UNITED STATES NUCLEAR REGULATORY COMMISSION

REGION I

Inspection Report Nos.	50-387/92-15; 50-388/92-15
License Nos.	NPF-14; NPF-22
Licensee:	Pennsylvania Power and Light Company 2 North Ninth Street Allentown, Pennsylvania 18101
Facility Name:	Susquehanna Steam Electric Station
Inspection At:	Salem Township, Pennsylvania
Inspection Conducted:	April 19, 1992 - May 31, 1992
Inspectors:	G. S. Barber, Senior Resident Inspector, SSES D. J. Mannai, Resident Inspector, SSES B. Westreich, Reactor Engineer, DRP
Approved By:	J. White, Chief Reactor Projects Section No. 2A,

6/18/92
Date

Inspection Summary:

Areas Inspected: Safety inspections were conducted in the following areas: operations, radiological controls, maintenance/surveillance testing, emergency preparedness, security, engineering/technical support, safety assessment/quality verification, and Licensee Event Reports, Significant Operating Occurrence Reports, and open item followup.

Results: During this inspection period, the inspectors found that the licensee's activities were directed toward nuclear and radiation safety. An Executive Summary is included and provides an overview of specific inspection findings.

EXECUTIVE SUMMARY

Susquehanna Inspection Reports

50-387/92-15; 50-388/92-15

April 19, 1992 - May 31, 1992

Operations (30702, 71707, 71710)

Both Susquehanna units were operated in a safe manner. Operators effectively controlled plant evolutions and identified plant problems.

Radiological Controls (71707)

Internal contaminations resulted when the "A" condensate demineralizer was breached for a planned work activity on May 21. The involved individual was not wearing a respirator when the system was breached. A subsequent uptake resulted on May 27 when the "G" condensate demineralizer was breached. This recurrence indicates weakness in supervisory control and management oversight of radiological work practices. This item is unresolved pending completion of the licensee's investigation and NRC assessment of its effectiveness. (Section 3.2.1 pertains)

Maintenance/Surveillance (61726, 62703)

The licensee exercised good control of maintenance and surveillance activities. No scrams were attributable to maintenance or surveillance activities. Minor adminstrative weaknesses were detected during the replacement of the Reactor Core Isolation Cooling (RCIC) barometric condenser condensate pump. (Section 4.3.1 pertains)

Security (71707)

Routine observation of protected area access and egress control indicated good control by the licensee.

Engineering/Technical Support (71707, 92720, 93702)

A new fuel bundle dropped approximately two inches as it was being positioned in the new fuel inspection stand. The licensee returned the bundle to Siemen's, the fuel vendor, for inspection. Significant fuel pellet cracking was seen after the individual pellets were downloaded from the bundle. A digital reproduction of a photograph in Section 7.2.1 shows a sample of the cracking. The licensee's evaluation of this event was thorough and considerate of nuclear safety.

On May 6, the licensee discovered, during final quality assurance (QA) review of the Unit 2 Cycle 6 (U2C6) reload licensing analysis, an error in a hand calculation for the technical specification (TS) flow-dependent minimum critical power ratio (MCPR) operating limit (OL) curve. Final NRC review of this issue is pending completion of a quality program review for the Nuclear Fuels Department reload analysis program.

A contractor QC inspector obtained a visual weld certification examination through improper means. The licensee terminated the affected individual and the contractor responded with a comprehensive and extensive list of corrective actions. The inspector reviewed the licensee's actions and found them to be thorough and timely.

Safety Assessment/Assurance of Quality (40500, 90712, 92700, 92701)

The inspector reviewed 15 Significant Operating Occurrence Reports, 3 of which were followed up in this report. Also reviewed were 4 Licensee Event Reports as presented in Section 8.1.1. The SOORs and LERs were found to be well written, thorough, and properly dispositioned.

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1. SUMMARY OF OPERATIONS

1.1 Inspection Activities

The purpose of this inspection was to assess licensee activities at Susquehanna Steam Electric Station (SSES) as they related to reactor safety and radiation protection. Within each inspection area, the inspectors documented the specific purpose of the area under review, the scope of inspection activities and findings, along with appropriate conclusions. This assessment is based on actual observation of licensee activities, interviews with licensee personnel, measurement of radiation levels, independent calculation, and selective review of applicable documents.

Abbreviations are used throughout the text. Attachment 1 provides a listing of these abbreviations.

1.2 Susquehanna Unit 1 Summary

Evolutions

- Unit 1 entered the inspection period in the refueling mode.
- The unit was started up to perform scram time testing on May 14. The unit was cooled down per the plan. Leak checks were performed as the plant was heated from cold to hot shutdown conditions. This testing was completed satisfactorily.
- Startup condition was entered on May 16.
- Power Operation was reached at 12:10 a.m. on May 17 when the mode switch was placed in 'run.'
- The main turbine generator was initially synchronized to the grid on May 17 at 2:25 a.m.. At 3:27 a.m. the turbine generator was removed from service due to an increase in vibration on the number 5 bearing. This vibration is common when removing the turbine from its turning gear for synchronization to the grid. The licensee has attributed a fluctuation in lube oil or excessive turbine shaft packing tightness as contributors to this vibration. Resolution involved placing the turbine generator on its turning gear for a few hours. The licensee's actions were appropriate based on experience.
- The generator was synchronized to the grid again at 11:28 a.m. after all bearing temperatures and flows were verified to be normal. However, power ascension was delayed due to problems with condensate demineralizers, vibration of a feed pump, and recirculation pump motor generator lube oil cooler temperatures.

- The unit finished the inspection period at approximately 25% power.

Actuations

- On April 22, an Engineered Safety Feature (ESF) actuation occurred when the Reactor Protection System (RPS) activated due to a spurious Intermediate Range Monitor (IRM) upscale signal. This resulted in a full scram due to the removal of the RPS shorting links. These links are removed to permit control rod testing. A control rod was fully withdrawn when the "A" IRM spiked upscale. The licensee could not determine the cause of the spurious signal.

- On April 26, another ESF actuation occurred when the RPS actuated due to spurious IRM upscale signals. This event was the same as on April 22, however, the cause for the spurious signals on the IRM was determined to be due to welding performed inside containment in close proximity of the IRM channels "C" and "G". The licensee is currently investigating additional shielding of these cables.

- On May 8, an ESF actuation occurred when the Reactor Water Cleanup (RWCU) system isolated on high flow while placing the "A" demineralizer in service. The high flow signal was the result of an operator's failure to open the air sparger line to the demineralizer. This prevented an air vent path from being established resulting in air accumulation in the demineralizer thus creating a void. When RWCU flow was established a surge occurred to fill the void and indicated high flow which, in turn, caused the isolation.

- On May 10, another ESF actuation was initiated by an RWCU system high flow signal. This signal was attributed to a surge in system flow created by a void that occurred during the backwash and precoating process. The licensee determined that during the process, a precoat pump was deadheaded allowing the filter demineralizer to drain to the precoat tank creating a void in the filter demineralizer. This void created a momentary high flow condition while placing the demineralizer in service. This high flow condition was sufficient to cause the isolation.

1.3 Susquehanna Unit 2 Summary

Evolutions

- Unit 2 entered the inspection period at 100% power.

- Power was reduced to 60% on April 29 for power control center (PCC) 500 kilovolt (kV) line work, control rod sequence exchange and main condenser water box cleaning.

- Power was returned to 100% on May 3 at 7:00 p.m.
- Full power was maintained for the remainder of the inspection period.

Actuations

- There are no actuations to report during this inspection period.

2. OPERATIONS

2.1 Inspection Activities

The inspectors verified that the facility was operated safely and in conformance with regulatory requirements. Pennsylvania Power and Light (PP&L) Company management control was evaluated by direct observation of activities, tours of the facility, interviews and discussions with personnel, independent verification of safety system status and Limiting Conditions for Operation, and review of facility records. These inspection activities were conducted in accordance with NRC inspection procedure 71707.

2.2 Inspection Findings

The inspector found that the licensee operated both units in a safe manner. Operators effectively controlled evolutions and identified plant problems.

3. RADIOLOGICAL CONTROLS

3.1 Inspection Activities

PP&L's compliance with the radiological protection program was verified on a periodic basis. These inspection activities were conducted in accordance with NRC inspection procedure 71707.

3.2 Inspection Findings

Observations of radiological controls during maintenance activities and plant tours indicated that workers generally obeyed postings and Radiation Work Permit requirements. No inadequacies were noted.

3.2.1 Personnel Uptake From Condensate Demineralizer Breach

An unplanned internal exposure resulted from breaching the Unit 1 "A" condensate demineralizer (CD) vessel on May 21. At 10:20 a.m., a worker was in the process of breaching the "A" CD vessel to vacuum residual resin.

Prior to the actual system breach, turnover discussions and pre-job briefing were conducted in preparation for resin removal. The Health Physics (HP) technicians and the work crew discussed the job. The lead mechanic stated that he had previously removed the inner screen wearing plastic personnel contamination clothing (PCs) and a respirator. The HP technician stated that experience on previous demineralizers indicated that respirators were not necessary and face shields would be adequate facial contamination protection. Screen removal requires the mechanic to reach at least two feet into the demin vessel. The HP technician did not understand exactly where the screen was and, therefore, didn't recognize that screen removal presented a greater radiological hazard than did the breech of the vessel.

The workers involved removed the screen and began vacuuming the spent resin. After work completion, they exited the area and set off the Unit 1 personnel contamination monitors (PCMs). Facial contamination was discovered on the individuals. Subsequently, all work was stopped, and access to the area was restricted. An investigation was initiated. The licensee's evaluation revealed that one of the individuals received an uptake of about 277 nanocuries (mixed corrosion products) which resulted in an exposure of about 10.2 millirem.

The licensee determined that the need for a respirator for the job was not clearly defined and that the failure to not require one was a work practice weakness. In addition, the licensee established the policy that any future system breeches would require respiratory protection.

On May 27, the "G" CD was breeched without the use of a respirator, which was contrary to the corrective action following May 21 event. The failure to use respirators, coupled with inadequate control by health physics personnel in establishing effective radiological controls, resulted in recurrence of a personnel exposure. Six individuals were involved, the highest uptake measured was 56 nanocuries. With consideration of the airborne activity that was present, the licensee estimated personnel exposure form this event to be 4 millirem, worst case. Notwithstanding the relatively low exposures, which were fortuituous and not due to effective radiological controls, this second event indicated weakness in the licensee's management oversight and supervisory control of work in radiological areas. Additionally, the inspector noted that the requirement for respirators was not well communicated to the HP staff and other workers.

The licensee's investigation of this event continued at the end of the inspection period. Therefore, this item will remain unresolved pending completion of the licensee's investigation and review of its adequacy by the NRC. (URI 50-387/92-15-01 (Common))

4. MAINTENANCE/SURVEILLANCE

4.1 Maintenance and Surveillance Inspection Activity

On a sampling basis, the inspector observed and/or reviewed selected surveillance and maintenance activities to ensure that specific programmatic elements described below were being met. Details of this review are documented in the following sections.

4.2 Maintenance Observations

The inspector observed and/or reviewed selected maintenance activities to determine that the work was conducted in accordance with approved procedures, regulatory guides, Technical Specifications, and industry codes or standards. The following items were considered, as applicable, during this review: Limiting Conditions for Operation were met while components or systems were removed from service; required administrative approvals were obtained prior to initiating the work; activities were accomplished using approved procedures and quality control hold points were established where required; functional testing was performed prior to declaring the involved component(s) operable; activities were accomplished by qualified personnel; radiological controls were implemented; fire protection controls were implemented; and the equipment was verified to be properly returned to service.

These observations and/or reviews included:

-- WA 21303, Standby Gas Treatment System Exhaust Fan "B" Quarterly Preventive Maintenance, dated May 20, 1992.

-- WA 20832, Reactor Core Isolation Cooling (RCIC) System Barometric Condenser Condensate Pump/Motor Assembly Replacement, dated May 22, 1992.

-- WA 23053, Reactor Building Closed Cooling Water (RBCCW) Pump Seal Replacement, dated May 26, 1992.

-- WA 26675, Standby Liquid Control Storage Tank Level Instrumentation Calibration, dated May 28, 1992.

4.3 Inspection Findings

The inspector reviewed the listed maintenance activities and determined that work was properly released before its commencement; that systems and components were properly tested before being returned to service and that surveillance and maintenance activities were conducted properly by qualified personnel. Where questionable issues arose, the inspector verified that the licensee took the appropriate action before system/component operability was declared. Except as noted below, the inspectors had no further questions on the listed activities.

4.3.1 Reactor Core Isolation Cooling Barometric Condenser Condensate Pump/Motor Replacement

On May 22, 1992 the inspector observed portions of the Unit 2 RCIC barometric condenser condensate pump/motor replacement. Some minor administrative weaknesses were identified:

- The yellow copy of equipment release form (ERF) signed by operations was not retained with the work package as required by AD-QA-306.
- The inspector discovered that the cleanliness cover was not installed on the tank opening when the job site was left unattended as required by AD-QA-503.
- No housekeeping/cleanliness controls were specified by the planning group in the work package as required by AD-QA-502.

The inspector informed the mechanical maintenance foreman of these deficiencies and the foreman promptly corrected them. The mechanical maintenance supervisor was also informed. The maintenance foreman informed the inspector that these deficiencies would be addressed in on-the-job training (OJT). The weaknesses were, for the most part, administrative in nature and did not significantly impact performance of the activity. The OJT for these weaknesses has been completed.

5. EMERGENCY PREPAREDNESS

5.1 Inspection Activity

The inspector reviewed licensee event notifications and reporting requirements for events that could have required entry into the emergency plan.

5.2 Inspection Findings

No events were identified that required emergency plan entry.

6. SECURITY

6.1 Inspection Activity

PP&L's implementation of the physical security program was verified on a periodic basis, including the adequacy of staffing, entry control, alarm stations, and physical boundaries. These inspection activities were conducted in accordance with NRC inspection procedure 71707.

inspection revealed severe fuel pellet chipping. In this case, 30 of the 62 fuel rods were damaged with heaviest chipping occurring in tie rods and gadolinia rods. Gadolinia pellets are more brittle than UO_2 pellets.

The inspector considered this concern safety significant. Cracked and/or chipped pellets could increase the likelihood for pellet clad interaction (PCI) or zircaloy (zirc) hydriding.

The licensee noted that pellet chips will either reduce the diametral rod gap or cause zirc hydriding. When power in a fuel rod is increased, the thermal expansion of the pellet can cause the pellet to prematurely press against the cladding and result in fuel rod cladding failure due to PCI. The increased diametrical gap caused by the missing chip on the pellet will cause the cladding at that spot to be at a lower temperature. Because hydrogen tends to migrate toward the cooler area of the cladding and the hydrogen will react with the zircaloy cladding, an excess amount of zircaloy hydriding can occur at that point in the cladding. A crack in the fuel rod cladding could then form during power changes (i.e., thermal cycling) as zircaloy hydrides are more brittle than zircaloy cladding.

On April 1, all eight tie rods, four of nine gadolinia rods, and two of the UO_2 rods were separated from the dropped fuel bundle. Siemens separated the pellets from their respective fuel rods. During the process, appropriate serial numbers were recorded, locations were mapped, and photographs were taken. The vendor took extraordinary precautions to ensure that when the fuel bundle was disassembled no additional damage resulted. The same technique was used to download fuel pellets from the fuel bundles with Zircaloy-4 end caps with no resultant damage.

The vendor downloaded the pellets from the selected rods and noted minor to gross fuel pellet chipping in a majority of the fuel rods inspected. The pellet chipping was scattered at all elevations throughout the rod. The inspection showed that two of the two inspected UO_2 rods, six of the eight inspected tie rods, and four of the four gadolinia rods received some pellet damage with the gadolinia rods receiving the most amount of pellet damage (Figure 1 pertains). Gadolinia fuel pellets are more brittle than UO_2 pellets and are therefore more prone to pellet chipping. In the future, if any bundle experiences a similar fall, the licensee has agreed not to use the bundle and to replace it to preclude the possibility of a fuel failure.

The inspector reviewed the licensee's response to the dropped fuel bundle and noted that their decision to not use the bundle was appropriate and conservative. Their decision to send the bundle to Siemens for downloading and inspection was also good. The inspector noted that the level of damage seen was unexpected. The licensee expected either very minor or no damage from the two inch drop. The brittleness of the UO_2 and gadolinia pellets was surprising. As such, the licensee is reviewing the need to modify procedures to address this brittleness. In view of the findings of the examination, the licensee elected not to install any dropped new fuel assemblies. The inspector determined that the licensee's response thorough, conservative, and considerate of nuclear safety.

6.2 Inspection Findings

The inspector reviewed access and egress controls throughout the period. No significant findings were noted.

7. ENGINEERING/TECHNICAL SUPPORT

7.1 Inspection Activity

The inspector periodically reviewed engineering and technical support activities during this inspection period. The on-site Nuclear Systems Engineering (NSE) organization, along with Nuclear Technology (NPE) in Allentown, provided engineering resolution for problems during the inspection period. NSE generally addressed the short term resolution of problems; and scheduled modifications and design changes, by the Nuclear Modifications organization as appropriate, to provide long term problem correction. The inspector verified that problem resolutions were thorough and directed at preventing recurrences. In addition, the inspector reviewed short term actions to ensure that they provided reasonable assurance that safe operation could be maintained.

7.2 Inspection Findings

7.2.1 Significant Fuel Pellet Cracking due to Two Inch Vertical Drop of a New Fuel Assembly

Prior to the Unit 1 Cycle 7 refueling outage, a receipt inspection was performed on all new fuel bundles to assure that the bundles met their acceptance criteria. While lowering fuel bundle A16-322 on January 27 into the new fuel inspection stand, the bundle became hung up on the inspection stand. Because the bundle was being lowered when it became hung up, slack occurred in the cable which was supporting the bundle. The bundle then slipped and dropped into the base of the inspection stand.

The licensee postulated that two mechanisms caused the hang up: 1) the nose piece of the lower tie plate could have settled on top of the ½-inch ring which is used to support the lower tie plate in the inspection stand, or 2) the upper tie plate could have hung up on the upper inspection stand support. After considering these two possibilities, the licensee calculated that the bundle dropped approximately 2½ inches for a free-fall velocity of 3.65 ft/sec at impact.

After the event, the inspector questioned the disposition of the new fuel assembly. The licensee's reactor engineers decided to return the fuel bundle to Siemen's for inspection. They initially believed that no damage would be seen, but felt it prudent to do the inspection.

In subsequent discussions with Siemens (fuel vendor), the licensee discovered that a similar fuel drop occurred Kuosheng Unit 2. An Exxon 8 x 8 bundle dropped two inches and

7.2.2 Unit 1 Fuel Reload Calculational Error

On May 6, the licensee discovered, during final quality assurance (QA) review of the Unit 2 Cycle 6 (U2C6) reload licensing analysis, an error in the calculation of the technical specification flow-dependent minimum critical power ratio (MCPR) operating limit (OL) curve. The licensee has agreed to correct this error prior to submitting the proposed reload amendment to the NRC prior to the Fall 1992, U2C6 refueling outage. Subsequently, the licensee checked the flow dependent MCPR OL curve for Unit 1 Cycle 7 (U1C7) and determined that the same error existed. Thus, the licensee placed an administrative limiting condition for operation (LCO) in affect to restrict Unit 1 operation to less than 25% core thermal power until resolution of the MCPR OL curve error. The calculational error was identified by the licensee prior to Unit 1 operation above 25% rated thermal power, where Technical Specification MCPR OL curve applies.

The flow-dependent MCPR OL curve is based on the analysis of the design basis recirculation flow controller failure (RFCF) event. A reactor recirculation pump runup would result in a power increase due to void coefficient reactivity feedback, and a resultant decrease in the MCPR margin. The error discovered was contained in the hand calculation of the flow-dependent MCPR OL curve. Specifically, the error involved the equation used to compute the delta-CPR from which the MCPR OL curve is derived. The transient hot bundle delta-CPR is calculated based on reaching a minimum CPR equal to 1.0. PP&L's methodology requires that a 4% uncertainty (i.e. 1.04 factor) be applied to the relative change in CPR (CPR = delta CPR/initial CPR). From the adjusted RPCR the final delta-CPR is calculated and added to the MCPR safety limit (equal to 1.06). However, analyses show that a transient initiated from a higher initial MCPR results in a higher value of the calculated delta-CPR, compared to the identical transient initiated from a lower initial MCPR. This aspect of the delta-CPR calculation was omitted in the calculation for U1C7. Therefore, the flow-dependent MCPR OL for U1C7 was calculated incorrectly, and resulted in an incorrect Technical Specification Figure 3.2.3-1. The other U1C7 limiting transient analyses were checked for similar errors, none were found.

On May 15, the licensee completed preparation of a new flow-dependent MCPR OL curve based on the correct calculation. The new curve was entered into the Powerplex core monitoring system. PP&L imposed additional compensatory action for conservatism by committing to reduce power below 25% if the main turbine bypass system becomes inoperable.

These proposed actions were reviewed and approved by the plant operations review committee. Subsequently these actions were discussed with and were found to be acceptable by the NRC. The licensee committed to submit a Technical Specification change by May 22 and to maintain administrative controls until the change was approved by the NRC.

The licensee identification of the problem, communication with the NRC, and their conservative approach in resolving the error was a strength. However the U1C7 calculational error resulted in a incorrect Technical Specification Figure 3.2.3-1. This was considered a weakness. The licensee is planning a quality program review for the Nuclear Fuels Department reload analysis program to occur over an approximate six month period. As an interim measure, the fuel vendor will independently review the U2C6 reload analysis prior to submittal to the NRC. These actions were good.

8. SAFETY ASSESSMENT/QUALITY VERIFICATION

8.1 Licensee Event Reports (LER), Significant Operating Occurrence Report (SOORs), and Open Item (OI) Followup

8.1.1 Licensee Event Reports

The inspector reviewed LERs submitted to the NRC office to verify that details of the event were clearly reported, including the accuracy of the description of the cause and the adequacy of corrective action. The inspector determined whether further information was required from the licensee, whether generic implications were involved, and whether the event warranted onsite followup. The following LERs were reviewed:

Unit 1

92-005-00 Leakage through both the inboard and outboard Main Steam Isolation Valves (MSIVs) exceeded the total Technical Specification limit for Main Steam Line (MSL) containment penetration leakage. On March 19, MSL Local Leak Rate Tests (LLRTs) performed during the unit's sixth refueling and inspection outage revealed 'as found' leakage of 51.7 standard cubic feet per hour (SCFH). The Technical Specification limit is 46.0 SCFH. The high leakage rate was attributed to a combination of all MSIVs. No definitive cause could be determined. Prior inspection of MSIVs failed to reveal unusual conditions. As a result, the "A" outboard MSIV was disassembled, the stem replaced, and the seat lapped. In addition, the "C" MSL inboard and outboard valves were stroked. Retesting following reworking of the valves demonstrated leakage was reduced to 21.23 SCFH.

92-007-00 Primary power supplied to the "B" Reactor Protection System (RPS) was interrupted when both of its Electrical Protection Assembly (EPA) breakers unexpectedly tripped. This interruption resulted in Primary Containment Isolation System actuations and automatic system initiations including the automatic actuation of "A" and "B" Standby Gas Treatment Systems and one control rod being inserted. However, there were no consequences of the rod insertion due to the reactor being defueled.

The EPA breakers for the RPS bus are in series and the trip of the upstream breaker caused the downstream breaker to trip. No failed components were found in the upstream logic card. However, the logic card was replaced with a card that had a component lifetime upgrade. The previously installed card was returned to the manufacturer for analysis. This particular logic card had been scheduled for replacement by the end of the current outage due to a previous trip. Prior to this event, licensee efforts were underway to perform component lifetime upgrades for those EPA logic cards with limited lifetimes used at the station. These upgrades include the replacement of failed components and components more susceptible to failure with age.

92-008-00 Unplanned ESF actuations of the RPS logic occurred due to spurious neutron monitoring instrumentation induced noise upscale signals. At the time the RPS was in the non-coincident trip mode to permit control rod testing. The spurious signals initiated full RPS logic actuations. Section 1.1 pertains. The licensee is performing an investigation of similar problems in the industry to determine how time can be minimized when the RPS in vulnerable to noise induced instrumentation signals.

Unit 2

92-002-00 High Pressure Coolant Injection (HPCI) system inoperable when the turbine overspeed reset mechanism failed to function properly. On April 22, with the unit at 100% power, HPCI was determined inoperable following a quarterly flow surveillance. The turbine overspeed tappet assembly failed to automatically reset due to binding. The tappet head experienced binding resulting from being installed in an environment of oil, moisture, and elevated temperatures. A modified mechanical overspeed trip tappet assembly was installed in the Unit 2 HPCI turbine as well as Unit 1 HPCI and Reactor Core Isolation Cooling (RCIC) turbines. The Unit 2 RCIC turbine overspeed tappet will be installed during the next refuel outage.

The inspector determined from review of LERs that actions taken or planned by the licensee were extensive and properly evaluated including the consideration of generic implications. Analysis for cause and corrective action were thorough and appropriately implemented.

8.1.2 Significant Operating Occurrence Reports

SOORs are provided for problem identification and tracking, short and long term corrective actions, and reportability evaluations. The licensee uses SOORs to document and bring to closure problems identified that may not warrant the issuance of an LER.

The inspectors reviewed the following SOORs during the period to ascertain whether: additional followup inspection effort or other NRC response was warranted; corrective action discussed in the licensee's report appears appropriate; generic issues are assessed; and, prompt notification was made, if required:

Unit 1

10 SOORs reviewed from SOOR numbers 1-92-162 through 1-92-216.

Unit 2

5 SOORs reviewed from SOOR numbers 2-92-044 through 2-92-052.

The following SOORs required inspector followup:

Unit 1

1-92-188	Documented the RWCU system isolation due to high flow. Section 1.2 pertains.
1-92-203	Documented high vibration on the no. 5 main turbine generator bearing. Section 1.2 pertains.

The inspector had no further questions.

8.1.3 Open Items

8.1.3.1 (Closed) UNR 50-387/89-30-01 Root Cause Determination for Diesel Generator Crankcase Overpressurization

On September 16, 1989, the licensee reported that the "B" Emergency Diesel (DG) generator crankcase ignited and overpressurized during a 24 hour surveillance run. On October 7, 1989 , the licensee reported a similar event on the "C" DG.

The licensee took immediate actions after each event to replace the damaged pistons and return the DG to operable status. However, the NRC was concerned that the cause of the crankcase vapor ignitions was due to a generic failure mechanism. The root cause determination and adequacy of long term corrective actions was considered an unresolved issue pending NRC review.

The licensee investigation into the cause of the overpressurization revealed no single root cause. However, four significant causal factors were identified which included cylinder debris generation, rapid loading following a start during routine testing, high piston pin/bushing friction, and low intake manifold air temperature.

The licensee developed an extensive program to determine the causes for the overpressurization and to enhance DG operation and maintenance. The following areas were included in the corrective actions:

-- Increased inspections. Inspection criteria were developed to be used during maintenance activities. These criteria were strictly adhered to and, as a result, many components with questionable indications were replaced.

-- Design modifications and enhancements. Automatic temperature control values were installed to maintain intake combustion air temperature between 95 F and 125 F, to enhance engine performance. The licensee replaced piston rings, inspected all cylinder liners for evidence of tin transfer, implemented DG reliability program, and chartered a Cooper Owners Group.

-- Improvements in maintenance. New pistons and rings are "broken in" by a 12 hour post maintenance run. An Emergency Diesel Generator predictive maintenance monitoring program was also implemented.

-- Operations. The duration of monthly operability runs was extended from one to four hours to allow engines to reach thermal equilibrium. The 18 month, 24 hour continuous run surveillances are now preceded by a two hour and 15 minute warmup period prior to loading to the two hour maximum overload rating of 4700 kw.

The inspector determined from review of licensee submittals that actions taken were thorough and extensive in determining the causes of the events and implementing corrective actions to assure continuing reliability of the DG's. Based on the review of actions taken, this item is closed.

8.1.4 Contractor QC Inspector Examination Impropriety

The licensee recently completed an investigation of a contract quality control (QC) inspector's alleged improprieties while taking a written certification examination. In this case, a contract QC inspector was taking an examination to certify his capability to perform visual weld inspections. Apparently, during the exam, the proctor left the room and the examinee took the exam he was taking to a nearby copier and made a copy of the exam. Although this exam did not have an answer key attached, this practice was still prohibited by the exam rules.

This impropriety was discovered prior to the Unit 1 - 6th refueling outage by a contract QC supervisor. While returning to the office on February 28, this supervisor saw what he thought was a qualification exam on the individual's desk. Later that afternoon, the supervisor telephoned his out-of-state manager to discuss his observation. He was directed to confront the individual which he did after a one week delay. The supervisor believed that the delay was acceptable since the individual did not have unescorted access, and that he was

working on a critical path pre-outage job. During a subsequent interview, the inspector stated delaying this confrontation was less than acceptable because of the nature of the impropriety. After further consideration, the QC supervisor acknowledged the delay was excessive.

Once the individual was confronted, he admitted he had the examination and gave it to the contract QC supervisor. He also stated that he knew that his actions were contrary to the exam policy. The licensee and contractor QC manager held a conference call on March 6, the same day the individual admitted the impropriety, and decided to terminate the individual as a result of this personal integrity violation. The contractor also agreed to review their examination practices.

In response to this, the contractor committed to upgrade their policies, practices and procedures covering the examination process. These corrective actions included:

-- Terminating the affected individual and revoking all of his non-destructive examination certifications.

-- The copied exam was retrieved and it was removed from the exam bank.

-- The contractor has reviewed the instructions given by the responsible Level III examiner to designated individuals who administer qualification examinations. The Statement of Confidentiality and Testing integrity which has been used in the past as an acknowledgement of a proctor's responsiblity, has been modified to include a statement which specifically addresses the necessity of keeping all individuals being tested under constant visual observation.

-- In addition, each of the individuals currently designated to proctor examiantions were given additional guidance and instructions from the Manager of Training and Certification with emphasis being placed on the following items:

- Importance of having all examinees read and sign the examination ground rules. These rules specifically address actions that are considered unsatisfactory conduct by the examinee.

- Importance of ensuring that all individuals being examined are under the proctor's constant observation and are not to be left unattended for any reason. Each proctor will be required to sign a new Statement of Confidentiality and Testing integrity attesting to their willingness to comply with this requirement.

- Importance of ensuring that all examinations and related materials are kept confidential and in no case are they to be copied, and/or distributed to others except when instructed to do so by the Manager of Training and Certification.

- ♦ Importance of terminating the examination of anyone suspected of cheating during a qualification examination and the reporting of such knowledge to the Manager of Training and Certification.

-- The individual responsible for administering the examination in question was removed from the list of eligible examination proctors.

In addition the licensee, in cooperation with other licensees, conducted a comprehensive audit of the contractor's actions in response to this concern from May 18-22. During this audit, the licensee assessed and evaluated the revised exam practices and concluded that they should preclude recurrence.

The inspector was notified of the incident shortly after it occurred. NRC management and the Office of Investigation (OI) were contacted. After licensee actions were complete, the inspector reviewed them and noted the following:

-- The licensee's actions and their exercise of control of their contractor, following the event, were both extensive and thorough. The discussions that were held between PP&L and the contractor were extremely timely (same day).

-- The contractor's response to the incident was both timely and comprehensive. The aforementioned corrective actions were committed to in a letter from the contractor to the licensee on March 9, one business day after the confrontation. The extensiveness and timeliness of the response indicated that contractor treated the impropriety as serious.

-- The contract QC supervisor acknowledged that the week delay in confronting the individual was excessive. He pledged a more prompt response time for future matters of a sensitive nature.

-- The licensee emphasized the seriousness of this incident in discussions with the inspector.

Based on the actions planned and taken to date, the inspector had no further questions on this matter.

9. MANAGEMENT AND EXIT MEETINGS

9.1 Resident Exit and Periodic Meetings

The inspector discussed the findings of this inspection with station management throughout and at the conclusion of the inspection period. Based on NRC Region I review of this report and discussions held with licensee representatives, it was determined that this report does not contain information subject to 10 CFR 2.790 restrictions.

9.2 Inspections Conducted By Region Based Inspectors

Date	Subject	Inspection Report No.	Reporting Inspector
5/4-8	Erosion/Corrosion	92-05	H. Gray

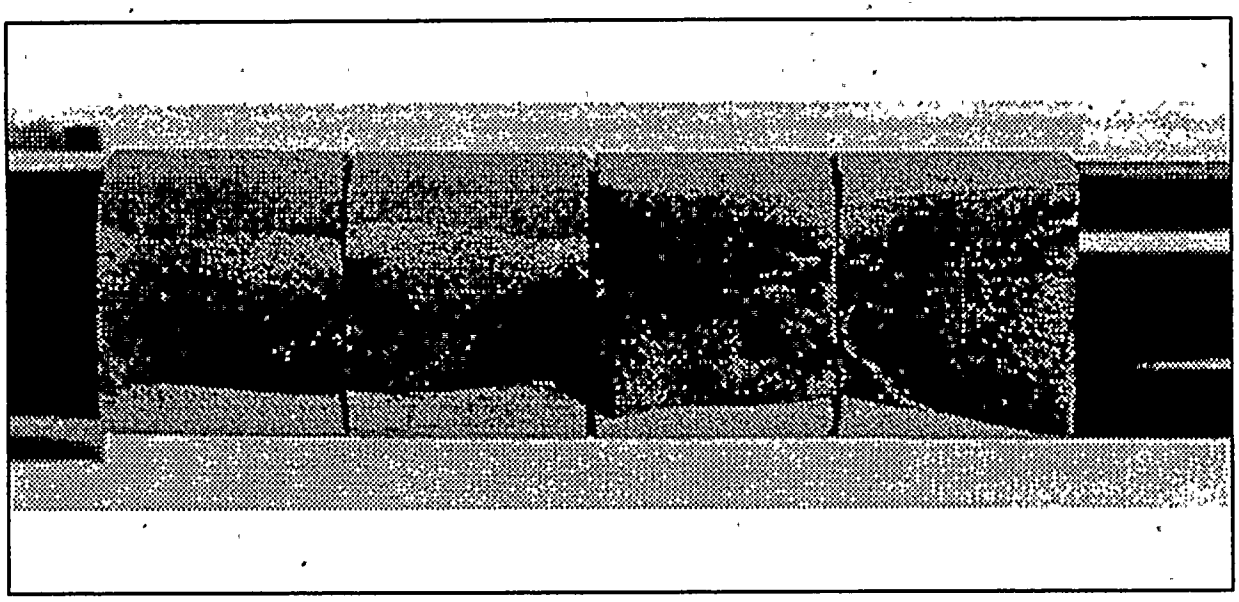

Figure 1. New Fuel Pellet Cracking due to a two inch fuel bundle drop

ATTACHMENT 1

Abbreviation List

AD - Administrative Procedure
ADS - Automatic Depressurization System
ANSI - American Nuclear Standards Institute
ASME - American Society of Mechanical Engineers
CAC - Containment Atmosphere Control
CFR - Code of Federal Regulations
CIG - Containment Instrument Gas
CRDM - Control Rod Drive Mechanism
CREOASS - Control Room Emergency Outside Air Supply System
DG - Diesel Generator
DX - Direct Expansion
ECCS - Emergency Core Cooling System
EDR - Engineering Discrepancy Report
EP - Emergency Preparedness
EPA - Electrical Protection Assembly
ERT - Event Review Team
ESF - Engineered Safety Features
ESW - Emergency Service Water
EWR - Engineering Work Request
FO - Fuel Oil
FSAR - Final Safety Analysis Report
HVAC - Heating, Ventilation, and Air Conditioning
ILRT - Integrated Leak Rate Test
I&C - Instrumentation and Control
JIO - Justifications for Interim Operation
LCO - Limiting Condition for Operation
LER - Licensee Event Report
LLRT - Local Leak Rate Test
LOCA - Loss of Coolant Accident
LOOP - Loss of Offsite Power
MSIV - Main Steam Isolation Valve
NCR - Non Conformance Report
NDI - Nuclear Department Instruction
NPE - Nuclear Plant Engineering
NPO - Nuclear Plant Operator
NQA - Nuclear Quality Assurance
NRC - Nuclear Regulatory Commission
OI - Open Item
OOS - Out-of-Service
PC - Protective Clothing
PCIS - Primary Containment Isolation System
PMR - Plant Modification Request

PORC - Plant Operations Review Committee
PSID - Pounds Per Square Inch Differential
QA - Quality Assurance
RB - Reactor Building
RCIC - Reactor Core Isolation Cooling
RG - Regulatory Guide
RHR - Residual Heat Removal
RHRSW - Residual Heat Removal Service Water
RPS - Reactor Protection System
RWCU - Reactor Water Cleanup
SGTS - Standby Gas Treatment System
SI - Surveillance Procedure, Instrumentation and Control
SO - Surveillance Procedure, Operations
SOOR - Significant Operating Occurrence Report
SPDS - Safety Parameter Display System
SPING - Sample Particulate, Iodine, and Noble Gas
TS - Technical Specifications
TSC - Technical Support Center
WA - Work Authorization