U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-352/84-16

Docket No. 50-352

License No. CPPR-106 Priority -- Category B

Licensee: Philadelphia Electric Company

2301 Market Street

Philadelphia, Pennsylvania 19101

Facility Name: Limerick Generating Station, Unit 1

Inspection At: Limerick, Pennsylvania

Inspection Conducted: March 28, 30, April 5, 6 and 9 through 13, 1984

Inspectors: J E Briggs 5/14/84
L. Briggs, Lead Reactor Engineer date

Approved By: L H Bettenhausen 5/16/84
L. Bettenhausen, Chief, Test Programs Section, Engineering Programs Branch date

Inspection Summary:

Inspection on March 28, 30, April 5, 6 and 9 through 13, 1984 (Report No. 50-352/84-16)

Areas Inspected: Routine, unannounced inspection by one region-based inspector (53 hours) of followup of previous inspection findings, preoperational test witnessing, initial emergency diesel generator testing, preoperational test procedure review and verification, and facility tours.
Results: One violation was identified (Test Control - 10 CFR 50, Appendix B, Criterion XI).

DETAILS

1. Persons Contacted

R. Ballou, General Electric Operations Superintendent
* J. Corcoran, Field QA Branch Head
* C. Endriss, Regulatory Engineer
A. MacAinsh, QA Site Supervisor
* W. McCullough, Project Startup Engineer
* J. McElvain, QA Auditor
* K. Meck, QA Engineer
* J. Rubert, Lead QA Engineer
J. Seago, Colt Industries Vendor Representative
J. Stansbury, Startup Group Supervisor
K. Vogel, Startup Engineer

Other NRC Personnel

* J. Wiggins, Senior Resident Inspector

* Denotes those present at the April 13, 1984 exit meeting.

The inspector also contacted other members of the licensee's technical and quality control staff during the inspection.

2. Followup of Previous Inspection Findings

(Closed) Unresolved Item (84-04-02) - Licensee to determine whether recirculation pump motor generators (RPMG) will runback on a loss of condensate flow if feedwater flow is above 90 percent or 65 percent. The FSAR stated 90 percent, while IP-64.1, "Reactor Recirculation System" preoperational test procedure stated 65 percent. The licensee determined that 90 percent was the correct value and revised IP-64.1 via Test Change Notice (TCN) 002 to indicate the correct value.

(Closed) Unresolved Item (84-04-04) - Licensee to incorporate expected runback values of RPMG's in IP-64.1. The licensee revised IP-64.1 to include the expected RPMG runback values in TCN 001. The expected values were derived from RPMG cam shaping data taken during Reactor Vessel Internals Vibration testing. The cam shaping was conducted by Research and Test personnel using G.E. Procedure STI-29X, Recirculation Flow Control System Tuneup.

(Open) Unresolved Item (84-04-03) - License to revise FSAR to incorporate the RPMG low reactor water level runback. The licensee's contractor has initiated Licensee Document Change Notice (LDCN) No. FS-565 from the site requesting the FSAR change. Inspector review of the requested change

indicated that the runback in question had not been incorporated. In addition, RPMG runback on a condensate pump trip with feedwater flow greater than 90 percent, a correct value, was requested to be changed to 65 percent. The inspector discussed the above at length with licensee management. The final documents had not yet been approved or issued and will be reviewed during a subsequent NRC inspection.

(Closed) Unresolved Item (84-07-01) - Licensee to provide a listing of preoperational test procedures or systems associated with each reactor vessel instrument listed in FSAR Section 7.7.1.1. The licensee provided two system drawings (M-41, Revision 27 and M-42, Revision 17) which detailed reactor vessel instrumentation. The drawings were marked up to indicate which instrument was considered to be within the scope of testing for each associated system. The above information satisfied the inspector's concern that instruments not tested under IP-80.1, Reactor Vessel Instrumentation were scheduled to be tested under their associated system preoperational test.

During NRC:RI Inspection 50-352/84-07, the inspector noted that IP-32.1, "Control Room HVAC System" required control room air leakage to be tested under Technical Test (TT) 1.10B, HVAC Air and Hydronic Balance. The inspector noted that TT 1.10B results might not be Test Review Board (TRB) approved subsequent to testing. A review of TT 1.10B showed it to be a TRB approved (March 22, 1984) procedure which requires a results review by the TRB.

The inspector had no further questions concerning the above item at this time.

3. Preoperational Test Procedure Review and Verification

The following procedures were reviewed in preparation for test witnessing, technical and administrative adequacy and for verification that testing is planned to adequately satisfy regulatory guidance and licensee commitments. The procedures were reviewed to verify licensee review and approval, proper format, technical adequacy, test objectives, prerequisites, initial conditions, test data recording requirements and system return to normal.

-- IP-13.3, Fire Protection Foam System, Revision 0, TRB approved April 2, 1984;

-- IP-28.1, Diesel Generator Enclosure HVAC System, Revision 0, TRB approved April 6, 1984; and,

-- IP-78.2, Power Range Neutron Monitoring System, Revision 0, TRB approved April 5, 1984.

The inspector found the above procedures satisfied the applicable criteria. He had no further questions.

4. Witnessing of Preoperational, Vendor and Operations Tests

4.1 Test Witnessing

Test witnessing by the inspector included the observations and overall crew performance identified in Paragraph 3.2 of NRC:RI Inspection Report 50-352/84-04.

4.2 Preoperational Test Witnessing

4.2.1 Reactor Recirculation System (IP-64.1)

The inspector observed the Recirculation Pump Trip Breaker 'A' control circuit testing. The inspector noted that testing was being conducted in accordance with the procedure and that QC witness points were initialed and dated as required. The inspector also reviewed (on a sampling basis) the effective TCN's and test exceptions. Those reviewed were properly filled out and approved.

No unacceptable practices were observed.

4.2.2 Standby Liquid Control System (IP-53.1)

The inspector observed a portion (control and alarm testing of thermocouples) of IP-53.1. The inspector noted that the procedure was being following and that both QC and QA personnel were present. Prior to system restoration, the startup engineer and the QC inspector reviewed the connection diagrams to verify correct electrical connections.

No unacceptable practices were noted.

4.3 Operational Test Witnessing

4.3.1 Source Range Monitoring (SRM) Installation and Handling

The inspector observed the handling and installation of one SRM. The installation was being conducted by operations personnel under construction personnel supervision and instruction. The operation was being performed to teach operations personnel proper handling methods and precautions and to walk through the operations procedure.

The following procedures were in use:

-- SP-FH-006, Handling Outside of the Shipping Container and Testing and Installation of New SRM's and IRM's, Revision 0, (operations procedure);

-- G.E. Specification 22A4211, Nuclear Instrument Installation Instruction, Revision 0; and,

-- Vendors Manual GEK 13962J.

In addition, a Bechtel Mechanical QC inspector was present to verify proper handling and procedure adherence (QCIR MI-QCGI, Log 157). The inspector questioned the health physics (HP) technician concerning radiation surveys and swipe samples and observed those in progress. Radiation readings were zero (0) and no loose contamination was detected from counted swipe samples.

No unacceptable practices were observed.

4.3.2 Operational Hydrostatic Test

The inspector discussed the conduct of the hydrostatic test with the PECo test engineer and reviewed the preliminary data. The test was being conducted using SP-GP-001, Revision 0, Operational Special Hydrostatic Test. The data indicated that total leakage was approximately 5 GPM at 1000 psig. Leakage was observed and documented on:

- 23 CRD mechanisms from 6 to 200 drops/minute;

- 15 valve packings inside containment from 10 to 120 drops/minute; and,

- 4 valve packings outside containment from 30 drops/minute to small steady stream.

The inspector asked about stem leakage from the recirculation loop isolation valves. The licensee explained that stem leakage from those valves could not be visually observed since it is hard piped (observed during plant tours) to the drywell sump. He also explained that they were in the process of quantifying the drops/minute into pints/minute. If the total amount of visible leakage could be determined, the remainder would be from the recirculation system isolation valves.

The inspector had no further questions concerning the conduct of this test.

4.4 Vendor Testing of Engineering Diesel Generators

The inspector continued observation of initial vendor (Colt Industries, Fairbanks Morse Engine Division) checkout and operation of the 'A' and 'C' Emergency Diesel Generators (EDG) on March 28 and 30, April 6, and 9 through 12, 1984. Testing was being conducted as discussed in Paragraph 2.2 of NRC:RI Inspection Report 50-352/84-07.

4.4.1 Problems Experienced and Resolution

'A' EDG

-- The EDG experienced hunting problems when started with speed control on the electrical governor. A minor adjustment was performed on the electric governor feedback circuit and the hunting stopped. The licensee proceeded, after making the above feedback adjustment, to place the EDG on the line for initial load tests. About 5 to 10 seconds after output breaker closure the breaker tripped, reason unknown. The inspector had observed a positive kilowatt pickup by the generator immediately after the output breaker was closed but suspected a reverse power trip because of reverse wiring problems noted on other equipment and discussed in NRC:RI Inspection Report 50-352/84-07. Subsequent licensee investigation found two wires internal to the General Electric supplied reverse power relay were reversed such that a reverse power was sensed when load was picked up by the EDG. The licensee corrected the reverse power relay wiring problems via the Temporary Modification procedure in all diesel generator breakers. Further followup is discussed in NRC:RI Inspection Report 50-352/84-14. Fuel load testing of 'A' EDG was completed on April 1, 1984. The licensee considered the hunting discussed above to be a problem since the electrical governor had controlled speed satisfactorily on a previous no load run. The Woodward Governor vendor representative was contacted to perform electrical and mechanical governor adjustments to preclude further problems. These adjustments were made on March 30, 1984.

The Woodward vendor in conjunction with the Colt/Fairbanks Morse vendor and the licensee also established a procedure/checklist titled EGA and EGB Governor Initial Setup and Checkout for Standby Diesel Generators, QC approved on April 4, 1984, to be used for initial governor setup and checkout of the remainding three (3) Unit 1 EDG's.

No problems were encountered by the Woodward vendor during the 'A' EDG governor checkout.

'C' EDG

-- 'C' EDG was tested (April 6 through 9) through 100 percent load on the mechanical governor without incident.

-- Vendor representative tripped the EDG when he noticed jacket cooling water and lube oil temperature increasing. This event is discussed in detail in Paragraph 4.4.2, Findings, below.

-- On April 11, 1984, the EDG was started to conduct adjustment and testing of the electrical governor. This was of particular interest since the EDG had not responded to the electrical speed adjust control at the local (EDG bay) panel on a previous attempt as noted in NRC:RI Inspection Report 50-352/84-07. Previous discussion with the Woodward vendor representative indicated that the electrical governor may have been calling for a very high speed and actual speed control is by the lowest called for speed from the mechanical or the electrical governor. During the previous attempt to control by the electrical governor, the operator did not hold the local speed adjust control in the decrease direction long enough to allow the electrical governor to call for a speed lower than the mechanical governor, therefore, no control was apparent. During this attempt, control was taker by the electrical governor. However, a problem was experienced. As part of the governor setup, once control is on the electric governor, the mechanical governor is set on its high speed stop (945 RPM) and a speed control range verification from 58.5 to 61.5 hertz is conducted using the electrical governor. When speed was raised to 61.5 hertz it would drop back to 61 hertz and could not be raised, speed control in the reduce speed direction was available. Subsequent investigation showed the mechanical governor high speed stop was set at 61 hertz and was taking control when the electrical governor was raised above 61 hertz. The mechanical governor high speed stop was readjusted to 945 RPM (63 hertz) and electrical governor checks were completed satisfactorily.

-- An additional problem was experienced on April 12, 1984 when the EDG testing had to be secured because diesel exhaust was being drawn into the reactor building by the reactor building ventilation intake which is almost directly above the EDG building. The licensee has issued a Startup Field Report No. 24A-37 requesting an engineering resolution of this problem.

The inspector had no further questions on the above.

4.4.2 Findings

On April 10, 1984 at 9:45 a.m., the 'C' EDG was started in preparation for electrical governor adjustments and checks. At 9:49 a.m., the load had been increased to 100 percent (2850 KW) on the mechanical governor. The vendor representative noticed lube oil temperature at 170°F and increasing during his system status checks and at 9:56 a.m. had load reduced and the 'C' EDG tripped.

It was quickly determined that the diesel had been operated at full load without cooling water (emergency service water or service water). Subsequent discussion with the licensee and review of the previous evening's testing activities by the inspector disclosed the following:

1. 'C' EDG cooling water was being supplied by the service water system. This is an abnormal line up which required the removal of M11-1011 and M11-1007 check valve interrals. Normal cooling water is supplied by Emergency Service Water.

2. Service water flow balancing was being conducted on a backshift on April 9, 1984. The flow balancing required valve M11-1006 to be closed (isolated flow to all EDG's). This valve was left in the closed position after testing.

3. Cooling water flow to the EDG's is normally verified by observation of inlet and outlet cooling water pressure gages which read pressure drop across the lube oil and jacket cooling water heat exchangers. These gages are 0 to 300 psig gages. Readings with flow, under the current system lineup, are about 85# inlet and 80# outlet. Readings on April 10, 1984 were 60 to 65 psig on each gage.

4. The emergency diesel generator checkout procedure requires that cooling water flow be established and verified but does not give guidance on determining cooling water flow.

The above combination of factors led to inadequate test control by the responsible test personnel on April 10, 1984 when all test prerequisites were not adequately verified as having been met and resulted in 'C' EDG being run without cooling water.

This is a violation of 10 CFR 50, Appendix B, Criterion XI (352/84-16-01).

Subsequent EDG checks did not reveal any damage to the 'C' EDG by this event.

5. Plant Tours

The inspector made several tours of various areas of the facility to observe work in progress, housekeeping, cleanliness controls and status of construction and preoperational testing activities.

No unacceptable conditions were identified.

6. Exit Interview

A management meeting was held on April 13, 1984, to discuss the inspection scope and findings as detailed in this report (see Paragraph 1 for attendees). No written information was provided to the licensee at any time during the inspection.