating at 100% power at the beginning of the inspection period. On January 10, 1998, power was reduced to approximately 70% for one day to make a control rod sequence exchange. On January 27,1998 an unplanned power reduction to 67% power was made, to support corrective maintenance on an isophase bus cooling bus duct cooling heat exchanger (see section O1.2). On January 29,1998, the unit was allowed to coast from 100% power to approximately 95% power, prior to changing a rod pattern. On March 6, 1998, power was reduced to approximately 70% to perform a rod pattern adjustment.

I. Operations

O1 Conduct of Operations [1]

O1.1 Operator Communications and Shift Turnover

a. Inspection Scope (71707)

During control room observations, the inspectors observed shift turnovers and communications between plant control operators (PCOs), nuclear plant operators (NPOs) and unit supervisors (USs).

b. Observations and Findings

Operator communications were clear, concise, formal and in compliance with SSES operations department procedures. Shift turnovers were observed to be detailed and complete.

The inspectors discussed plant conditions with oncoming PCOs and USs following shift turnovers and determined that sufficient information and status was transferred to the oncoming shift to ensure the safe operation of the units. In general, communication between PCOs and NPOs was observed to be of good quality.

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[1]Topical headings such as O1, M8, etc., are used in accordance with the NRC standardized reactor inspection report outline. Individual reports are not expected to address all outline topics.

c. Conclusions

Operator communications were observed to be clear, concise, formal, and in compliance with SSES operations department procedures. Shift turnovers were detailed and complete. In general, communications between plant control operators and nuclear plant operators were observed to be of good quality.

O1.2 Unit 2 Power Reduction for Isophase Bus Duct Cooler Repair

a. Inspection Scope (71707)

On January 27, 1998, Unit 2 reduced power to approximately 67%, in order to repair a leak in a main generator isophase bus duct cooler. The inspectors reviewed operator actions and the event.

b. Observations and Findings

The inspectors discussed the rational used by the Shift Supervisor (SS) to support the power reduction and observed the leak, including its temporary repair. The decision to reduce power was also discussed with the Unit 2 PCOs and US. The inspectors determined the management decision to reduce power was well communicated within the operations department and was a conservative action.

While observing the leak, the inspectors identified the service water supply header was vibrating in a manner that could have resulted in fatigue and the area on the connector that had failed was corroded. The Unit 1 isophase bus duct cooling supply line was observed by the inspectors and determined to not be oscillating in the same manner as the Unit 2 cooling system, nor did it have visible leakage.

The licensee issued CR 98-0282 to perform a root cause analysis and determine the corrective actions to prevent recurrence. The inspectors determined the licensee initiated appropriate corrective actions, no violations of NRC requirements occurred, and the failure was documented for maintenance rule tracking purposes.

c. Conclusions

A PP&L management decision, to reduce power in response to a main generator isophase bus duct cooler leak, was well communicated within the operations department and was conservative. The licensee initiated appropriate corrective actions, no violations of NRC requirements occurred, and the failure was documented for maintenance rule tracking purposes.

O1.3 Operator Response to Alarmed and Unexpected Conditions

a. Inspection Scope (71707)

During control room observations, the inspectors observed/reviewed PCO and US response to alarmed and unexpected conditions in order to determine compliance with Technical Specification (TS) and SSES operating procedures.

b. Observations and Findings

Operator responses to the following alarmed conditions were observed to be aggressive and in accordance with TSs and SSES operating procedures.

AR-G16-001	"E" Emergency Diesel Generator (EDG) Room Temperature
AR-F02-001	Panel 0C577E Local Trouble
AR-015-C10	"A" EDG Local Alarm
AR-231-A04	Recombiner Panel 0C145 Trouble
AR-201-001	Area Radiation Monitor Panel 2C605 DNSCALE/INOP
AR-102-G03	Recirculation Pump Motor Hi Temp

Operators identified a slow speed drift of one reactor recirculation pump, on two separate occasions, and responded well to these anomalies.

c. Conclusions

Operators were observed to respond well to control room alarmed conditions. Appropriate SSES procedures were adhered to, operability and impact on plant equipment were controlled, and actions were adequately announced and documented. Operators identified a slow speed drift of one reactor recirculation pump, on two separate occasions, and responded well to these anomalies.

O2 Operational Status of Facilities and Equipment

O2.1 Safety Relief Valve Operability

a. Inspection Scope (71707)

During routine control room tours, the inspectors noted Unit 1 currently has three Safety Relief Valves (SRVs) with elevated tailpipe temperatures and one with an inoperable acoustic monitor. The inspectors reviewed the licensee's approach to this condition to determine if it ensured the operability of these SRVs.

b. Observations and Findings

Elevated SRV tail pipe temperature is addressed in annunciator response procedure AR-1/210-001, SRV High Temperature, and off normal procedure ON-1/283-001, Open SRV. The licensee appropriately responded through its Industry Event Review Program (IERP) to NRC Information Notice IN 95-47, Unexpected Opening of a Safety Relief Valve.

The inspectors reviewed the licensee's setpoint documentation (GEK-R1-1095, dated 10/20/82) and found that the alarm setpoint, associated with AR-210-001, was appropriately justified and that the indication of weeping below 250 degrees fahrenheit (°F) is not considered by General Electric (GE) and the licensee to be an indication of valve degradation. The setpoint documentation states that tests have shown that 20 lbs/hr of safety relief valve leakage is acceptable for continued plant operation and can be detected by a setpoint of 250 °F.

The inspectors reviewed the licensee's compensatory measures for the Unit 1 "S" SRV and found them to be adequately implemented in accordance with the Notice of Enforcement Discretion dated September 11, 1997.

c. Conclusions

The licensee's approach to the establishment of alarm setpoints for safety relief valves (SRVs), compensatory measures for a Notice of Enforcement Discretion on the "S" SRV, and the control of SRV operability, were acceptable.

O4 Operator Knowledge and Performance

O4.1 Operability Determinations

a. Inspection Scope (71707)

The inspectors reviewed a sample of operability determinations to determine whether potential degraded conditions were identified, characterized, and resolved in a manner commensurate with their importance to safety.

b. Observations and Findings

Seventeen initial operability determinations were reviewed by the inspectors. In general, the operability determinations were found to be acceptable. The inspector raised questions on two of the operability determinations.

CR 97-2018 identified a potentially significant long term degradation of an emergency diesel generator (EDG) main drive chain. Maintenance activities determined the main drive chain and attached cotter pins were worn. The operability determination states this condition, if it had been allowed to remain uncorrected, would have resulted in a failure of the main drive chain, and have caused extensive diesel engine damage.. The EDG defective parts were replaced.

The inspectors noted that there was no review of the remaining EDGs in the operability determination. The inspectors determined there were no current operability concerns with the remaining EDGs based on a review of completed and ongoing maintenance activities. However, the lack of any generic considerations for the other EDGs in the root cause of the operability determination existed, until questioned by the NRC.

CR 98-0491 identified a degraded condition of the "E" EDG day tank. The day tank level slowly decreases, requiring make-up fuel oil addition. The operability determination characterized the leak as "minor" and within the capability of the fuel oil transfer pumps. The inspectors questioned why the engineers did not quantify the leak or discuss the basis for the TS minimum day tank volume (e.g., how long the diesel must be able to run on the day tank alone without makeup). This short coming was discussed with operations management, and the operability determination was revised. The inspectors reviewed the revised operability determination and found that it adequately addressed the TS and design basis for the EDG day tank.

c. Conclusions

Seventeen initial operability determinations (ODs) were reviewed and were determined to be adequate. The inspectors questioned two of the ODs. An emergency diesel generator (EDG) OD did not address the operability of the other EDGs, although they could have been subject to the same degraded condition (worn EDG drive chain). The other OD did not consider the affect of a leaking EDG day tank check valve on an associated Technical Specification requirement for EDG day tank volume. Subsequent revisions of the two ODs, questioned by the NRC, provided adequate bases for operability.

O4.2 Non-Licensed Operator Performance

a. Inspection Scope (71707, 92901)

The licensee's corrective actions associated with non-licensed operator performance problems identified in conjunction with the "E" EDG mis-alignment in June 1996 were reviewed. This review specifically examined corrective actions associated with escalated enforcement action VIO 50-387,388/96-270-01022 Items B.2.a, c, and d.

b. Observations and Findings

On July 4, 1996, operators identified that the "E" EDG auxiliary equipment supply breaker, at panel 0A510, was not installed. Subsequently, it was discovered that a circuit breaker was mis-positioned on June 14, 1996, when an NPO aligned the "E" EDG for service. A number of procedural violations were cited in escalated enforcement actions, issued on June 20, 1997.

- Item B.2.a of VIO 96-270-01022 identified that an NPO failed to self check during alignment of the "E" EDG breakers at 0A510 and consequently did not align the equipment as specified in the applicable procedure.

- Item B.2.c of VIO 96-270-01022 identified that an NPO failed to notify the control room operators after discovering a potential problem with the breaker alignment at panel 0A510, on July 3, 1996.

- Item B.2.d of VIO 96-270-01022 identified that NPOs failed to perform panel alarm tests for "E" EDG panel 0C577E on numerous occasions, between January 1996 and June 1996.

The inspectors reviewed licensee corrective actions for issues involving procedure compliance, which included operator training, and first line leadership training. In addition, PP&L established a number of general corrective actions. The inspectors concluded that the licensee's corrective actions for the specific cited violations were acceptable. Several additional issues, with implications regarding personnel performance, were also reviewed and are discussed below.

In February 1997, questions regarding the validity of the computer records, for the panel alarm tests at panel 0C577E, were reviewed by PP&L and subsequently reviewed by the NRC. The NRC review and inspection activities were documented in NRC Inspection Report (IR) 50-387,388/97-09. The NRC's review concluded that a failed reflash unit had prevented the control room alarm from reflashing on February 13, 1997; despite the control room annunciator not alarming, computer records were available to show the panel alarm test had been performed.

In response to the June 1997 escalated enforcement action, PP&L committed to a number of reviews and assessments. PP&L's reviews ultimately included audits of other routine activities required of Nuclear Plant Operators (NPOs), Auxiliary System Operators (ASOs) and Plant Control Operators (PCOs). Three reviews examined routine panel alarm tests required for the engineered safeguard systems (ESS) transformers, radwaste control room panels, and main control room panels. NRC review of these alarm test issues and PP&L's investigations are documented in sections E2.2, E2.3, and E2.4 of this report. The NRC inspection included reviews of PP&L's audit reports, computer reports and PP&L's conclusions regarding personnel performance. The inspectors concluded the licensee's audits were acceptable and that appropriate actions had been taken to validate and verify the quality of computer data used to assess personnel performance.

The inspectors concluded that PP&L has implemented appropriate corrective actions to address personnel performance related violations identified in Items B.2.a, c, and d of VIO 50-387,388/96-270-01022. Subsequent licensee's audits and self assessments reflect improvements which have occurred in the operations

department. NRC observations of current operator performance documented in NRC IR 50-387,388/97-10 concluded that operator performance was good. Based on these findings, Items B.2.a, c, and d of violation VIO 50-387,388/96-270-01022 are closed.

c. Conclusions

PP&L's corrective actions for three procedure violations, associated with the June 1996 "E" emergency diesel generator circuit breaker misalignment, were acceptable. Corrective actions focused on improving operator performance, management oversight, and independent assessment. Subsequent licensee audits of operator performance were acceptable and appropriate actions were taken to validate and verify the quality of computer data used to assess operator performance.

O5 Operator Training and Qualification

O5.1 Licensed Operator Re-qualification Training Program

a. Inspection Scope (71001)

The inspector evaluated the Susquehanna licensed operator re-qualification training (LORT) program using NRC Inspection Procedure 71001, Licensed Operator Re-qualification Program Evaluation, during the week of January 12, 1998. The inspector evaluated the adequacy of the annual operating test and biennial written examinations, and the administration of the examinations to one operating crew and several staff licenses using NUREG 1021, Operator Licensing Examination Standards for Power Reactors. In addition, the inspector reviewed the procedures for maintenance and activation of operator licenses and verified that the requirements were met to reactivate inactive licenses. Administrative procedures and documents associated with the training program and its implementation were also reviewed.

b. Observations and Findings

Examination Materials

The inspector reviewed six written annual re-qualification examinations (i.e., 3 reactor operator and 3 senior reactor operator) prepared and administered by PP&L this examination cycle. Overall, the written examinations were adequate but sections on "limits and controls" for five of six written examinations had questions that were weak at testing higher cognitive levels of knowledge. This portion of these examinations contained a number (i.e., 30-40%) of direct lookup or memory level questions.

The job performance measures (JPM's) reviewed (4 sets) were adequate but some weaknesses were noted. Two of the JPMs reviewed did not have critical steps annotated (212.004.01, "Remove RPS Set "A" from Service" and 223.009.03, "Shutdown a Containment Recombiner..."). Some of the JPM sets reviewed did not include alternate path JPMs. In addition, a number of the JPM tasks, although safety significant, were not challenging requiring only one or two action steps to complete the task. The use of direct lookup or memory level questions on the written examinations and weaknesses in the JPMs will be inspector followup items. **(IFI 50-387,388/98-01-01)**

The simulator scenario sets reviewed (3 sets) were acceptable.

Sample Plan

The inspector reviewed two sample plans developed for the examinations administered during the week of the inspection and concluded the sample plans provided an appropriate sampling of the material taught throughout the year and adequately sampled the items specified in 10 CFR 55.

Examination Administration

The inspector observed PP&L's administration of operating examinations (scenarios and JPMs) to an operating crew and several staff licensed individuals and determined examination administration was good. The PP&L evaluators used good techniques in administering the operating examinations. The evaluators were thorough and there were no discrepancies noted during examination administration or in the followup evaluations that documented crew and individual performance.

Operator Examination Performance

Operator performance was generally good with some individual operator deficiencies identified on the written examinations and during performance of the simulator scenarios and JPMs. The licensee evaluators properly identified these deficiencies for followup and feedback to the training program.

Management Oversight and Training Feedback System

The inspector reviewed management observation forms for 1996 and 1997 and noted that the forms provided constructive feedback on performance. A limited number of observations were documented by senior management above the level of the operation's manager.

The inspector noted several training initiatives were implemented based on operator feedback and operations department requests. These initiatives included the team building simulator activity, plant operators training with the shift, and training on refueling platform modifications.

The inspector reviewed open simulator deficiencies. There were a total of 414 deficiencies outstanding as of the January 7, 1998. There were 212 open items that had some potential for affecting simulator fidelity, but most of these appeared to be somewhat minor in nature and transparent to the operators. The backlog appeared to be well managed with good coordination between the operation's training department and the engineering staff maintaining the simulator to ensure simulator reliability and fidelity was maintained to support training goals.

Remedial Training Program

Based on a review of a sample of remediation records for individuals and crews who had failed cyclic, annual operating and written examinations, the inspector determined this area was satisfactory.

Maintenance and Activation of Operator Licenses

The inspector reviewed various training attendance, grades, and medical records and also records for six individuals who re-activated their licenses. No weaknesses were identified.

Susquehanna's instruction OI-AD-010, Summary of Limitations, Requirements and Restrictions Imposed on Operations Personnel, provided a very good and detailed summary of limitations, restrictions and requirements imposed on licensed personnel. The procedure specified that licensed operators would have to complete a refresher training program prior to returning to on-shift duties when they are absent [for more than six weeks but less than three months]. The inspector concluded that this instruction was a good initiative to ensure maintenance of operator proficiency in accordance with NRC regulations.

Examination Security and Validity

Security measures for examination development and administration were reviewed and found to be adequate. No instances of examination compromise were identified.

PP&L developed unique static, written, JPM and simulator examinations for each crew tested with limited overlap of examination material between examinations. In addition, for the simulator examinations a computer data base was maintained to ensure scenarios were not repeated for a crew within a two year period. The inspector concluded that PP&L's examination development practices were satisfactory for maintaining examination integrity.

c. Conclusions

The inspector concluded that Susquehanna's licensed operator re-qualification training program was satisfactory overall. The written examinations were adequate but certain questions did not test cognitive knowledge. Examination administration was good and operator performance was generally good with some individual weaknesses identified on the written examinations and during performance of simulator scenarios and job performance measures. The program to remediate training weaknesses was satisfactory. Various training attendance records, grades, license reactivation and medical records were reviewed with no weaknesses identified. Security measures for examination development and administration were reviewed and found to be adequate in that no instances of examination compromise were identified.

O7 Quality Assurance in Operations

O7.1 Quality Assurance Audit of Personnel Training and Qualifications (71707)

PP&L Nuclear Assessment Services (NAS) Audit 96-139 was reviewed to determine if significant operator qualification or training deficiencies were identified. The inspectors determined the audit was adequately performed, findings and observations were fully communicated to SSES management, and SSES management aggressively completed the appropriate initial corrective actions.

O7.2 Safety Review Committee Activities

a. Inspection Scope (71707)

TS 6.5.1 and 6.5.2 establish the requirements for the Plant Operations Review Committee (PORC) and Susquehanna Review Committee (SRC), respectively. The activities of the PORC and the SRC were reviewed/observed for a three month period ending March 16, 1998. A review was conducted to determine whether their activities were aggressive in seeking out areas needing improvement, and were overall effective.

b. Observations and Findings

The inspectors determined, in general, the PORC and SRC conducted in-depth reviews and demonstrated a conservative and safe approach to power operation. PP&L management made conservative presentations to the committees and received, when appropriate, recommendations to improve safety and compliance.

c. Conclusions

A selection of Plant Operations Review Committee (PORC) and Susquehanna Review Committee (SRC) activities, covering a 3 month period, were reviewed. NRC determined PORC and SRC, in general, conducted in-depth reviews and demonstrated a conservative and safe approach.

O8 Miscellaneous Operations Issues

O8.1 (Update) URI 50-388/97-10-01, TS 3.0.3 Entry for Surveillance Activities

a. Inspection Scope (71707, 92901)

The inspectors reviewed the licensee's corrective actions and observed portions of a PORC meeting that reviewed an October 16, 1997, entry into TS 3.0.3, for performance of a surveillance test.

b. Observations and Findings

On October 16, 1997, the Unit 2 "A" rod block monitor (RBM) was taken out of service and declared not operable to support performance of a surveillance test. During the surveillance, a count circuit output was observed to be below its expected value. The licensee stopped the surveillance, initiated work authorizations to investigate and repair the circuit, and initiated a CR. After the circuit was repaired, the TS 3.1.4.3 LCO expired and the licensee entered TS 3.0.3 to continue the surveillance.

Inspection Related Activities

This event was discussed in NRC Inspection Report (IR) 50-387,388/97-10. A request was made in an NRC letter dated February 4, 1998, for SSES management to review their decision regarding the voluntary entry into TS 3.0.3. IR 97-10 identified two issues regarding the licensee's actions in response to the situation on October 16, 1997:

- During the first five hours after entering TS 3.0.3, the licensee took no physical actions to initiate actions to place the unit in shutdown, in order to comply with the TS 3.0.3 action requirements.
- At the time the decision to enter TS 3.0.3 was made, the licensee was capable of performing the action required by TS 3.1.4.3(a) action statement.

The licensee responded to the NRC request for review by initiating CR 97-3431 and conducting a PORC review of the event. The licensee, in part, came to two conclusions:

- During the first five hours after entering TS 3.0.3, SSES did not establish a clear shutdown plan.
- At the time the decision to enter TS 3.0.3 was made, the unit was capable of performing the required TS 3.1.4.3 (a) action statement by tripping the rod block monitor (RBM). However, TS 3.0.3 was entered to allow continued testing of the RBM.

The above SSES management decisions were reviewed and concurred with by the PORC, and reported by LER 50-388/97-07.

The inspectors reviewed the licensee's responses to NRC questions and supporting documentation, observed in part the PORC activities, and discussed the conclusions with several SSES managers.

Previous Similar Events

Twenty three TS 3.0.3 entries reported by PP&L, in Licensee Event Reports (LERs), since January 1993 were reviewed.

Three of the LERs involved the performance of TS required emergency diesel generator (EDG) testing with one unit in an outage that created a condition not allowed by the operating unit's TS. This condition was identified by the licensee on January 3, 1994, and a TS amendment was requested to resolve this issue on January 11, 1996 (Attachment 3). However, at this time this amendment has not been approved by the NRC. The licensee also has a pending Improved Technical Specification (ITS) submittal that would resolve this issue. It is anticipated that the licensee will address this issue in advance of a May 1998 outage.

Eight of the LERs involved tripping/un-tripping equipment to perform operability testing. In addition to the RBM, these issues involve TS required containment radiation monitors and secondary containment ventilation dampers. The containment radiation monitor issues were resolved with a TS amendment. However, the secondary containment ventilation damper issue is similar to the RBM issue, in that the licensee is waiting for approval of the ITS submittal to resolve the problem.

Twelve of the LERs involved failures and/or events that placed a unit(s) in conditions not specifically addressed by the TS. The inspectors determined that these twelve, involuntary entries in TS 3.0.3 were necessary, and the causes of the events were adequately addressed by the licensee.

Findings

With respect to the licensee's control of activities after entering TS 3.0.3, the inspectors determined the licensee's post PORC interpretations and corrective actions were adequate.

With respect to the decision to enter TS 3.0.3, in deference to performing the actions required by TS 3.1.4.3, this part of the unresolved item will remain open until the issue is reviewed by NRR. This URI remains open.

c. Conclusions

On October 16, 1997, the licensee chose to enter Technical Specification (TS) 3.0.3, in order to continue with a surveillance test, rather than trip the rod block monitor, as specified by TS 3.1.4.3. Two issues, raised by the NRC: (1) The licensee's control of its activities while in TS 3.0.3, and (2) The licensee's capability to choose entry into TS 3.0.3, rather than TS 3.1.4.3. Administrative control issues, identified by the NRC, for the implementation of TS 3.0.3 actions, have been adequately addressed by PP&L. This item will remain open pending a review of PP&L's use of TS 3.0.3, to support surveillance testing, by the Office of NRR.

O8.2 Licensee Event Report Review (92700)

(Closed) LER 50-388/97-03-00
Required Sample was not Collected and Analyzed within Technical Specification Time Limit

On March 20, 1997, a service water radiation monitor was removed from service. Subsequently a service water sample required by TS was not collected and analyzed within the time specified by TS Limiting Condition for Operation (LCO) Action 3.3.7.10. The TS LCO Action states that with less than the minimum required number of radiation monitors operable, the effluent release pathway may continue for up to 30 days provided that, at least once per eight hours grab samples are collected and analyzed for gross radioactivity at a specific limit of detection. The subject sample was taken and analyzed within fifteen minutes of the required eight hour period. The licensee determined that the root cause of the event was personnel error and entered the involved individual in the PP&L performance improvement process.

The inspectors performed a summary review of the LER, the associated condition report and its corrective actions. In addition, onsite field inspections were performed. It was determined there was no safety impact from the delay in taking the effluent sample, because the results of the sample were normal and as expected. Therefore, this non-repetitive, licensee identified and corrected violation is being treated as a non-cited violation, consistent with Section VII.B.1 of the NRC Enforcement Policy. This LER is closed. **(NCV 50-388/98-01-02)**

(Closed) LER 50-388/97-05-00
Reactor Building Vent Continuous Sample Lost for Twenty Minutes

On March 25, 1997, while the unit was shut down, chemistry technicians were performing a transfer process from the reactor building ventilation stack monitor to the system particulate iodine noble gas (SPING) system. During the transfer, a spurious reactor building criticality monitor alarmed, requiring the evacuation of the area in which the technicians were working. Upon returning to the area the

technicians realized that there had been an approximately 20 minute period that continuous sampling of the reactor building vent was not maintained in accordance with TS 3.3.7.11. The licensee determined that the reactor building criticality monitor had drifted low which caused the unanticipated alarm.

The inspectors reviewed the LER, inspected the licensee's corrective actions and root cause evaluation, conducted an onsite field inspection and determined that there were no safety consequences associated with the failure to continuously monitor the stack release. There were no safety consequences because the unit was shut down and there was a clear pattern of data established both before and after the missed time period. With respect to the criticality alarm drift, the drift was in the conservative direction, and there was no significant pattern of spurious alarms. This TS violation resulted from circumstances not within reasonable licensee control, in that the criticality alarm failure could not have been avoided within the parameters of the licensee's surveillance program. Therefore, this non-repetitive violation is being treated as a non-cited violation, consistent with Section VI.A of the NRC Enforcement Policy. This LER is closed. **(NCV 50-388/98-01-03)**

(Closed) LER 50-387/97-013-00
Requirements for Testing Activated Carbon Samples

On June 19, 1997, while both units were operating at 100% power, the licensee determined that the testing methodology used for activated carbon samples was different than that required by TS. The licensee received a Notice of Enforcement Discretion to operate until it accomplished the required testing. VIO 50-387,388/97-04-01 and a notice of enforcement discretion were issued to the licensee. The licensee responded to the violation in PP&L letter PLA-4666, dated September 4, 1997, and affected adequate corrective actions which included a TS change, procedure changes, and technician training. VIO 50-387,388/97-04-01 was closed in inspection report 50-387,388/97-06, through onsite field inspection activities. This LER is closed.

(Closed) LER 50-387/97-21-00 and 50-387/97-21-01
Condition Prohibited by Technical Specifications - Technical Specification 3.0.3 Entry

On September 21, 1997, with Unit 1 at 100% power, the licensee made a voluntary entry into TS 3.0.3, in order to perform a required TS surveillance of the common refueling floor ventilation system. The licensee completed the surveillance and exited TS 3.0.3 within the allowed TS 3.0.3 LCO time limit. The technical decisions made by plant management were adequate.

The inspectors reviewed the LER, inspected the licensee's corrective actions and root cause evaluation, conducted an onsite field inspection and determined that the broader resolution of TS 3.0.3 entry discussed in section O8.1 of this report will encompass this issue. Therefore this issue will be treated as an example of the URI in section O8.1 of this report. This LER is closed.

O8.3 Followup of Open Items (92901)

(Closed) VIO 50-387,388/96-270-01012
Less Than Four Independent Diesel Generators Operable

On June 14, 1996, an NPO was instructed to substitute the "E" EDG for the "D" EDG. At SSES, four emergency EDGs are required by TS during power operation and the "E" EDG is an installed spare, which can be directly substituted for any one of the other four EDGs to allow maintenance during power operations. On July 4, 1996, the licensee discovered that the NPO had incorrectly aligned an electrical breaker associated with the "E" EDG, such that if the "E" EDG was needed for a loss of offsite power event, the engine would have started, but its auxiliary equipment would not have be automatically energized, thus making the "E" EDG inoperable.

Between June 14, 1996 and July 4, 1996, the alignment of the EDGs were such that the licensee did not comply with TS. The licensee established a number of corrective actions including an event review team, an Independent Safety Engineering Group (ISEG) audit, and a QA audit. The inspectors reviewed the licensee's corrective actions, including operator training, personnel actions, procedure changes, physical equipment modifications, leadership training for first line supervisors, and several other programs. The licensee's corrective actions were adequate to address the TS violation for failure to maintain the required number of operable diesel generators. This violation is closed.

(Updated) VIO 50-387,388/96-270-01022
Failure to Implement Procedures as Required by TS 6.8.1

Items B.2.a, c, and d are discussed in detail in section O4.2 of this report, and are closed. Other items of this escalated enforcement violation remain open.

(Closed) VIO 50-387,388/96-270-02013
Containment Isolation Valve Open and Deactivated for 24 Hours

During a Unit 1 core spray system outage, the licensee back-seated and de-energized the only containment isolation valve (redundant isolation boundary provided by a closed system) in a test return line. While the valve was back seated, its packing was replaced, further affecting the pressure boundary integrity of the valve.

The root cause for the event was an operational decision based on a SSES technical specification interpretation (TSI) that was in conflict with the wording of TS 3.6.1. The licensee's corrective actions were reviewed and determined to include upgrades to the TSI, generic procedure reviews, and engineering training. The inspectors determined that the licensee's corrective actions were adequate. This violation is closed.

<u>(Closed) VIO 50-387,388/96-270-03014</u>
Standby Liquid Control System Heat Trace De-energized

On June 12, 1996, a NPO de-energized circuit breakers labeled as the normal and alternate power supplies for the "A" standby liquid control system (SLCS) pump heat trace, in preparation for work on the inoperable "A" pump. A day later, the licensee discovered that the NPO had erroneously de-energized heat trace for the "B" train SLCS pump which was still required to be operable. The licensee's corrective actions were documented on a WA and CR.

The inspectors reviewed the corrective action associated with CR 96-0705 and work authorization (WA) S60168. The licensee's corrective actions included counseling the involved operators, and additional operations department training on the importance of applying status control tags. The licensee's corrective actions were adequate. This violation is closed.

<u>(Closed) VIO 50-387,388/97-04-02</u>
Nuclear Safety Assessment Group

NRC IR 50-387,388/97-04addressed non-compliances with respect to the Nuclear Safety Assessment Group (NSAG) staffing. The NRC requested, as part of the licensee response to the violation, a discussion of the licensee's planned corrective actions to review and reconcile the activities preformed by NSAG. The inspectors reviewed the licensee's response and corrective actions.

PP&L responded to the notice of violation in a letter dated September 4, 1997 (PLA-4666), stating that two additional persons, with a bachelor's degree in engineering, had been assigned as dedicated full-time NSAG engineers to assure TS compliance, and that PP&L was in full compliance. The inspectors verified that for the period of January 2, 1998 through March 1, 1998, that the NSAG was adequately staffed.

In addition, several issues related to the violation were identified, including management control and oversight of NSAG. These included organization changes that could compromise the independence of the NSAG function. The NRC requested that the licensee review and reconcile these issues. The licensee performed a review and determined the NSAG function to be independent and unaffected by the identified issues. The inspectors performed additional reviews and did not identify an instance where the identified issues affected the safe operation of the units. Corrective actions in response to a violation for inadequate staffing of the Independent Safety Engineering Group (ISEG) was acceptable. This violation is closed.

<u>(Closed) VIO 50-387,388/97-04-03</u>
Quality Assurance Program (QA) Changes

In February 1995, the licensee made changes in the accepted QA program, without prior NRC approval, that affected the span of control of the manager of QA. As part of its corrective actions, the licensee completed an evaluation of the QA

program changes, in accordance with NASP-QA-104, Evaluation of Proposed Changes to the Quality Assurance Program Description. The inspectors reviewed the licensee's corrective actions and determined the corrective actions, which included a safety evaluation, an QA organizational change and QA program implementing procedure changes, were acceptable. This violation is closed.

(Closed) URI 50-387,388/97-06-04
Control Room Emergency Outside Air Supply System (CREOASS) Operability

On July 24, 1997, the licensee identified an open intake plenum access door on the "A" train of CREOASS, which was contrary to the design of the system. The impact on system operability, licensee's operability determination, and corrective actions were reviewed in NRC IR 50-387,388/97-06.

Three issues were identified to the licensee in an NRC letter, dated October 27, 1997, and responded to in a PP&L letter, PLA 4839, dated February 5, 1998. The three issues addressed the initial cause of the open CREOASS door, the consequences of the open door on system operability, and the control afforded the positioning of the door by operations personnel. In its response, the licensee was not able to determine the definitive cause of the open CREOASS door, but determined the system would have operated at its design capacity following initiation, and agreed that the control of CREOASS panel doors needed improvement.

The inspectors evaluated the licensee's corrective actions and written response to the NRC letter. The licensee's discussions of operability and root cause were adequate. The licensee's control of the CREOASS doors prior to the event was determined to have been inadequate to ensure TS 3/47.2 system operability. Because of the lack of consequence in this particular case, the response of the panel doors following system actuation and adequate licensee corrective actions, the failure to establish and implement controls to ensure the position of CREOASS doors, in support of TS 3/4.7.2 operability requirements, was considered a violation of minor significance and is being treated as a non-cited violation, consistent with Section IV of the NRC Enforcement Policy. This unresolved item is closed. **(NCV 50-387,388/98-01-04)**

Subsequent to the discovery, the licensee established adequate controls on the positioning of plenum access doors for CREOASS and other HVAC systems The license has implemented administrative controls to enter the appropriate LCO when the systems are breached. In addition, the licensee will block the automatic start of the CREOASS system, when personnel have the system breached and are performing activities within the system plenum.

II. Maintenance

M1 Conduct of Maintenance

M1.1 Preplanned Maintenance Activity Review

a. Inspection Scope (62707)

The inspectors observed/reviewed selected portions of pre-planned maintenance activities, to determine whether the activities were conducted in accordance with NRC requirements and SSES procedures.

b. Observations and Findings

Maintenance activities performed by the following WAs were observed/reviewed during this inspection. In addition, selected personnel qualifications, equipment, permits (tagouts), procedures, drawings, and/or vendor technical manuals associated with the maintenance activities were also reviewed.

V80190	"A" EDG 5 Year Maintenance
S80379	"B" EDG Fuel Oil Drain Line
V80011	Local Power Range Monitor
S86011	"B" EDG Lubrication Oil Pressure Indication

Interviews with maintenance personnel showed the individuals involved in the maintenance activities to be knowledgeable and capable of explaining their function.

c. Conclusions

Four planned maintenance activities, reviewed during this period, were found to be appropriately conducted and controlled. Interviews with maintenance personnel showed the individuals involved in these activities were knowledgeable, appropriately qualified, and capable of explaining their activities.

M1.2 Surveillance Test Activity Sample Reviews

a. Inspection Scope (61726)

The inspectors observed/reviewed selected portions of pre-planned surveillance activities, to determine whether the surveillance tests conformed to TS requirements and SSES administrative requirements.

b. Observations and Findings

Portions of the following pre-planned surveillance activities were observed/reviewed:

SC-134-104	System Particulate Iodine Noble Gas Quarterly Functional Radiation Monitor - Iodine Channel
SO-024-001	"A" EDG Monthly Operation
SO-156-001	Weekly Control Rod Exercising
SO-024-013	Class 1E Operability Test
SC-234-104	System Particulate Iodine Noble Gas Quarterly Functional Radiation Monitor - Iodine Channel
SI-283-320	Quarterly Calibration of Condensor Vacuum
SI-155-302	18 Month Calibration of Control Rod Scram Accumulator Leak Detectors
SO-149-A02	"A" Loop RHR Full Flow Test
SO-013-010	Monthly Fire Protection System Valve Alignment Check

The activities were determined to conform to the requirements of TS and satisfied PP&L administrative requirements (approvals, personnel qualifications, scheduling and permits). Equipment was properly removed from service and, when appropriate the TS LCOs were documented and met. The surveillance activities were determined to have been accomplished by qualified and trained personnel.

c. Conclusions

The surveillance activities observed were adequately performed and appropriately controlled. The activities were accomplished by qualified and trained personnel. No violations of NRC requirements were identified.

M2 Maintenance and Material Condition of Facilities and Equipment

M2.1 EDG Turbocharger Lube Oil Low Pressure Alarm - Failed Maintenance Test

a. Inspection Scope (62707)

A maintenance test run on the "B" EDG was discontinued and a 72 hour LCO was entered following receipt of an unexpected turbocharger lube oil low pressure alarm. The inspectors observed/reviewed portions of the troubleshooting and restoration.

b. Observations and Findings

On February 9, 1998, a maintenance run was commenced on the "B" EDG, as part of a post-modification test, following replacement of the fuel oil crossover drain line. Shortly after the start of the run, the turbocharger lube oil low pressure alarm was

received at the local EDG control panel. A local pressure gauge indicated the turbocharger lube oil pressure to be lower than normal. Operations personnel shutdown the EDG using the emergency stop. The "B" EDG was declared inoperable and SSES Unit 1 and Unit 2 entered a TS 3.8.1.1(b) 72 hour LCO.

The inspectors reviewed/observed a turbocharger boroscope inspection, instrument calibration checks and re-calibration, functional checks of the turbocharger lube oil pressure regulating valve, and turbocharger lube oil filter inspection and replacement.

The indicated low oil pressure and alarm, seen by the operator at the local EDG control panel, was attributed to air intrusion into the oil instrument line. Two other utilities, contacted by the licensee, which have similar Cooper-Bessemer model diesel engines, stated they had experienced similar low oil pressure indications and low oil pressure alarms due to air intrusion into the oil instrument line. Cooper-Bessemer also stated air intrusion would not result in the actual turbocharger oil pressure being below minimum requirements.

The inspectors observed that instrument calibration checks were performed as minor maintenance activities. Overall, maintenance activities were adequate. No violation of NRC requirements were identified.

c. Conclusions

The "B" Emergency Diesel Generator (EDG) test run was discontinued following receipt of an unexpected turbocharger lube oil low pressure alarm. The cause was adequately identified, and the EDG was repaired and returned to service within the time period allowed by Technical Specification. Overall, maintenance activities were adequate.

M3 Maintenance Procedures and Documentation

M3.1 Hot Tapping of Safety Related Piping

a. Inspection Scope (62707)

The inspectors observed/reviewed selected portions of pre-planned maintenance activities related to modification of the Emergency Service Water (ESW) system. The inspections were intended to determine whether the activities were conducted in accordance with NRC requirements and SSES procedures.

b. Observations and Findings

The selected maintenance items included boring activities on safety related concrete wall structures, and modification activities on ESW system piping. The licensee implemented the ESW pipe modifications to attach chemical addition tubing to a main ESW header, by using a "hot tapping" connection. The hot tap procedure welds a piping connection onto a header pipe, then uses a special drilling rig, with a pressure retaining drill bit assembly, to drill into the pressurized header pipe. The attached piping connection was intended to be used to supply biocide treatment to the ESW header.

Maintenance activities were authorized and conducted by the following:

MRP-QA-3806, Hot Tapping of Piping Systems
WA C73282, Hot Tap of Division I ESW Piping
IP-100, Core Drilling Machine Vendor Manual
DCP 96-9048, ESW Design Change Package

Maintenance personnel involved in these activities were knowledgeable of their assigned duties.

There were several contradictions identified by the inspectors between the governing procedures, the vendor manual and field practices, for performance of hot tapping activities. The contradictions included calculation errors, contradicting methods and depths of drilling, contradicting methods of foreign material exclusion (FME) control in the drilled cavity, and different applications of vendor supplied materials. Because of these discrepancies, the inspectors determined the observed maintenance activities on safety related piping were not adequately controlled by procedure, contrary to the requirements of TS 6.8.1. Because of the reasons discussed below, this failure constitutes a violation of minor significance and is being treated as a non-cited violation, consistent with Section IV of the NRC Enforcement Policy. **(NCV 50-387,388/98-01-05)**

The inspectors' observations were discussed with SSES maintenance department management. Adequate changes were made to the procedures controlling hot tapping activities by procedure revisions to MFP-QA-3806, on February 24, 1998. The licensee's corrective actions were viewed as prompt and appropriate. No unreviewed safety question was identified. Because ESW is a low pressure raw water system, there was no safety impact. This finding was not considered a precursor to a more significant event.

c. <u>Conclusions</u>

Emergency Service Water system hot tapping maintenance activities were governed by procedures with contradictions in the method and depth of drilling and the method of foreign material exclusion. As a result, the activities were not adequately controlled by procedure. The licensee's response to the issue was acceptable and the safety impact of the inadequate maintenance practices was low. In this specific instance, the failure to provide adequate procedures for control of maintenance activities is considered a violation of minor significance, and is being treated as a non-cited violation.

M7 Quality Assurance in Maintenance

M7.1 Review of Maintenance Department Performance

a. Inspection Scope (62707)

The inspectors reviewed SSES actions to improve maintenance controls.

b. Observations and Findings

Performance issues exist in outstanding work (corrective action and maintenance authorization) backlog, maintenance activity control, work implementation and completion, and work control effectiveness. Based on the performance of plant equipment, the inspectors determined the licensee is appropriately prioritizing corrective maintenance and has adequate control of the corrective maintenance backlog. Based on the licensee's lack of success in implementing work as planned, the inspectors concluded the licensee continues to be challenged with the scheduling and planning aspects of maintenance. However, the inspectors found no discernable impact on operational safety due to the current maintenance and corrective action backlog.

The inspectors determined that SSES management has recognized that performance issues exist in the maintenance and work control areas and has initiated actions to address these performance issues. The inspectors reviewed these actions and discussed them in detail with SSES management. PP&L actions are aggressive and safety oriented. However, there are presently no clear results from these new actions.

c. Conclusions

The licensee implemented several actions, in response to NRC and SSES self assessment identified issues, in the maintenance and work control programs. The performance issues include, in part, work control effectiveness, outstanding work backlog, and maintenance activity control. These actions have not been in place for a sufficient period of time to show improvement in the maintenance area.

M8 Miscellaneous Maintenance Issues

M8.1 (Closed) URI 50-387,388/97-10-04- Unit 1 Standby Liquid Control Accumulators Found Depressurized

a. Inspection Scope (62707)

In response to NRC violation 50-387,388/97-07-06,Standby Liquid Control System (SLCS) Accumulator Operability, the licensee discovered additional periods in which the SLCS was inoperable. These events were reported by the licensee and reviewed in NRC IR 50-387,388/97-10. The inspectors reviewed additional information associated with these issues.

b. Observations and Findings

Background

On November 25, 1997, the Unit 1 "A" and "B" SLCS discharge accumulators were discovered by the licensee to be partially depressurized. The NRC identified several issues associated with the root cause of this condition and reviewed the licensee's immediate corrective actions. On November 26, 1997, PP&L identified a maintenance practice as the potential cause for the accumulators losing pressure. After questions from the NRC, on December 2, 1997, the licensee made a 4-hour ENS notification stating that preliminary results showed the low accumulator pressure jeopardized the system's ability to perform its intended safety function. On January 2, 1998, the licensee submitted LER 50-387/97-25-00and stated that the full safety function of the SLCS was lost. Since then PP&L has reconsidered whether the SLCS safety function was lost. By letter dated February 4, 1998, the NRC acknowledged that PP&L was re-evaluating the issue and requested this re-evaluation be completed within 20 days. The unresolved item (URI 50-387/97-10-04) was opened because more information was needed from PP&L to ascertain whether the SLCS pumps were actually inoperable and whether violations had occurred.

Additional Information

During this inspection period, PP&L re-evaluated the as-found condition of the Unit 1 SLCS on November 25, 1997. PP&L determined the SLCS pump relief valve set points are essential to their final conclusion on SLCS operability. Consequently, PP&L informed the NRC that their re-evaluation of SLCS could not be completed until after the SLCS relief valves are bench tested during the Unit 1 refueling outage scheduled to begin April 14, 1998.

The inspectors reviewed a summary of the PP&L historical test data and discussed system design and setpoint information with cognizant engineering personnel. The inspectors found that with the accumulators de-pressurized, the expected SLCS discharge pressure during accident conditions is 1398 pounds per square inch gauge (psig) and the relief valve setpoint is 1400 psig (-0, +3%). PP&L historical

relief valve bench test test data indicated that 83% of as-found setpoints would result in the relief valves prematurely opening at < 1398 psig. However; PP&L has questioned the historical bench test data because the relief valves have not lifted prematurely during quarterly surveillance tests.

Based on the inspectors' review, several issues were identified that appear to be contrary to SSES Technical Specifications and NRC regulations:

- On September 19, 1995, and September 22, 1996, a single Unit 1 standby liquid control accumulator pressure was discovered to be below the acceptable pressure range specified by maintenance procedure MT-053-003 and no condition report was initiated for this condition adverse to quality as required by NDAP-QA-702. These issues are considered apparent violations which led to the SLCS being degraded to the extent that a detailed evaluation is necessary to determine whether the system was operable. The issues are being considered for escalated enforcement in accordance with the NRC Enforcement Policy. **(EEI 50-387,388/98-01-06)**

- On September 10, 1997, the procedures controlling the standby liquid control system maintenance activity being performed were not adequate to ensure the accumulator charging valve cap was installed in accordance with the vendor's instructions. As a result, the caps for both standby liquid control pump accumulators were over tightened and caused the loss of accumulator pressure discovered on November 25, 1997. These issues are considered apparent violations which led to the SLCS being degraded to the extent that a detailed evaluation is necessary to determine whether the system was operable. The issues are being considered for escalated enforcement in accordance with the NRC Enforcement Policy. **(EEI 50-387,388/98-01-07)**

- On September 10, 1997, the Unit 1 Quarterly Standby Liquid Control Flow Verification surveillance test procedure, SO-153-004, specified that maintenance personnel pre-charge the standby liquid control nitrogen accumulators to the range specified in maintenance procedure MT-053-003. This activity resulted in the standby liquid control pumps being tested in a condition that was different from the as-found condition, thereby potentially affecting the validity of the surveillance test results. These issues are considered apparent violations which led to the SLCS being degraded to the extent that a detailed evaluation is necessary to determine whether the system was operable. The issues are being considered for escalated enforcement in accordance with the NRC Enforcement Policy. **(EEI 50-387,388/98-01-08)**

Unresolved item 50-387/97-10-04 is closed.

c. Conclusions

NRC review of additional information, regarding the Unit 1 standby liquid control system (SLCS) operability, between September 10, 1997, and November 25, 1997, identified three apparent violations. The apparent violations contributed to the SLCS being degraded and potentially inoperable. These apparent violations are being considered as escalated enforcement items, in accordance with the NRC Enforcement Policy.

M8.2 Followup of Open Items (92902)

(Closed) URI 50-387/94-14-01 and 50-388/94-15-01
Evaluation of Thermal and Pressure Locking

This item was opened to track the status of PP&L's corrective actions for gate valves susceptible to pressure locking and thermal binding. On August 17, 1995, the NRC issued Generic Letter (GL) 95-07 requesting licensees to formally evaluate pressure locking and thermal binding for motor operated valves. PP&L provided 60-day and 180-day responses to the GL on October 16, 1995 and February 13, 1996, respectively. PP&L's program continued to evolve during its implementation and on November 7, 1996, a revision to the 180-day response was submitted to the Office of Nuclear Reactor Regulation (NRR). By letter dated April 29, 1997, PP&L updated NRR on the status and schedule for additional corrective actions. The adequacy of PP&L's response to the issues of GL 95-07 are currently under review by NRR and, pending resolution of any concerns, NRR will close out the GL by direct correspondence to PP&L. No violations were identified. This unresolved item is closed.

(Closed) VIO 50-388/97-09-02
Reactor Recirculation Valve Bonnet Vent Line Failure

On September 17, 1997, Unit 2 was shut down to investigate increased drywell leakage. The licensee identified the source of the drywell leakage to be a 180 degree through-wall crack on a reactor recirculation discharge valve bonnet vent line. The crack resulted from the failure to ensure that an adequate vent line support was maintained at the completion of maintenance activities.

The licensee responded to the violation in PP&L letter PLA 4836 dated February 2, 1998. The inspectors reviewed/inspected the corrective actions reported in the PP&L letter. The corrective actions, which included repair of the bonnet, replacement of an associated hanger, and procedure changes, were determined to be acceptable. The inspectors reviewed the results of three non-destructive examinations (NDEs) conducted under WA C72397 and WA C73718 and two hanger inspections conducted under WA V72413. The NDEs were intended to

ensure that there were no additional failures on similar plant equipment. The inspectors determined that the NDEs were adequately performed and did not identify problems similar to the failure that resulted in the Unit 2 shutdown. This violation is closed.

III. Engineering

E1 Conduct of Engineering

E1.1 Control Room Annunciator Setpoints and TS Entry Conditions

a. Inspection Scope (37551)

On January 18, 1998, the "B" EDG was declared inoperable, when an NPO, on rounds, discovered the air start receiver pressure was below the 240 psig requirement of TS 4.8.1.1.2.(a).7. The inspectors reviewed the root cause of this occurrence.

b. Observations and Findings

The inspectors determined the finding was the result of good NPO round performance and the licensee took adequate initial corrective actions, including initiation of CR 98-0175. However, this is a repetitive occurrence (September 5, 1995, and November 11, 1996) and the air start receiver low pressure annunciator setpoint was not adequate to detect that the pressure was below the 240 psig TS minimum pressure requirement. As a result, the control room operators were unaware the EDG had become inoperable, until the NPO identified the condition by observation of a local pressure gauge.

The inspectors reviewed other control room annunciator setpoints and alarmed conditions and determined two other annunciators (for containment hydrogen and oxygen levels) are also less conservative than the TS allowable values. The consequence of this paring of TS and annunciator setpoints, can also result in unalarmed TS LCO entries. The inspector noted that LCO entry times were logged by the operators at the time that the alarm took place, which was not conservative. The inspectors discussed the issue with operations management and determined the general issue of annunciator conservatism, including LCO action statement start time, was being addressed in the PP&L corrective action system since 1988. Although several examples of unalarmed TS entry were identified, no violations of TS LCO requirements were identified.

c. Conclusions

NRC identified three control room annunciators which alarm after Technical Specification (TS) Limiting Condition for Operation (LCO) action levels are exceeded. The issue was discussed with operations management and it was determined the general issue of annunciator conservatism, including LCO action statement start time, was being addressed in the PP&L corrective action system. Several examples of unalarmed TS entries were identified by the NRC, but no violations of the TS allowed outage time were identified.

E1.2 Primary Containment Penetration Leak Rate Testing - Notice of Enforcement Discretion

a. Inspection Scope (37551)

On February 3, 1998, SSES requested and received an Notice of Enforcement Discretion (NOED) to allow operation without taking action in accordance with TSs 4.0.3 and 4.6.1.2. The inspectors observed/reviewed portions of licensee activities associated with the NOED.

b. Observations and Findings

On February 3, 1998, at midnight, the licensee entered TS 4.0.3 upon discovering it had not leak rate tested two primary containment penetrations in Unit 1, and five primary containment penetrations in Unit 2, in accordance with requirements of TS 4.6.1.2. Because of the complexity of performing the leak rate tests while at power, the licensee chose to pursue an NOED.

SSES PORC reviewed and recommended the NOED request in meeting 97-2-2 after reviewing the corrective actions recommended in response to CR 98-0342. The PORC review activities were observed to be insightful and detailed. The inspectors observed the actions of operations management and shift supervision in support of the NOED request and determined that the actions were conservative and safety oriented.

The NOED was granted by the Director of Project Directorate I-2, NRR, at approximately 4:30 p.m. on February 3, 1998, based on the completion of a telephone conference with the NRC.

The inspectors reviewed/observed portions of three of the five penetration leak rate tests for Unit 2. The two Unit 1 penetration leak rate tests will be performed during the upcoming Unit 1 outage, in April-May 1998. Based on satisfactory test results from the Unit 1 testing, the remaining two Unit 2 penetration leak rate tests will be postponed until the next scheduled Unit 2 refuel outage (Spring 1999). Penetrations X-90A, X-90D, and X-223A were tested by surveillance procedures SE-259-109, SE-259-110, and SE-259-113, under WAs A80357, A80358, and A80359. Each of the three surveillance tests was completed satisfactorily and the licensee completed its initial NOED commitments, as indicated in PP&L letter PLA-

4844. The decision to exercise enforcement discretion by issuing an NOED does not change the fact that a violation will occur, nor does it imply that enforcement discretion is being exercised for any violation that may have led to the violation at issue. Pending additional information from the licensee regarding the root cause of this event, this issue will be tracked as an Unresolved Item. **(URI 50-387,388/98-01-09)**

c. Conclusions

On February 2, 1998, SSES requested and received a Notice of Enforcement Discretion (NOED) for containment penetration leak rate tests that were not performed when required. The licensee's request and immediate corrective actions for the issues were adequate. The licensee's initial NOED commitments were verified to be complete and an unresolved item was opened, pending information on the circumstances which led to this event.

E2 Engineering Support of Facilities and Equipment

E2.1 "B" Reactor Recirculation Pump Speed Drift

a. Inspection Scope (37551)

A design condition described by the licensee as recirculation pump speed control system drift, was reviewed by the inspector. As a result of the control system drift, the SSES Unit 1 "B" reactor recirculation pump speed was observed to be slowly changing without any operator action. In addition, the inspectors observed and reviewed the initial troubleshooting efforts for this problem.

b. Observations and Findings

On February 14, 1998, the Unit 1 "B" recirculation pump speed increased by approximately 11 rpm over a 6 hour period, for no apparent reason. There was no change in the "A" recirculation pump speed during this period. All recirculation pump and recirculation motor-generator (M-G) set parameters appeared normal. On two different occasions, during this six hour period, recirculation flow was reduced with the master recirculation flow controller; both pumps responded normally.

On February 17, 1998, on Unit 1 during a planned increase in recirculation flow, to maintain 100% reactor power, a momentary reduction in "B" recirculation drive flow (e.g., a reduction in pump speed) was noted, followed by a slower than expected increase in the "B" drive flow. A 3 rpm speed decrease over a 3 hour period was observed for the "B" recirculation pump. As before, there was no change in the "A" recirculation pump speed during this period. The licensee initiated CR 98-0498 and CR 98-0518 to evaluate this problem.

Since February 14, the PCO's have been closely monitoring recirculation speed and flow, however, no speed or flow drift has been observed since February 17. The recirculation pumps operate at about 1500 rpm, therefore, the observed speed drift problem represents a change of approximately 0.1% per hour. SSES engineering and instrument and controls personnel analyzed the system performance data for these two events, based on a computer history review, and concluded that this was probably caused by a drift in the control signal. SSES engineering has further concluded, based on the information available, that a rapid speed change or failure of the control system is not likely. A temporary data recorder was installed in the recirculation flow control system to obtain additional diagnostic information not available from the plant computer system. SSES engineering response was adequate.

Operators responded well, to control reactor power and monitor plant parameters, on two occasions when the recirculation pump speed drift resulted in unanticipated reactivity additions. The inspectors reviewed the CR and supporting data, and discussed recirculation speed control, reactivity addition, and the resulting effects on reactor power with operations supervision, system engineering supervision, and PCOs. The operability determination was found to be adequate. The licensee's initial actions appeared to be reasonable and conservative.

c. Conclusions

The Unit 1 "B" reactor recirculation pump speed was observed to be slowly changing without any operator action, on two separate occasions, resulting in unanticipated reactivity additions. The inspectors reviewed the operability determination and the licensee's initial corrective actions, and found them to be adequate.

E2.2 Engineered Safeguards System Transformer Local Panel Alarm Tests (37551, 71707)

Nuclear Plant Operators (NPOs) perform a local panel alarm test for several engineered safeguards system (ESS) transformers as part of their routine round activities. The inspectors reviewed two computer reports, for ESS transformer local panel alarm actuation data, and a PP&L corporate audit report, dated October 15, 1997, for ESS transformer local panel alarm test performance.

The inspectors concluded the computer reports showed data recording deficiencies for some Unit 1 ESS transformer local panel alarms. A comparison of the Unit 1 and 2 computer reports with in-plant maintenance records, and system configurations, provided evidence that PP&L's conclusions were reasonable with respect to NPO local panel alarm test performance. After accounting for the computer data recording deficiencies, computer records covering the periods of January to July 1996, August to December 1996, and January to March 1997, all indicate NPOs were consistently performing the required ESS transformer local panel alarm tests.

Although some deficiencies were identified with the recorded computer data, the inspectors found that PP&L accounted for the computer data deficiencies and reached reasonable conclusions regarding the data. Based on the computer records discussed above, the inspectors concluded that the ESS transformer local alarm tests were consistently performed by the NPOs.

E2.3 Radwaste Control Room Panel Alarm Tests (37551, 71707)

Auxiliary System Operators (ASOs) perform radwaste control room panel alarm tests as part of their routine shift activities. The inspectors reviewed computer reports and PP&L audit data dated February 10, 1998, for radwaste panel alarm tests for selected periods in 1996 and 1997.

The inspectors concluded the computer reports showed data recording deficiencies for some radwaste control room panel alarms. A comparison of the Unit 1 and Unit 2 computer reports with in-plant maintenance related conditions, and system configurations, provided evidence that PP&L's conclusions were reasonable, with respect to ASO radwaste control room panel alarm test performance. PP&L's audit determined that their management expectations were not clear and had not been consistently implemented throughout all operation shifts.

Records for the period January to July 1996, indicated the ASOs were not consistently performing the radwaste control room panel alarm tests, in that these tests were, at times, documented as completed but not actually performed. This issue is considered part of personnel performance problems which existed prior to July 1996. Licensee corrective actions in response to VIO 50-387,388/96-270-01022, "E" diesel generator misalignment event which occurred in the same time period, are considered applicable to this issue.

NRC reviews of the records covering the periods August to December 1996, and January to March 1997, indicate ASOs were consistently performing the required radwaste control room panel alarm tests. The inspectors concluded that the licensee's corrective actions, with respect to ASO performance, were acceptable based on direct inspection of ASO performance, interviews of ASOs, and additional record reviews.

Although some deficiencies were identified with the recorded computer data, the inspectors found that PP&L accounted for the computer data deficiencies and reached reasonable conclusions regarding the data. PP&L's conclusions and corrective actions to improve ASO performance, management oversight, and independent assessment were found to be acceptable.

Failure of ASOs to consistently perform radwaste control room panel alarm tests is being considered a non-cited violation consistent with Section VII.B.1 of the NRC enforcement policy. These issues were identified by the licensee's processes and occurred during the same time frame and were of the same nature as the "E" EDG misalignment event (Section O4.2). The corrective actions and root cause, of failure of management to communicate expectations, from the "E" EDG misalignment event were also applicable. The "E" EDG misalignment event, in part, formed a basis for a $210,000 civil penality issued on June 20, 1997. (NCV 50-387, 388/98-01-11)

E2.4 Main Control Room Annunciator Alarm Tests (37551, 71707)

Plant Control Operators (PCOs) perform main control room annunciator alarm tests as part of their routine shift activities. The inspectors reviewed PP&L audit data dated December 11, 1997 for performing control room annunciator alarm tests.

The inspectors determined that there was no computer data which would indicate whether specific main control room annunciator alarm tests were or were not performed. The inspector also determined that the method used to accomplish the annunciator alarm tests varied from shift to shift. The licensee also concluded, that there was no computer data to support a performance review for specific main control room annunciator alarm tests. Therefore, the licensee conducted a review of main control room annunciator alarm tests using PCO interviews, Unit Supervisor (US) interviews and control room log reviews. The licensee determined that in the January to June 1996 time period there were PCO performance issues with the performance of main control room annunciator alarm tests which included, at times, the test was documented as completed but not actually performed.

The inspectors concluded that the corrective actions in response to VIO 50-387, 388/96-270-01022,"E" diesel generator misalignment event which occurred in the same time period, were applicable to this issue and that PP&L's initial actions to evaluate the PCO performance issues were conservative. In general, the inspectors concluded the corrective actions, for varied PCO alarm test practices, were reasonable and overall PCO performance was good, based on direct inspection, interviews of PCOs, and additional record reviews.

The inspectors found that PP&L accounted for the absence of supporting computer data and reached reasonable conclusions. PP&L's conclusions and corrective actions, to improve PCO performance, management oversight, and independent assessment, were found to be acceptable.

PCO performance issues regarding main control room annunciator alarm tests is being considered a non-cited violation consistent with Section VII.B.1 of the NRC enforcement policy. These issues were identified by the licensee's processes and occurred during the same time frame and were of the same nature as the "E" EDG misalignment event (Section O4.2) The corrective actions and root cause, of failure of management to communicate expectations, from the "E" EDG misalignment event were also applicable. The "E" EDG misalignment event, in part, formed a basis for a $210,000 civil penality issued on June 20, 1997. (NCV 50-387, 388/98-01-12)

E8 Miscellaneous Engineering Issues

E8.1 Followup of Open Items (37551, 92903)

(Closed) URI 50-387,388/97-07-09
Reactor Building Truck Bay Hatch

During a routine tour of SSES reactor buildings, the inspectors observed that a large floor hatch, on elevation 749 of the Unit 2 reactor building, was open and appeared to have been that way for many years. A subsequent review by PP&L found that the hatch was assumed to be closed in the tornado analysis for the reactor building. CR 97-1950 was opened to document this discrepancy and two calculations were performed to evaluate the as-found condition (EC-012-2207 and EC-012-2209). PP&L concluded that the open hatch is an acceptable configuration.

As discussed in NRC IR 50-387,388/97-07, the licensee had not performed a 10 CFR 50.59 safety evaluation prior to placing the hatch in a position contrary to the original tornado analysis. The inspectors reviewed the results of PP&L's recent calculations and determined the tornado analysis was not adversely affected by having the truck bay hatch in the open position. No unreviewed safety question was identified. No safety impact was identified, this finding does not represent a programmatic problem, and this finding was not considered a precursor to a more significant event. This failure constitutes a violation of minor significance and is being treated as a non-cited violation, consistent with Section IV of the NRC Enforcement Policy. This unresolved item is closed. **(NCV 50-387,388/98-01-10)**

The inspectors identified a floor hatch in the reactor building which was maintained open for many years. In response to the inspectors questions, PP&L determined the site tornado analysis assumed the hatch was closed. No safety evaluation was performed prior to placing the hatch in other than the analyzed position. A subsequent PP&L calculation determined the result of the tornado analysis was not adversely affected by hatch position. The failure to perform a safety evaluation prior to changing the hatch position was a violation of minor significance and is being treated as a non-cited violation.

IV. Plant Support

R1 Radiological Protection and Chemistry Controls

R1.1 As-Low-As-Reasonably-Achievable (ALARA)

a. Inspection Scope (83750)

A review was performed of the controls to maintain radiation exposures as-low-as-reasonably-achievable (ALARA). Information was gathered by reviews of ALARA evaluations written for radiation work permit 1997-0061, "Application of paint and epoxy" in the emergency core cooling system rooms on the lower elevation of the unit 1 and unit 2 reactor buildings, through discussions with cognizant personnel, and tours through the plant.

b. Observations and Findings

ALARA reviews were well detailed and included person-rem estimates, work planning information, external and internal exposure controls, health physics operational concerns, dosimetry and radiological monitoring, anticipated dose rates, additional comments, a work flow synopsis, and lessons learned from previous jobs. Examples of ALARA measures implemented for painting of the residual heat removal (RHR) rooms included use of temporary shielding, system flushes, use of long handled tools, radiation source postings, and use of pictures for briefings. "ALARA (work) in-progress reviews" were performed as the project evolved, and one notable lesson learned was that a preplanned flush of the unit 2 RHR shut down cooling (SDC) line was canceled without consultation of the cognizant ALARA specialist. The ALARA in-progress review highlighted the need for improved communications between operations and health physics to ensure the success of future RHR SDC system flushes.

During tours of the plant, the inspector examined temporary shielding installed in the RHR rooms. Lead blankets were suspended from the upper grating and were hung beneath the RHR shut down cooling lines in the overhead of the RHR room. Licensee records showed that the shielding reduced general area dose rates by approximately 25-35 percent. Although the shielding was installed to reduce dose rates for the painting project, approval had been obtained to allow the shielding to remain in-place until the end of the next outage on each unit, thereby increasing the effectiveness of the shielding. Shielding packages were neat and orderly, showed evidence of detailed planning, and were noted as excellent by the inspector.

The inspector also observed a willingness of the health physics staff to use the employee ALARA concern program. A health physics technician assigned to provide job coverage activities noted that, in an ongoing effort to clean and remove stored materials from the plant, a camera had been removed from the control rod drive (CRD) rebuild room. One of the uses for the camera was to perform an air damper inspection. With the camera removed, personnel had to enter a posted high radiation area to inspect the air damper. In response to this observation, the health

physics technician submitted an Employee ALARA Concern to the ALARA organization for review. This suggestion was accepted for evaluation. The inspector concluded that this was an effective use of the employee ALARA concern program.

c. Conclusions

The inspector concluded the as-low-as-reasonably-achievable (ALARA) organization was effectively evaluating and implementing radiation dose reduction measures and the health physics staff effectively used the employee ALARA concern program.

R1.2 Control of Radioactive Material and Contamination

a. Inspection Scope (83750)

A selected review was performed of contamination controls. Information was gathered through tours of the facility and discussions with cognizant personnel.

b. Observations and Findings

The inspector observed a noticeable reduction in areas classified as contaminated areas. Many areas had been de-contaminated and contaminated areas had been moved back to room doors. The best examples were the emergency core cooling system (ECCS) rooms on the lower elevation of the unit 1 and unit 2 reactor buildings which had been de-contaminated and painted. Licensee staff indicated that goals had been established to reduce the total square footage of areas classified as recoverable contaminated areas. Records showed that at the beginning of 1997, approximately 9.4 percent of plant areas were classified as recoverable contaminated areas, and this was reduced to 6.2 percent by the end of 1997. A health physics supervisor stated that future contaminated area reduction goals included de-contaminating the refuel floor, and reducing the total square footage of recoverable contaminated areas to zero percent by the end of the year 2000.

Records for internal dose assignments resulting from bioassay showed that there were no assignments greater than 10 mrem which indicated that controls to limit internal dose had been effective.

A commitment to improve contamination controls was evidenced by the performance of a two week contamination control self-assessment performed in December 1997.

c. Conclusions

The inspector concluded that a strong commitment to reducing plant contamination was evidenced by the reduction of recoverable-contaminated areas in 1997 from 9.4 to 6.2 percent and performance of a self-assessment in contamination controls.

R1.3 Hydrogen Water Chemistry - Preparation and Planning

a. Inspection Scope (83750)

A review was performed of preparation and planning for hydrogen water chemistry (HWC). Information was gathered by a review of an evaluation of the radiological impact of HWC and efforts taken to mitigate the radiological impact of HWC.

b. Observations and Findings

Background

Reactor system components fabricated of high-alloy metals are subject to stress corrosion cracking (SCC), and this type of cracking has become increasingly evident in reactor vessel internal components. Industry experience has shown that cracking begins after about 10 years of operation, and the start of visible SCC has been identified in the welds of the core shroud and the steam dryer at SSES. The area of greatest concern is the potential development of SCC in the lower regions of the reactor vessel such as in the core support structures, vessel penetrations, and vessel internal structural attachment welds. In these areas, access for inspection is limited and the methods and technology to repair damage has not been fully developed and demonstrated. Research has shown that injection of hydrogen into reactor feedwater could reduce SCC by inhibiting the radiolysis of water and promoting recombination of radiolytic components. Potential savings with HWC were calculated by estimating the avoided cost to repair potential damage due to SCC minus the cost to install and operate HWC. This calculation forecasted that operating under conditions of HWC would result in significant monetary savings over the life of the plant, and based on that information a decision was made to install HWC in both units during the next two refueling outages.

HWC Radiological Impact

N-16 activity is produced in the reactor coolant by the $^{16}O(n,p)^{16}N$ reaction in the core region. N-16 has a short half-life (7.1 seconds), but emits high energy gammas upon decay. Under HWC, as hydrogen concentration increases, volatile forms of nitrogen such as NH_3 are produced and swept from the reactor with main steam. Licensee staff predicted that dose rates in steam related areas would increase by a factor of five during power operation. This is expected to increase radiation dose to personnel working in and around the turbine building, and for personnel working adjacent to steam related areas outside the radiologically controlled area (RCA). A notable impact is that many personnel who previously received non-detectable radiation dose {i.e., radiation dose less than the 10 mrem detection limit of the thermoluminescent dosimeters (TLDs) used for personnel monitoring}, were predicted to receive reported radiation dose under conditions of HWC. The most significant dose impact was predicted to come from increased radiation levels associated with primary systems. Under HWC, changes in primary water chemistry cause in-core corrosion product layers to loosen, resulting in the re-distribution of activated corrosion products to out-of-core regions. This has been predicted to add more than 290 person-rem to a typical refueling outage. In total, even with mitigating measures, HWC was predicted to more than double the total yearly collective radiation dose at Susquehanna.

Mitigating Measures

Licensee staff had taken a number of initiatives to mitigate the radiological impact of hydrogen water chemistry. Examples included installation of condensate filtration to reduce feedwater iron concentration; preparation and plans for chemical de-contamination if excessive dose rates were encountered; preparation and plans for depleted zinc injection; improvements and increased use of shielding including identification and evaluation of multiple permanent shielding locations, installation of shield supports in the drywell, replacement of some drywell grating with steel plates, and construction of shield walls at the feedwater heater bay; installation of cameras in steam related areas including reactor water feed pumps, condenser bay, moisture separators, turbine deck, and control valves; revised work practices and efficiency improvements to minimize time in areas with elevated dose rates; revised work scheduling such as movement of some 10 year in-service inspection requirements from the unit 2 ninth refueling outage to the unit 2 eighth refueling outage and scheduling of some steam related work during outages; and initiation of multiple staff communications to inform station personnel of the benefits and impact of hydrogen water chemistry.

c. Conclusions

The inspector concluded that hydrogen water chemistry (HWC) was predicted to have a significant radiological impact, essentially doubling the total yearly collective dose at SSES. The licensee has made reasonable efforts to assess the radiological impact of hydrogen water chemistry. Although as-low-as-reasonably-achievable (ALARA) initiatives to minimize the radiological impact of HWC appeared comprehensive, including the implementation of condensate filtration, shielding up-grades, contingencies for chemical de-contamination, and improvements in work practices and scheduling, continued vigilance to assess and mitigate the radiological impact of HWC is warranted.

R2 Status of RP&C Facilities and Equipment

a. Inspection Scope (83750)

The inspector performed selected tours of the Unit 1 and 2 reactor and turbine buildings to evaluate the condition of facilities, housekeeping, and health physics equipment.

b. Observations and Findings

Overall, material conditions of plant structures and operating equipment were very good. No significant water leakage was observed from pumps or valves, catch containments were installed as needed, and there was no observable ground water intrusion in the lower elevations of the reactor buildings. Many locations in the reactor buildings had worn or chipped paint on floor surfaces; however, fresh paint had been applied to floors, walls, structures, and piping in the lower elevation of the unit 1 and unit 2 reactor buildings that housed emergency core cooling systems (ECCS).

Overall, plant housekeeping was good as evidenced by clear isles and walkways, and the volume of stored materials had been noticeably reduced in the radiologically controlled areas as evidenced by the removal of cages used to temporarily store tools and equipment.

Contamination monitoring equipment observed to be in-use including friskers, personnel contamination monitors (PCMs), tool contamination monitors (TCMs), and continuous air monitors (CAMs) appeared to be well maintained and in good working condition.

c. Conclusions

Based on this review, the inspector concluded that health physics equipment and facilities were well maintained, and housekeeping and material conditions of plant structures and equipment were good.

R6 RP&C Organization and Administration

a. Inspection Scope (83750)

The inspector reviewed the organization and administration of the health physics organization. Several changes had been made including the appointment of a new Supervisor-Health Physics. A review was performed to determine if the individual's qualifications met the requirements specified in technical specifications. Information was gathered by a review of an organization chart, interviews with cognizant personnel, and review of a resume.

b. Observations and Findings

Technical Specification 6.3, "Unit Staff Qualifications," required the Supervisor-Health Physics to meet or exceed the qualification requirements of Regulatory Guide 1.8, "Personnel Selection and Training," dated September 1975. The inspector compared the qualifications of the Supervisor-Health Physics that were documented on a resume, to the qualification requirements presented in Regulatory Guide 1.8. This review indicated that the individual met the qualification requirements for the position of Supervisor-Health Physics (Radiation Protection Manager).

c. Conclusion

Based on this review, the inspector concluded that the newly appointed Supervisor-Health Physics met the qualification requirements outlined in plant technical specifications 6.3.

R7 Quality Assurance in RP&C Activities

a. Inspection Scope (83750)

A review was performed of the effectiveness of the condition reporting system for resolving radiological control deficiencies. Information was gathered by a selected review of condition reports, interviews with cognizant personnel, and tours through the facility.

b. Observations and Findings

A selected review of records showed that a variety of low threshold radiological control issues were placed into the condition reporting system as evidenced by the following examples: individual performed minor personal de-contamination without health physics assistance; uncontaminated tools with purple paint were found in the Combo shop; and informational postings of radioactive material were found to be inconsistent. The inspector noted that when items were entered into the condition reporting system, immediate corrective actions were taken, a significance review was performed, causes/causal factors were identified, past experience was reviewed, and actions to prevent the condition were investigated or implemented. Interviews revealed that health physics technicians had increased confidence in and readily used the condition reporting system to resolve radiological control program deficiencies.

Condition report number CR 97-2624 was selected to evaluate the effectiveness of the condition reporting system in resolving deficiencies. CR 97-2624 was originally written after an instrument and control (I&C) technician notified the health physics staff that he received radiation exposure at a greater rate than anticipated while working near the unit 1 fuel pool cooling unit precoat tank. The I&C technician had been assigned to perform work in an area with dose rates of 10 mrem/h; after 10 minutes, the individual received 7 mrem of dose. Followup surveys showed that work area dose rates had increased from 10 mrem/h to approximately 40 mrem/h and that the elevated dose rates originated from the bottom of the unit 1 fuel pool filter demineralizer precoat tank. The licensee concluded, and the inspector concurred, that the individual did not exceed an allowable exposure because the individual was equipped with a personal alarming dosimeter, and the I&C technician maintained a questioning attitude. During the initial review, licensee staff noted that the condition reporting system contained related condition reports involving elevated dose rates related to the change-out of the FPC filters and processing of the wastes. A multi-disciplined team including representatives from operations, health physics, effluents, scheduling, and engineering was assembled to investigate the event and implement corrective actions to prevent recurrence. Deficiencies in

equipment, system design, and procedures associated with the fuel pool cooling demineralizer and waste processing systems were identified. Examples of actions taken to prevent creation of un-posted or un-barricaded high radiation areas included revising operations procedure OP-135-001/OP-235-001 to require health physics (HP) notification and specific "hold-points" when a backwash of the FPC filter demineralizer was necessary, and revisions to health physics procedure HP-HI-073, "Notification of Plant Evolutions and Expected HP Actions," Rev. 11, to ensure proper posting, barricading, and access control at the fuel pool hold pump room, the fuel pool precoat tank, and fuel pool cooling back wash receiving tank upon change out of the fuel pool cooling unit filter demineralizer. Other actions to prevent recurrence were to change the precoat tank alarm response to isolate the filter from the precoat tank, and to evaluate methods for waste stream flushing. Corrective actions were broad based and appeared adequate to prevent recurrence.

c. Conclusions

The inspector concluded the condition reporting system was effectively used to identify, evaluate, and resolve radiological control program deficiencies.

R8 Miscellaneous RP&C Issues

R8.1 Final Safety Analysis Report Review (83750)

A recent discovery of a licensee operating their facility in a manner contrary to the Final Safety Analysis Report (FSAR) description highlighted the need for a special focused review that compares plant practices, procedures and/or parameters to the FSAR description. While performing the inspections discussed in this report, the inspectors reviewed the applicable portions of the FSAR that related to the areas inspected.

The inspector reviewed selected sections of Chapters 12.1 - 12.5, "Radiation Protection," of the FSAR, pertaining to radiological controls, to evaluate the accuracy of the UFSAR regarding existing plant conditions and practices.

No FSAR discrepancies were identified during this review.

R8.2 Hydrogen Water Addition Modification (71750)

During a review of TS and the SSES on going Hydrogen Water Addition (HWA) system modification work, the inspectors determined the licensee was directing a substantial effort to reduce the impact of sulfate concentrations on the integrity of the reactor coolant system (RCS). RCS oxygen levels are reduced by the HWA system in order to prevent intergranular stress corrosion cracking initiation related to high sulfate concentrations.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection report period on March 16, 1998. The licensee acknowledged the findings presented.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. The licensee identified a proprietary Electric Power Research Institute (EPRI) document, to which the inspectors had access. The licensee did not disagree with any of the findings presented at either exit meetings.

The licensee stated at the exit meeting that their evaluation of the as-found standby liquid control accumulator pressure, on November 25, 1997, would be completed prior to June 30, 1998.

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-387,388/98-01-01	IFI	Licensed Operator Re-qualification Training Program (section O5.1)
50-387,388/98-01-06	EEI	Unit 1 Standby Liquid Control Accumulators Found Depressurized (section M8.1)
50-387,388/98-01-07	EEI	Unit 1 Standby Liquid Control Accumulators Found Depressurized (section M8.1)
50-387,388/98-01-08	EEI	Unit 1 Standby Liquid Control Accumulators Found Depressurized (section M8.1)
50-387,388/98-01-09	URI	Primary Containment Penetration Leak Rate Testing - Notice of Enforcement Discretion (section E1.2)

Updated

50-388/97-10-01	URI	Technical Specification 3.0.3 Entry to Support Surveillance Activities (section O8.1)
50-387,388/96-270-01022	VIO	Failure to Implement Procedures as Required by TS 6.8.1 (section O8.3)

Closed

50-388/98-01-02	NCV	Required Sample was not Collected and Analyzed within Technical Specification Time Limit (section O8.2)
50-388/98-01-03	NCV	Reactor Building Vent Continuous Sample Lost for Twenty Minutes (section O8.2)
50-387,388/98-01-04	NCV	Control Room Emergency Outside Air Supply System (CREOASS) Operability (section O8.3)
50-387,388/98-01-05	NCV	Hot Tapping of Safety Related Piping (section M3.1)
50-387,388/98-01-10	NCV	Reactor Building Truck Bay Hatch (section E8.1)
50-388/97-03-00	LER	Required Sample was not Collected and Analyzed within Technical Specification Time Limit (section O8.2)

50-388/97-05-00	LER	Reactor Building Vent Continuous Sample Lost for Twenty Minutes (section O8.2)
50-387/97-013-00	LER	Requirements for Testing Activated Carbon Samples (section O8.2)
50-387/97-21-00	LER	Condition Prohibited by Technical Specifications - Technical Specification 3.0.3 Entry (section O8.2)
50-387/97-21-01	LER	Condition Prohibited by Technical Specifications - Technical Specification 3.0.3 Entry (section O8.2)
50-387,388/96-270-01012	VIO	Less Than Four Independent Diesel Generators Operable (section O8.3)
50-387,388/96-270-02013	VIO	Containment Isolation Valve Open and Deactivated for 24 Hours (section O8.3)
50-387,388/96-270-03014	VIO	Standby Liquid Control System Heat Trace De-energized (section O8.3)
50-387,388/97-04-02	VIO	Nuclear Safety Assessment Group (section O8.3)
50-387,388/97-04-03	VIO	Quality Assurance Program (QA) Changes (section O8.3)
50-387,388/97-06-04	URI	Control Room Emergency Outside Air Supply System (CREOASS) Operability (section O8.3)
50-387/97-10-04	URI	Standby Liquid Control Accumulators Found Depressurized (section M8.1)
50-387/94-14-01	URI	Evaluation of Thermal and Pressure Locking (section M8.2)
50-388/94-15-01	URI	Evaluation of Thermal and Pressure Locking (section M8.2)
50-388/97-09-02	VIO	Reactor Recirculation Valve Bonnet Vent Line Failure (section M8.2)
50-387,388/97-07-09	URI	Reactor Building Truck Bay Hatch (section E8.1)
50-387,388/98-01-11	NCV	ASO Performance for Radwaste Control Room Alarm Tests (Section E2.3)
50-387, 388/98-01-12	NCV	PCO Performance of Control Room Annunciator Alarm Tests (Section E2.4)

LIST OF ACRONYMS USED

ALARA	As Low As Reasonably Achievable
ATWS	Anticipate Transient Without Scram
ASO	Auxiliary Systems Operator
CAM	Continuous Air Monitor
CFR	Code of Federal Regulations
CR	Condition Report
CREOASS	Control Room Emergency Outside Air Supply System
CRD	Control Rod Drive
ECCS	Emergency Core Cooling System
EDG	Emergency Diesel Generator
EEI	Escalated Enforcement Item
EPRI	Electric Power Research Institute
ESS	Engineered Safeguard System
ESW	Emergency Service Water
FPC	Fuel Pool Cooling
FME	Foreign Material Exclusion
FSAR	Final Safety Analysis Report
GDC	General Design Criteria
GE	General Electric
GL	[NRC] Generic Letter
gpm	gallons per minute
HP	Health Physics
HPCI	High Pressure Coolant Injection
HWA	Hydrogen Water Addition
HWC	Hydrogen Water Chemistry
I&C	Instrument and Control
IFI	Inspection Follow-Up Item
IR	[NRC] Inspection Report
ISEG	Independent Safety Engineering Group
ITS	Improved Technical Specification
JPM	Job Performance Measure
kv	Kilovolts
Kw	Kilowatts
LPRM	Local Power Range Monitor
LCO	Limiting Condition for Operation
LORT	Licensed Operator Re-qualification Training
LER	Licensee Event Report
M-G	Motor-Generator
MOV	Motor Operated Valve
mrem	millirem
mrem/h	mrem per hour
N-16	Nitrogen-16
NAS	Nuclear Assessment Services
NCV	Non-Cited Violation
NDE	Non-destructive Examination
NOED	Notice of Enforcement Discretion

[illegible]

NOV	Notice of Violation
NPO	Nuclear Plant Operator
NRC	Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
NSAG	Nuclear Safety Assessment Group
NSE	Nuclear System Engineering
OD	Operability Determination
PAD	Personal Alarming Dosimeter
PCO	Plant Control Operator
PCM	Personnel Contamination Monitor
PORC	Plant Operations Review Committee
psig	Pounds per Square Inch Gauge
QA	Quality Assurance
RBM	Rod Block Monitor
RCA	Radiologically Controlled Area
RCS	Reactor Coolant System
RG	Regulatory Guide
RHR	Residual Heat Removal
RMCS	Reactor Manual Control System
RP&C	Radiological Protection and Chemistry
RPM	Radiation Protection Manager
RWCU	Reactor Water Cleanup
RWP	Radiation Work Permit
SCC	Stress Corrosion Cracking
SDC	Shut Down Cooling
SER	Safety Evaluation Report
SIL	[GE] Service Information Letter
SLCS	Standby Liquid Control System
SPING	System Particulate Iodine Noble Gas
SRC	Susquehanna Review Committee
SRO	Senior Reactor Operator
SRV	Safety Relief Valve
SS	Shift Supervisor
SSES	Susquehanna Steam Electric Station
STA	Shift Technical Advisor
TCM	Tool Contamination Monitor
TLD	Thermoluminescent Dosimeter
TS	Technical Specification
TSI	Technical Specification Interpretation
URI	[NRC] Unresolved Item
US	Unit Supervisor
WA	Work Authorization