

U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Report No. 88-15

Docket No. 50-352

License No. NPF-39

Licensee: Philadelphia Electric Company
2301 Market Street
Philadelphia, Pa 19101

Facility Name: Limerick Generating Station, Unit 1

Inspection Period: June 1 - July 5, 1988

Inspectors: T. J. Kenny, Senior Resident Inspector
L. L. Scholl, Resident Inspector

Reviewed by: J. H. Williams
J. H. Williams, Project Engineer

7/14/88
Date

Approved by: James Linville
James Linville, Chief, Projects Section 2A

7/14/88
Date

Summary: Routine daytime (135 hours) and backshift/holiday (29 hours) inspections of Unit 1 by the resident inspectors consisting of (a) plant tours, (b) observations of maintenance and surveillance, (c) review of LERs and periodic reports, (d) review of operational events and (e) system walkdowns.

During this inspection period the licensee:

- Operated the plant at 85 to 90% power while monitoring the previously identified fuel leakage.
- Submitted several LERs (section 6.0), the monthly operating report (section 5.0).
- Conducted a Reactor Core Isolation Cooling System maintenance outage.
- Replaced defective motor control center bus bars.
- Performed minimum flow tests on core spray pumps.
- Corrected feedwater heater level control problems.

DETAILS

1.0 Persons Contacted

Within this report period, interviews and discussions were conducted with members of licensee management and staff as necessary to support inspection activity.

2.0 Operational Safety Verification (71707, 70709, 71710 and 71881)

2.1 Documents Reviewed

- Selected Operators' Logs
- Shift Superintendent's Log
- Temporary Circuit Alteration Log
- Radioactive Waste Release Permits (liquid and gaseous)
- Selected Radiation Work Permits (RWP)
- Selected Chemistry Logs
- Selected Tagouts
- Health Physics Log

- 2.2 The inspector conducted routine entries into the protected areas of the plant, including the control room, reactor enclosure, fuel floor, and drywell (when access is possible). During the inspection, discussions were held with operators, technicians (HP & I&C), mechanics, security personnel, supervisors and plant management. The inspections were conducted in accordance with NRC Inspection Procedures 71707, 71709, 71710 and 71881 and affirmed the licensee's commitments and compliance with 10 CFR, Technical Specifications, License Conditions and Administrative Procedures.

No violations were identified.

2.2.1 Engineered Safety Feature (ESF) System Walkdown: (71710)

The inspectors verified the operability of the selected ESF system by performing a walkdown of portions of the system to confirm that system lineup procedures match plant drawings and the as-built configuration. This ESF system walkdown was also conducted to identify equipment conditions that might degrade performance, to determine that instrumentation is calibrated and functioning, and to verify that valves are properly positioned and locked as appropriate. The inspectors also utilized methods prescribed in a study prepared for the NRC by Brookhaven National Laboratory using the Limerick Probabilistic Risk Assessment (PRA). The study, entitled PRA-Based System Inspection Plan, dated May 1986, provides inspection guidance by prioritizing plant safety systems with respect

to their importance to risk. An abbreviated system checklist on Table 11-3 which identifies components that are considered to have a high contribution to risk as determined in the PRA was also used. Accessible portions of the standby liquid control system were inspected.

The following procedures, drawings and tests were also reviewed:

S48.1.1	Standby Liquid Control System Set-up for Normal Operation
S48.9.A	Routine Inspection of Standby Liquid Control System
S48.1.A (COL)	Equipment Alignment to Place Standby Liquid Control System in Normal "Standby" Condition
IV 48	Instrumentation Valve List
ST-5-048-800-1	SBLC Sodium Pentaborate Concentration Analysis
Drawing M-48	P&ID Standby Liquid Control
Procedure A-8	Locked Valve List

The inspector also reviewed the tank chemistry analysis results and verified they were in compliance with Technical Specification 4.1.5 for frequency and specification. Technical Specification surveillance requirements for tank and piping temperature monitoring and for tank level were also verified.

The inspector identified a discrepancy that several instrument root valves did not appear on the system check off list or instrument lineup. The licensee immediately verified the valves were in the correct position and added them to the instrument valve list.

The inspector had no further questions concerning this system.

2.3 Inspector Comments/Findings (93702)

The inspector selected aspects of the unit's operation to determine compliance with the NRC's regulations. The inspector determined that the areas inspected and the licensee's actions did not constitute a health and safety hazard to the public or plant personnel. The following are noteworthy areas the inspector researched in depth:

On June 1, at 7:58 p.m., during a severe thunder storm, a spike occurred on 'D' channel of the control room chlorine detector causing a control room ventilation isolation. All other channels of the detection system were normal. The licensee determined that the alarm was spurious, reset the tripped condition and returned the

systems to normal. The licensee notified the NRC of this event on the Emergency Notification System (ENS) as required.

On June 7, the licensee reduced power from 90% to 85% in order to further reduce power in the fuel bundles which may be susceptible to crud induced localized corrosion (CILC) failures. Recommended maximum power levels provided by General Electric are based on operating experience at other plants. When operated at power levels in accordance with these recommendations CILC induced failures have not been experienced. The 5% power reduction ensures power levels are in accordance with the guidelines provided by General Electric.

At 11:45 a.m., on June 9, while performing a special test on D-13 Emergency Diesel Generator, the diesel inadvertently started. The licensee was performing a special test to evaluate a slow start capability of the diesel and during the installation of special test equipment the diesel started when a control circuit terminal block connection was loosened. Subsequent licensee investigation of the event also revealed a faulty tachometer (which initiates auxiliary start features as the diesel accelerates to speed). During the replacement of the tachometer the instrument technician was demonstrating the operation of the tachometer relay to the QC inspector and was unaware that the operator had already replaced the fuses for the relay. This resulted in an inadvertent start of the diesel's associated emergency service water (ESW) pump. The licensee event report associated with this event will be reviewed in a future report. The NRC was notified of both the diesel and ESW pump start on the ENS as required.

On June 10, power was reduced to approximately 70% when problems were experienced with the 5C feedwater heater drain valve controller resulting in a high feedwater heater level condition. Control circuit calibrations were performed and a defective level switch was repaired. The heater was returned to service and reactor power was increased to 85% power late on June 11. Several hours later on June 12 the 5C feedwater heater automatically isolated due to high water level. Additional drain valve controller tuning was performed to eliminate excessive level oscillations, the heater was returned to service and power was returned to 83% by approximately 9:00 a.m. on June 13. No further level control problems were observed.

On June 13, the licensee announced it is currently rebidding the plant security contracts at both the Peach Bottom and Limerick nuclear power stations with the primary objective of the rebidding to increase the efficiency and the consistency of the company's nuclear plant security operations by placing both under a single contractor. The bids are expected to be awarded by July 8 and the new Limerick contract will begin on October 1. The NRC is monitoring licensee actions in this area for any potential effects on the plant security.

On June 20, PECO announced it will implement a new comprehensive drug policy which provides for random testing of all executives and employees granted unescorted access to its nuclear facilities, and the mandatory termination of anyone found selling, distributing or using drugs on PECO premises. The new policy provides for random drug testing at least once during the next year with no prior notification for employees with nuclear unescorted access clearance. Such clearance allows an employee to be admitted to certain areas of a nuclear plant without escort.

Initial testing will be done between August 1 and September 30, 1988. Periodic drug testing will be conducted thereafter with employees being informed in advance that they will be tested once during a specific three-month period, but without advance notice of when during the period the test will occur.

On June 21, at 4:32 a.m., a Unit 1 security guard was observed sleeping by two Unit 2 construction watchmen. Security supervision was notified and guard was immediately relieved. Sweeps of the entire plant were conducted and no discrepancies were found. The NRC was notified via the ENS as required.

At 2:07 p.m., on June 27, a channel B reactor enclosure isolation occurred. The inadvertent isolation occurred while performing a surveillance test on A reactor enclosure isolation channel. The test was repeated but the licensee could not duplicate the problem. It is suspected that an isolation valve, which is required to be shut to perform the test, was not shut fully. After repositioning the valve the surveillance was performed satisfactory. The NRC was notified via the ENS as required.

On July 4, Mr. Martin McCormick, Jr. assumed the duties of Plant Manager. He previously held the position of Maintenance Division Manager for nuclear operations and electric production. Since the reassignment of the previous Limerick plant manager Mr. G. Leitch, Vice President-Limerick, had assumed the plant manager duties.

The inspector reviewed the potential impact that the recent dry weather could have on plant operation. The use of water from the Schuylkill River for cooling tower makeup is restricted when flow decreases below 530 cubic feet per second (cfs) or when dissolved oxygen levels drop below specified limits. To compensate for low flow or dissolved oxygen levels water is released from upstream reservoirs. Based on existing reservoir reserves plant operations could continue for approximately 100 days after river conditions necessitate release from the reservoirs. If the Titus and Cromby fossil generating stations are also operating approximately 75 days of reserve water is available to support Limerick.

During the inspection period dissolved oxygen levels required reservoir releases for several days and by the end of the period river flow had decreased below 530 cfs requiring releases on a daily basis.

2.4 Followup on Outstanding Inspection Items

(Closed) Deficiency 87-07-01. This deficiency was written when, during a simulator examination, the senior reactor operators had difficulty in reentering Emergency Operating Procedures (TRIPs) after exiting them following subsequent reentry conditions. Generic Letter 82-33 (NUREG-0737) Supplement I requires that operators be trained in accordance with Emergency Protection Guidelines for upgraded TRIP procedures. The licensee has conducted training in this area for all licensed personnel. The resident inspector reviewed documentation of the training, which conforms with the Generic Letter 82-33, that has been conducted twice since the March inspection of 1987. This item is closed.

(Closed) Deficiency 87-07-03. This deficiency was written when communication of authority and responsibility between the shift supervisor and shift superintendent was demonstrated unsatisfactory. The event contributed to the failure of four SRO candidates. The resident inspector has reviewed documentation of retraining in this area including a video tape and a procedure QPS MAN 6.2 which delineates methods of communication to ensure reliable and accurate transmission of information. This item is closed.

(Closed) Deficiency 87-07-04. This deficiency was written when RO and SRO candidates demonstrated unsatisfactory performance using procedure GP-8, Containment Isolation Reset. The inspector verified that the licensee has conducted additional training with all licensed personnel, in the use of procedure GP-8. The licensee has entered this training into the two year retraining cycle to reinforce the licensed personnel knowledge concerning containment isolation. This item is closed.

2.5 Fuel Leak

As discussed in report 50-352/88-08, the licensee identified evidence of a fuel leak on March 25. During the inspection period reactor power has been limited to approximately 85% in order to minimize the potential for additional cladding degradation.

Dose equivalent iodine in the reactor coolant and offgas system activity remained relatively constant during the period and are less than 5% of the Technical Specification limits. The resident inspectors will continue to monitor licensee actions.

2.5 NRC Bulletin 88-07: Power Oscillations in Boiling Water Reactors (92703)

The power oscillation event which occurred at LaSalle Unit 2 on March 9, 1988 was reviewed with licensee personnel to determine if there were any immediate safety implications for Limerick. The oscillations at the LaSalle plant occurred following a dual recirculation pump trip. The immediate action in Limerick procedure OT-112, Recirculation Pump Trip, instructs the operator to insert control rods as required to prevent a reactor scram. This action is recommended by General Electric in Safety Information Letter (SIL) No. 380, Revision 1, to minimize the possibility of experiencing sustained power oscillations.

Additional procedure clarifications are being prepared in response to the bulletin and will be reviewed in a future report.

2.7 Motor Control Center Bus Bar Failure

On June 13, a fault occurred on the D144-R-H motor control center (MCC) which caused its feeder circuit breaker to trip. The fault was due to arcing between the MCC bus bars which occurred when the B reactor enclosure cooling water (RECW) pump was started. The fault apparently was the result of a deteriorated electrical connection where the motor controller stabs engage the vertical bus bars.

The defective motor controller was removed and the MCC was re-energized within about one hour. Due to damage caused by the fault, the bus bars which supply the B RECW pump were replaced on June 15.

The vertical bus bars are constructed of aluminum, and it is suspected that when large electrical loads are operated, the aluminum bus cannot adequately conduct the heat from the contacts, and gradual deterioration of the connection results. The vendor, Eaton Corporation (Cutler-Hammer), indicated potential reasons for stab interface failure could be:

1. High ambient levels of vibration.
2. Long high current starting times.
3. Excessive wear on aluminum bus plating due to frequent unit insertion and withdrawal.
4. Vertical bus or stab clip plating deterioration. This could be original plating defects or degradation of plating due to corrodents in the atmosphere.

The vendor recommends that the aluminum bus bars be replaced with copper bars to alleviate this condition.

During the corrective maintenance the licensee also measured the contact resistance for all of the motor controllers in the D144-R-11 MCC. The resistance readings were in the range of 0.001 to 0.004 ohms although one reading was found to be 0.011 ohms. After removing and reinstalling the controller, this contact resistance dropped to the same approximate value as the other controllers.

The licensee subsequently inspected the bus connections for 11 motor controllers installed in other MCC's. These controllers supply power for some of the larger plant loads. Of the 11 inspected, only the 1A instrument air compressor, showed signs of contact deterioration and required the bus bars be replaced. These bus bars were replaced on June 25, with copper bus bars. Several non-safety MCC loads have also experienced contact deterioration.

This condition was previously reported in accordance with 10CFR50.55(e) on the Limerick Unit 2 docket 50-353. That report was made due to similar failures which were experienced at a licensee fossil generating station (Eddystone).

The MCCs at Limerick were previously modified to provide an additional amount of stab engagement on the bus bars and also have seismic clips installed to better secure the motor controller in the MCCs. Based on these features, contact failures were not expected.

As of the end of the inspection period all the size 4 motor controllers, in safety related MCCs, have been inspected and found satisfactory or were repaired. The licensee is continuing to evaluate the results of their inspections and continuity measurements. Additional inspections of non-safety related size four starter connections are planned and inspection of size three starter connections are also being considered.

The resident inspectors will continue to monitor actions taken to resolve this problem.

3.0 Surveillance Observations (61726)

During this inspection period, the inspector reviewed in-progress surveillance testing as well as completed surveillance packages. The inspector verified that surveillances were performed in accordance with licensee approved procedures and NRC regulations. The inspector also verified that instruments used were within calibration tolerances and that qualified technicians performed the surveillances.

The following surveillances were reviewed:

ST-6-052-231-1	A Loop Core Spray Pump, Valve and Flow Test
ST-6-107-590-1	Daily Surveillance Log
ST-6-092-312-1	Monthly D-12 Diesel Run
ST-6-092-314-1	Monthly D-14 Diesel Run
ST-6-020-232-1	D-12 Diesel Generator Fuel Oil Transfer Pump, Valve and Flow Test
SP-ST-014	A Loop Core Spray Pump Minimum Flow Verification Inspection

SP-ST-014 performed flow rate checks on the A and C core spray pump minimum flow lines utilizing a clamp-on ultrasonic flow indication. The A and C pumps share a common minimum flow path. The test was written to gather data to investigate the potential for pump damage due to inadequate minimum recirculation flow as identified in NRC Information Notice No. 87-59: Potential RHR Pump Loss. The test results show that the minimum flow with the pumps operating at shutoff head meets the vendor recommendations.

The subject of adequate minimum pump flows has subsequently become the subject of NRC Bulletin No. 88-04: Potential Safety-Related Pump Loss and the inspectors will follow the licensee actions related to this subject.

No violations were identified.

4.0 Maintenance Observations (62703)

The inspector reviewed the following safety related maintenance activities to verify that repairs were made in accordance with approved procedures, and in compliance with NRC regulations, and recognized codes and standards. The inspector also verified that the replacement parts and quality control utilized on the repairs were in compliance with the licensee's QA program.

<u>Work Order Number</u>	<u>Description</u>
8803565	Motor Control Center D144-R-H Bus Bar Replacement
8883553	Bench Test RCIC PSV-050-1F018
8803263	RCIC Turbine Overspeed Trip Repairs
8803732	Inspection of D134-R-H-01 Bus Connections
8803741	Inspection of D134-R-H-03 Bus Connections

Reactor Core Isolation Cooling (RCIC) System Outage

On June 20, the RCIC system was taken out of service to replace worn parts in the mechanical overspeed trip mechanism. During this repair numerous other minor repairs and preventative maintenance items were also performed. The repair work continued around the clock and the test personnel immediately performed the retest when the final work was completed. The pre-outage preparation, planning and in-process management was good and resulted in a minimal system outage duration.

No violations were identified.

5.0 Review of Periodic and Special Reports (90713)

Upon receipt, the inspector reviewed periodic and special reports. The review included the following: inclusion of information required by the NRC; test results and/or supporting information consistent with design predictions and performance specifications; planned corrective action for resolution of problems, and reportability and validity of report information. The following periodic report was reviewed:

- Unit 1 Monthly Operating Report - May 1988

The inspector had no questions concerning this report.

6.0 Licensee Event Report Followup (90712, 92700)

The inspector reviewed the following LERs to determine that reportability requirements were fulfilled, immediate corrective action was taken, and corrective action to prevent recurrence was accomplished in accordance with technical specifications.

88-016

This LER reports various engineered safety feature actuations due to the loss of power to a Reactor Protection System logic panel as a result of a blown fuse.

This event was previously reviewed and documented in NRC inspection report 50-352/88-13. In addition to the LER stated action of inspecting and replacing the fuse clips, if necessary, the inspector confirmed that the station has requested an engineering review of the design to determine if a plant modification is appropriate to correct the condition.

The inspector had no further questions or concerns related to this LER.

88-017

This LER reports an unplanned isolation of the reactor enclosure along with the actuation of the standby gas treatment system, reactor enclosure recirculation system, and nuclear steam supply shutoff system due to the failure of a system solenoid valve. This event was reviewed at the time of occurrence (Inspection Report 50-352/88-013). The inspector had no additional questions upon review of the report.

88-018 and 88-021

These LERs report automatic actuation of the control room emergency fresh air supply (CREFAS) system, an engineered safety feature, resulting from a chlorine concentration signal believed to be caused by rainwater contacting a chlorine analyzer probe.

The inspectors are following licensee actions related to a plant modification to eliminate CREFAS actuations due to instrumentation spikes. The modification has been delayed because the chlorine probe manufacturer went out of business earlier this year.

88-019

This LER reported several locking springs on Agastat relays which were found missing or unsecured as discussed in previous report 50-352/88-13, section 8.3. This condition may affect the ability of plant systems to perform their safety related functions during or after a seismic event. The licensee is continuing to evaluate the effect of the unsecured clips on the relay's seismic qualification and will report the results in a supplement to the LER. The inspectors had no further questions at this time.

88-020

This LER concerns an isolation of the reactor enclosure secondary containment on low differential pressure due to the inability of the exhaust air fans to maintain differential pressure as a result of a severed instrument air line tube. The tubing supplied air to the blade pitch controller on the B reactor enclosure exhaust fan which is not a safety related component. This event was previously reviewed in report 50-352/88-13, section 2.3. The inspector had no further questions concerning this event.

7.0 Assurance of Quality

During this assessment period the following issues relate to licensee assurance of quality:

- The instrumentation valve list and valve identification program failed to include several standby liquid control system valves (section 2.2.1).

- Continued close monitoring of the fuel leak (section 2.5)
- Prompt action to inspect and correct safety related MCC bus bar problems following the D144-R-H failure (section 2.7), however the potential for such a failure had been identified in February 1988.
- Well managed RCIC maintenance outage resulting in a minimum system inoperability period (section 4.0).

8.0 Exit Interview (30703)

The NRC resident inspectors discussed the issues in this report throughout the inspection period, and summarized the findings at an exit meeting held with the Plant Manager, Limerick Generating Station, on July 7, 1988. No written inspection material was provided to licensee representatives during the inspection period.