

U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Report No. 88-08

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: March 11 - April 30, 1988

Inspectors: T. J. Kenny, Senior Resident Inspector
L. L. Scholl, Resident Inspector
T. P. Johnson, Senior Resident Inspector
L. E. Myers, Resident Inspector

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

5/12/88
Date

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

5/12/88
Date

Summary: Routine daytime (266 hours) and backshift/holiday (28 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:

- Identified a fuel cladding degradation (discussed in section 2.5 of this report).
- Conducted an outage during which the licensee repaired the D and I channel intermediate range monitors, cleaned and leak tested the main condensers, and performed electrical and mechanical maintenance including repacking valves to eliminate steam leaks and condenser air inleakage.
- Conducted a plant start-up.

- Submitted LERs (discussed in section 6.0), one monthly report (discussed in section 5.0) and one security report (discussed in section 2.3).
- Conducted on site meetings with the NRC to discuss the new quality assurance department alignment and reactor coolant water chemistry program, including methods to control impurities in the water and the philosophy for operating with degraded fuel cladding. These licensee initiatives will be assessed during future inspections.
- One violation involving inadequate control of temporary procedure changes is discussed in section 2.4.

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.

One violation was identified (detail 2.4).

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 accessible 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 High Pressure Coolant Injection system was inspected. The following concern was noted.

Information note (tag #55-17) on suppression pool return valve F071 stated that the valve may not open when the

High Pressure Coolant Injection (HPCI) pump discharge pressure is greater than 1000 psig. Discussions with operators determined that the suppression pool mode of HPCI was used for reactor pressure control during the September 19, 1987 scram, however, no operating procedure existed even though this is the normal method of operating HPCI during routine surveillance testing. The licensee identified the procedural need and subsequently revised S.55.1.D to include steps for this HPCI mode. The inspector verified that Rev. 5 dated February 25, 1988 included a procedure step (8.18) for this activity. However, three operators interviewed were unaware of this procedure revision. During discussions with operations management and the HPCI system engineer, the inspector expressed concern that the operators interviewed were not aware of the existence of an approved procedure for the HPCI suppression pool mode of operation. The licensee stated that training was scheduled for the current requalification cycle, however, the licensee took immediate steps to ensure that operators were informed of this HPCI procedural change. The inspector had no further questions. The timeliness and adequacy of training on procedure revisions will be reviewed in a future inspection.

2.3 Inspector Comments/Findings (92706, 93702)

The inspector selected phases 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 March 11, at 8:37 p.m., the licensee informed the NRC of alleged cocaine transactions that took place inside of the Unit 1 protected area. The information was obtained from confidential sources. Four janitorial personnel were interviewed on March 11. One admitted to selling cocaine on site in September 1987 and his employment was terminated. Three other personnel submitted to urinalysis and pending test results, have had their Unit 1 access dropped. Additionally, as part of the licensee's deterrent actions, drug detection dogs were randomly deployed on site March 14 to search selected site locations. An NRC Region I Safeguards Supervisor and the Senior Resident Inspector witnessed the searches. No additional findings were made. Licensee report number 88-S02 was reviewed by the inspector and the corrective actions were found to be adequate.

On March 21, Mr. Thomas J. Kenny assumed the duties of Senior Resident Inspector at Limerick Unit 1. Mr. Eugene Kelly transferred to Region I to assume the duties of Technical Support Section Chief. This is Mr. Kenny's third assignment as a Senior Resident Inspector. Former assignments were Indian Point Stations Unit 2 and 3 and Salem Station Units 1 and 2.

On March 24, at 4:45 a.m., a reactor water cleanup system isolation occurred. The isolation was initiated by the steam leak detection system because of high temperature in the room. The resident inspector conducted a followup inspection including discussions with the licensee during which the licensee stated a relief valve in the regenerative heat exchanger room was leaking past its seat. The valve was replaced and the system returned to operation on March 28. Reactor coolant chemistry remained within technical specification limits during the system outage.

On March 26, at 2:41 a.m., a reactor enclosure isolation occurred due to low differential pressure caused by the tripping of reactor enclosure ventilation fans. The fans tripped when system dampers drifted shut due to instrument air system pressure decreasing below the normal setpoint. A system valve lineup error during restoration from maintenance caused the decreasing air pressure. The air lineup was corrected, the isolation signal was reset, and at 2:47 a.m. the system was returned to normal. Discussions with the licensee identified that the individual involved was relatively new on the job and misunderstood the direction he was given for the valve lineup. He was counseled by the supervision on procedural awareness and the correct method to perform valve lineups.

On March 26, at 6:15 a.m., the reactor water cleanup (RWCU) system isolated on a high differential flow signal. The isolation occurred during a realignment of the system to allow a slow warmup of the 'C' RWCU pump prior to placing it in service. The flow instruments were verified for proper operation, the isolation was reset, and the system returned to service. A modification is planned which will reduce the size of the demineralizer bypass valve to allow better flow control and avoid such transients and the resulting isolations.

On March 25, the licensee noted increased radiation levels at the steam jet air ejectors. Subsequent grab samples indicated the presence of a small fuel cladding leak. No increase in off site release was detected due to the small size of the leak. Reactor coolant dose equivalent iodine levels increased by about a factor of 10 but remained a factor of 100 below the technical specification limit. For more information see paragraph 2.5 of this report.

On April 5, an unannounced emergency planning drill was held. The state and local counties participated in the drill and the NRC observed. For further details see NRC inspection report 50-352/88-09.

On April 6, at 7:27 a.m., a hand gun was found in an employee's personal bag as he was entering the protected area. Security personnel detected the gun with x-ray screening equipment and the individual has been denied access to the plant pending further investigation. The NRC and local police were notified. The person involved stated he forgot to remove the gun prior to entering the plant and did not intend to bring it on site. Subsequent investigations by the licensee and discussions with the resident inspectors and Region I security personnel revealed that the licensee's one hour notification was not necessary because the hand gun never was inside the protected area and testing of the individual indicated there was no intent to commit harm. The individual is working for the licensee outside the protected area and is being evaluated to determine if he may return to his former job.

On April 8, at 2:00 p.m., the licensee began to shutdown the unit for a 10 day maintenance outage. The maintenance outage was primarily to clean main condensers in order to improve plant efficiency. During the shutdown, the licensee located the leaking fuel element in the fuel bundles surrounding control rod 50-23 by the manipulation of control rods. This information enabled the licensee to determine a rod pattern which will minimize power in the failed region during future operation. The reactor was not opened to remove any fuel. A refueling outage is planned for January 1989.

On April 9, at 4:15 a.m., the reactor scrammed from a low power level. During the shutdown the licensee had inserted a one half scram signal on Channel B1 in accordance with technical specifications because of inoperable Intermediate Range Monitors (IRMs). However, during the shutdown sequence a power increase occurred with IRM channel 'C' on range 2 resulting in a high flux scram. The power increase has been attributed to the decrease in reactor coolant temperature caused by the control rod drive water flow and heat losses to ambient. The corrective actions to prevent recurrence will be reviewed in a future report.

At 3:36 p.m., while in cold shutdown with a one half scram signal inserted in A2 channel, a spike was received on 'F' IRM (range 1) causing a B1 channel trip. This was attributed to noise on the channel apparently caused by a welding machine in the area of cables coming from the 'F' IRM channel instrument.

During the scram at 4:15 a.m. the licensee identified that neither the scram pilot air solenoid valves nor the scram discharge volume drain valves functioned as expected while resetting the scram. The licensee conducted testing, using an approved procedure (SP-055 CRDH Scram System Operability Test), to determine why the valves did not operate as expected. Testing showed that when the one half scram signal on the 'B' channel is present the system does not reset as expected and when the 'A' one half scram signal is present the system resets as expected. The reason is that the path for air venting when the 'B' signal is present does not allow the solenoid diaphragms to reposition themselves due to low air pressure. This phenomenon was subsequently found to have been the subject of NRC Information Notice 85-95 and a GE information letter dated May 9, 1972. The licensee reviewed actions taken upon receipt of this information and noted a prior change to procedure GP 11, Reactor Protection System-Scram Reset. However, while the change enabled the operators to recognize the unexpected operation of the CRDH scram system, it did not identify the reason why the system did not function as expected. The licensee has corrected procedure GP 11 to amplify the reason. The licensee also revisited the reasoning behind inserting the one half scram and issued PORC position 36 which clearly defines the reasons for the insertion of the one half scram and the conditions under which it is necessary.

It should be noted that although the licensee made changes to procedure GP-11 in response to information from the NRC and GE, and did recognize the unexpected operation of the system, the information in the procedure was not clear enough for the operator to immediately recognize a known system idiosyncrasy as described in the above mentioned correspondence.

On April 16, a control room chlorine detector momentarily spiked upscale causing a control room isolation. The signal was verified to be spurious by an immediate check of the remaining three detection channels. The control room isolation and emergency fresh air systems functioned per design. A plant modification is planned which will eliminate spurious isolations caused by a single instrument spiking.

On April 16, at 7:55 p.m., a security watchman was found sleeping while on duty. The watchman was immediately relieved and removed from the site. A licensee conducted search of the area did not reveal any discrepancies. A licensee investigation conducted subsequent to the initial NRC notification determined that at the time of occurrence additional compensatory measures were in place due to sun glare on the closed circuit television cameras.

On April 18 the D14 diesel generator inadvertently started during troubleshooting. The start occurred when technicians were performing a continuity measurement in the control circuitry causing a relay in the starting circuit to energize. The diesel started normally and there was no equipment damage or any other undesirable consequences. The resident inspector will review the adequacy of the licensee's actions when the LER is issued.

On April 20, a plant start-up commenced following the completion of the 10 day outage in which the licensee performed main condenser cleaning and selected maintenance. Criticality was achieved at 9:55 p.m. April 20, and the plant was returned to service at 3:26 a.m. on April 22. The delay in the startup was attributed to a newly discovered steam leak on a feedwater heater drain valve. After repairs to the valve the unit power was increased to 85% where the licensee is evaluating the fuel defect and the effectiveness of the control rod pattern in minimizing reactor coolant radioactivity levels.

2.4 D-14 Emergency Diesel Generator Temporary Circuit Alteration

On January 22, a temporary circuit alteration was installed to jumper a defective contact on the remote/local control switch for the D-14 emergency diesel generator. In order to operate the diesel generator in the "local" mode, the jumper must be removed. A change to procedure SE-8, Attachment D, "Safe Shutdown Method D", was issued to instruct the plant operators of this fact. During a review of the main control room copies of procedure SE-8 Attachment D, the inspector noted that the procedure change had not been placed in either of the controlled copies. The failure to assure that procedures were properly updated to reflect the change is a violation of the requirements of Technical Specification 6.8.1 which requires that written procedures be established, implemented and maintained to control various plant activities. Step 5.6 of Administrative Procedure A-3, Procedure for Temporary Changes to Approved Procedures, requires that the proposer of the change assure that the original of the procedure be placed at the work control station, which is the main control room in this case, and/or notifying personnel affected by the change. The failure to implement this requirement resulted in SE-8 Attachment D not being maintained in a current condition.

The licensee subsequently incorporated the change to SE-8 into the controlled copies. The licensee is preparing a change to Administrative Procedure A-3, Procedure for Temporary Changes to Approved Procedures, to strengthen the control and distribution of temporary procedure changes. This change will be reviewed in a future report (50-352/88-08-01).

2.5 Fuel Leak

As discussed in section 2.3 of this report the licensee identified evidence of a fuel leak on March 25. Since the initial identification of the leak, additional sampling has been performed to more closely monitor the magnitude of the leakage and to minimize any effects of the high radioactivity levels in the reactor coolant. Areas which have been subjected to additional sampling are the reactor coolant, main condenser off-gas, stack airborne releases, and in-plant airborne activity. Although the samples have shown increased radioactivity levels, all have been significantly below the technical specification limits.

The cause of the fuel leak has not been determined. One possible cause which has been experienced at other boiling water reactors is crud induced localized corrosion (CILC). Further evaluation will be performed during the next refueling outage.

During the plant shutdown for main condenser cleaning, numerous steam leaks were repaired resulting in reduced in-plant airborne radioactivity levels. Additionally, to minimize the effects of the fuel leak, a control rod pattern has been established which will suppress the power in the area of the core where the defects have been identified. Reactor coolant radioactivity levels were monitored closely as the plant power was increased following the outage. Power is being held at 85% for additional evaluation. The resident inspectors are continuing to monitor licensee actions.

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-6-107-590-1	Daily Surveillance Log
ST-6-092-311-1	Monthly D-11 Diesel Run
ST-6-092-314-1	Monthly D-14 Diesel Run
ST-3-107-790-1	Control Rod Scram Tests
ST-5-070-885-1	Isotopic Offgas Analysis

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>
8800544	D-14 Diesel generator remote/local switch troubleshooting
8801811	D-14 Remote/local switch repair
8801385	Hydraulic control unit wiring inspections
8802156	Hydraulic control unit wiring repairs

4.1 Scram Pilot Valve Wiring

During an inspection of the Unit 2 hydraulic control units (HCUs), deficiencies were found in the scram pilot valve junction box wiring. The types of problems found were:

- improper crimping of lugs
- broken wire strands
- water tight seals on conduit missing

Based on this finding the Unit 1 scram pilot valve junction boxes were inspected and similar problems were identified. The licensee prepared a safety evaluation to determine if the wiring problems adversely affected the safe operation of Unit 1. The safety evaluation concluded that short circuits or open circuits caused by the wiring problems would, in the worst case, result in the scram pilot valves deenergizing, thus fully inserting the control rod. Based on this conclusion and a determination that the wiring problems could not affect the ability of the reactor protection system to automatically scram all of the control rods the licensee determined that Unit 1 could operate safely until the wiring problems are fully evaluated and corrected. The inspector identified a concern that in the event of an inadvertent single rod scram with the plant at full power, prompt operator action may be necessary to ensure technical specification thermal limit requirements are not violated. The licensee revised procedure ON-104, Control Rod Problems, to clarify the immediate operator actions to be taken in the event of a scrambled rod.

During the April 8-22 outage, the wiring for 20 HCUs was reworked. The remainder will be corrected at a future date.

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 - March 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.

88-007

This LER discusses a component failure that rendered the High Pressure Coolant Injection (HPCI) system inoperable for 31 hours and 21 minutes. The failed component, the discharge pressure transmitter, was discovered while conducting quarterly surveillance test ST-6-055-230-1 (HPCI Pump, Valve and Flow Test). The cause of the failure was attributed to the failure of an internal amplifier board. The transmitter was replaced by another of the same model and was tested satisfactorily. Other safety related systems were operable and if required, the HPCI system could have been used without the benefit of a minimum flow valve which was affected by the failed pressure transmitter. The inspector had no further questions regarding this matter.

88-008

This LER discusses the discovery of missing fire rated internal seals in electrical conduit penetrating several fire barriers separating safe shutdown fire areas. Upon discovery, the licensee posted fire watches and patrolled the areas until proper fire seals were installed 23 days later. The licensee has subsequently conducted additional investigations that have not turned up any additional missing seals. Investigations are continuing into the reason for the missing seals which the licensee will report in a supplement to this LER. The LER supplement will be reviewed in a subsequent inspection.

88-009

This LER discusses a reactor water cleanup system isolation as discussed in section 2.3 of this report (March 24). The licensee replaced the relief valve and is investigating the reason for the lifting of the original. The inspector had no further questions.

88-010

This LER discusses a reactor closure isolation as discussed in section 2.3 of this report (March 26). The inspector had no further questions.

88-011

This LER discusses a reactor water cleanup system isolation as discussed in section 2.3 of this report (March 26).

7.0 Assurance of Quality

During this assessment period there were licensee actions in support of assurance of quality as evidenced by the following.

1. The licensee removed the unit from service to perform cleaning of the condensers to increase efficiency and to repair air in-leakage known to be in the minimum flow bypass around the main feed pumps.
2. After identification of the degraded fuel cladding, the licensee took the appropriate action by first assessing the off gas limits and technical specification limits for radioactive releases. Then by reducing power to limit off gas releases and power per linear foot of fuel, and finally by control rod manipulations to identify the location of the degraded fuel.
3. During the plant restart the licensee was very sensitive to limiting power increases and control rod configurations in order to keep the degraded fuel at a lower power level in accordance with NRC guidelines for operating with degraded fuel.

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 Vice President, Limerick Generating Station, on April 28, 1988. No written inspection material was provided to licensee representatives during the inspection period.