U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-352/84-71

Docket No. 50-352

License No. NPF-27 Priority -- Category C

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

Facility Name: Limerick Generating Station

Inspection At: Limerick Pennsylvania

Inspection Conducted: December 5-31, 1984

Inspectors:

D. Florek, Lead Reactor Engineer — 3/8/85 date

L. Briggs, Lead Reactor Engineer — 3/8/85 date

S. Kucharski, Reactor Engineer — 3/11/85 date

H. Kerch, Lead Inspector — 3/12/85 date

J. Durr, Chief, Materials and Processing Section — 3/12/85 date

R. Nimitz, Senior Radiation Specialist — 3/12/85 date

M. Miller, Radiation Specialist — 3/13/85 date

K. Manoly, Lead, Reactor Engineer — 3/12/85 date

H. Gray, Lead Reactor Engineer — 3/12/85 date

Approved by:

L. Bettenhausen, Chief,
Test Programs Section, DRS — 3/22/85 date

Inspection Summary: Inspection on December 5-31, 1984 (Inspection Report No. 50-352/84-71

Areas Inspected: Routine, onsite, unannounced inspection on previous inspection findings; startup test program including procedure review, test results evaluation, initial criticality witnessing and overall startup program; preoperational test exceptions; QA/QC interfaces; independent verification of preservice inspection findings and tours of the facility. The inspection involved 146 hours on site and 45 hours in office by eight region based inspectors and one section chief.

Results: No violations were identified.

DETAILS

1. Persons Contacted

Philadelphia Electric Company and Contractors

+R. Chmielewski, LD Scheduling Engineer
+J. Corcoran, Manager, Quality Assurance
+R. Crofton, QA Engineer
J. Doering, Operations Engineer
J. Dolan, Instrumentation and Control Engineer
L. Dryer, QA Engineer
*C. Endress, Regulatory Engineer
J. Ferguson, Radwaste Consultant
P. Fleckser, Startup Test Program Planning
K. Folta, Operations Quality Control (QC) Site Supervisor)
J. Frantz, Assistant Plant Superintendent
+E. Gibson, QA Engineer
*G. Gilbody, QA Engineer
C. Harmon, QA Engineer
M. Held, Quality Engineer
R. Hennessy, QC Site Supervisor
*A. Jenkins, Startup Test Program Supervisor
G. Leitch, Plant Superintendent
*S. MacAinsh, QA Site Supervisor
*J. McElwain, QA Auditor
+J. Moskowitz, ME Division
*J. Murphy, Power Ascension Group Supervisor
P. Pagano, NSSS Test Supervisor
+E. Patel, Field Engineering
*W. Rekito, Regulatory Coordinator
+D. Schmidt, Mechanical Engineer
*F. Sierzega, QC Engineer
+R. Smith, QA Engineer
J. Wiley, Senior Chemist
L. Wink, Lead Shift Test Coordinator
+R. Zong, Senior Metalurgical Engineer

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*R. Borchardt, Reactor Engineer
J. Wiggins, Senior Resident Inspector

*Denotes those present at exit meeting conducted on January 3, 1985, covering results except pre-service inspection.

+Denotes those present at exit meeting conducted on January 3, 1985 covering pre-service inspection.

The inspector also contacted several other licensee and contractor personnel in the course of the inspection including shift supervisors, reactor operators and startup test engineers.

2.0 Previous Inspector Findings

(Closed) Unresolved Item (352/84-67-02): Modification of Master Startup Test Procedures. The inspector reviewed startup test procedures STP-99.3 Revision 1 dated December 19, 1984, STP-99.4 Revision 1 dated December 19, 1984, STP-99.6 Revision 1 dated December 19, 1984, STP-33.0 Revision 2 dated December 19, 1984 and STP-33.2 Revision 1 dated December 19, 1984. The inspector verified STP-1 and STP-33 were included as part of TC-2 and TC-5. This item is closed.

(Open) Follow-up Item (352/84-57-02): Evaluate and resolve open test exceptions from procedure 1P68.1A, "Solid Radwaste System" to ensure system operability, as needed to support low power testing and routine operations. Review of the licensee's resolution of the open test exceptions indicated adequate evaluation and retesting. Presently, two test exceptions remain open, namely Test Exceptions (TE) 25 and 26. The licensee stated these TEs would be resolved and approved by the Test Review Board (TRB) to support low power testing.

(Closed) Follow-up Item (352/84-57-03): Evaluate and resolve open test exceptions from procedure 1P69.1, "Equipment Drain Collection and Storage System", and 1P69.3A, "Liquid Radwaste System" to ensure system operability, as needed to support initial criticality. Review of the licensee's resolution of the open test exceptions indicated adequate evaluation and system restoration. All test exceptions have been closed for these preoperational tests.

(Closed) Follow-up Item (352/84-57-04): Evaluate and resolve open test exceptions from procedure 1P72.1, "Gaseous Radwaste" to ensure system operability, as needed to support low power testing and routine operations. Review of the licensee's resolution of the open test exceptions indicated adequate evaluation, retesting and system restoration. All test exceptions from 1P72.1 needed to support routine operations had been dispositioned and were approved by the TRB. The inspector noted resolution of TE 28, concerning an improved moisture element had been delayed to the first refueling outage. This TE will be tracked by the licensee.

(Open) Follow-up Item (352/84-57-06): Evaluate and resolve open test exceptions from procedures 1P76.1, "Post Accident Sampling" to ensure system operability, as needed to support low power testing and routine operations. Review of the licensee's resolution of the open test exceptions indicated adequate evaluation, system modification and retesting. Presently, TE 5, from 1P76.1 and TE 6 from 1P76.2 remain open. The licensee stated these TEs would be dispositioned and approved by the TRB to support low power testing.

(Closed) Follow-up Item (352/84-68-01): Provide training to Radwaste System operators for the solid and gaseous radwaste systems, as necessary to support initial criticality. The inspector evaluated the licensee's training program for these systems and determined that the subject outlines and reference materials were adequate. The licensee stated that training would be completed prior to initial criticality.

(Closed) Follow-up Item (352/84-45-15): Licensee to verify that adequate documentation is available to demonstrate calibration of the Area Radiation Monitoring Systems. The licensee collected documentation and verified calibration of all ARMs. Inspector review of selected documentation did not identify any concerns. This matter is closed.

(Closed) Follow-up Item (352/84-45-17): Licensee to revise procedures to ensure the requirements of IE Bulletin 80-10 are addressed. Inspector review of procedures indicated the licensee adequately addressed the following open concerns: one lower limit of detection was selected to be used as a criterion for further system review; instructions were provided to notify operations supervision of potentially contaminated systems; and instructions were generated to initiate a 10 CFR 50.59 review of a contaminated system. The following item remains open, will be assigned a new followup item number, and will be reviewed during a subsequent inspection: licensee to select the Unit 2 Systems for sampling which interconnect with Unit 1 in order to identify inadvertent cross-contamination from Unit 1 to Unit 2. These systems should be included in the licensee's IE Bulletin 80-10 sampling program. (352/84-71-03)

(Closed) Follow-up Item (352/84-57-09) Licensee to complete surveillance testing of the Standby Gas Treatment System and Reactor Building Recirculation System to demonstrate system operability. Inspector review of completed surveillance tests and discussions with cognizant licensee personnel indicated the systems were tested to demonstrate their operability. Compliance with the following technical specifications was reviewed: T.S. 4.6.5.3.d.2 and d.3 and T.S. 4.6.5.4.d.2 and d.3. No problems were identified.

3.0 Startup Program

3.1 References

- Regulatory Guide 1.68, Revision 2, "Initial Test Program for Water-Cooled Nuclear Power Reactors".
- ANSI 18.7 - 1976, "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants
- Limerick Generating Station (LGS) Technical Specification
- LGS Final Safety Analysis Report
- LGS Safety Evaluation Report

- NEBO 23A1918, Revision 0, "Limerick 1 and 2 Startup Test Specification"
- LGS Startup Program Schedule
- Administrative Procedure A-200, "Startup Test Procedure Format and Content"
- Administrative Procedure A-201, "Startup Test Procedure Control"
- Administrative Procedure A-202, "Startup Test Implementation"
- Administrative Procedure A-203, "Startup Test Program Personnel Training and Qualification"

3.2 Startup Test Procedure Review

The 13 procedures of Appendix A were reviewed for the attributes as indicated in inspection report 50-352/84-50. No unacceptable conditions were noted.

3.3 Startup Test Results Evaluation

Completed STP-2.1-1 "Pre-Fuel Load Radiation Survey" was reviewed for the attributes listed in inspection report 50-352/84-70 section 3.3. The inspector verified that this review was completed as required per the administrative procedures. Management approval of the test results was issued October 15, 1984. No unacceptable conditions were noted.

3.4 Initial Criticality Witnessing

The inspector witnessed portions of initial criticality activities to assess that:

- Licensee was complying with technical specification requirements for initial criticality
- SRM/IRM instruments were properly calibrated and have appropriate outputs
- SRM shorting links were removed
- Adequate staffing existed
- Appropriate procedures were in use
- Procedure prerequisites were satisfied

- Data was obtained

- Acceptance crit ia were satisfied

The inspector reviewed the following procedures:

- STP-4.1 "In-Sequence Critical", Revision 1
- GP-1 "Preparations for Normal Plant Startup", Revision 0
- GP-2 "Normal Plant Startup", Revision 2

The inspector reviewed the following surveillance tests for the SRM scram and rod block setpoints:

- ST-2-074-600-1 "SRM A Channel Functional Test" Revision 3 Conducted December 14, 1984

- ST-2-074-601-1 "SRM B Channel Function Test" Revision 3 Conducted December 12, 1984

- ST-2-074-602-1 "SRM C Channel Functional Test" Revision 3 Conducted December 12, 1984

- ST-2-074-603-1 "SRM D Channel Function Test", Revision 3 Conducted December 11, 1984

The inspector reviewed ST-2-074-404-1 IRM Channel Calibration Test for:

IRM A - Conducted on September 7, 1984
B - Conducted on September 10, 1984
C - Conducted on September 9, 1984
D - Conducted on September 12, 1984

The inspector reviewed the surveillance tests listed in Appendix B to verify they were conducted prior to entering Operational Condition 2.

The inspector witnessed portions of the licensee PORC meeting on December 20, 1984 to ascertain management review of activities and authorization to proceed to Operational Condition 2.

The inspector reviewed the Rod World Minimizer (RWM) sequence loaded into the computer for compliance with the rod pull sheets of STP-4.1.

The inspector reviewed licensee predictions of estimated critical rod position and shutdown margin in letters:

- Review of RWM Sequence for LGS Unit 1 Cycle 1 and CRD Testing During LGS Unit 1 Startup dated August 24, 1984

- Shutdown Margin Calculation for Limerick Unit 1 Cycle 1 dated December 3, 1984

Control room logs were reviewed.

Findings:

The pre initial criticality activities were adequately accomplished. The surveillance tests reviewed were accomplished prior to entering Operational Condition 2. The licensee management was carefully monitoring those activities necessary to enter Operational Condition 2 and was observed to perform overview checks of alarm/annunciator status on at least two occasions.

The SRM rod block and scram trip settings were lowered as required per STP-4.1. The IRM calibration tests reviewed indicated IRM's were properly calibrated. The RWM sequence was consistent with the control rod pull sheets of STP-4.1.

The inspector observed an official test copy of the following STP's were available for the initial criticality.

- STP-4.1 In Sequence Critical
- STP-6.1 SRM Signal/Noise Minimum Count Rate
- STP-6.2 Approach to Critical SRM Response to Control Rod Drive Withdrawals
- STP-6.3 SRM Non-Saturation Demonstration
- STP-10.1 IRM/SRM Overlap

The inspector verified that the shorting links were removed. The staffing levels in the control room were adequate to conduct the test. The licensee did have a large number of individuals in the control room to witness initial criticality who would not be present normally, and exercised reasonably good control for this event.

The inspector conducted a walkdown of the control room panels prior to entering Operational Condition 2 and observed that RHR minimum flow valve F007B was open rather than in the normally closed position. When brought to the operator's attention, the valve was closed. The valve position did not affect RHR operability since it would have gone to its proper position if an automatic initiation signal was present. The inspector also questioned shift supervision on the reason for the suppression pool to dry well vacuum breaker alarm being lit. Shift supervision dispatched an operator to the local panel and noted all vacuum breakers indicated closed. The licensee then made a suppression pool entry and discovered the reason for the alarm, repaired and recalibrated the faulty switch prior to entering Operational Condition 2.

The inspector observed portions of STP-6.1. The SRMs were observed to have count rates that satisfied the acceptance criteria. No unacceptable conditions were noted.

The inspector independently calculated, using the test procedure, the estimated critical rod pattern and calculated that at 150°F criticality would occur at notch 1954. This was consistent with the licensee. At 2213 hours on December 21, 1984, the licensee placed the Mode Switch in startup and at 2258 hours on December 21, 1984, the licensee began to withdraw control rods. The plant moderator temperature was 150°F. The inspector verified control rod positions after each rod was fully withdrawn using the full core display map. Initial criticality was declared at 0318 hours on December 22, 1984 with 2260 notches withdrawn. The ±1% Δk/k of predicted value was between 1290-2264 notches at 68°F. Post test analysis correction for moderator temperature resulted in a ±1% Δk/k of 1378-2328 notches. In post test discussions the inspector observed that the large number of notches between actual and predicted was in the low worth region. The test acceptance criteria were satisfied.

The SRM/IRM overlap and SRM non saturation tests were witnessed by the Senior Resident inspector and are discussed in his inspection report.

Test results evaluation of the completed tests will be assessed in a subsequent inspection.

3.5 Overall Startup Test Program

The inspector and licensee representatives held discussions regarding the adequacy of baseline data for thermal expansion startup test due to the as-tested condition being hotter than the calculations were based upon. The deviation from the baseline data is utilized as acceptance criteria for subsequent expansion tests. The licensee representative provided FDDR-HH1-0986 dated December 20, 1984 and Bechtel letter dated December 18, 1984 providing revised deflection values or acceptability of the testing as-was conducted.

Specifications 8031-P-319 "Hot Deflection Testing of BOP Piping System" Revision 2 and 8031-P-319 "Installation Inspection and Documentation of Pipe Supports Hangers and Restraints" Revision 17 were also reviewed. The inspector had no further discussions.

The inspector held discussions with the Startup Test Program Supervisor regarding the testing that was conducted or planned testing to satisfy HPCI testing as indicated in FSAR Section 6.3. FSAR Section 6.3 indicates that testing to demonstrate that vortex formation does not occur will be performed with the condensate storage tank level at the transfer level and with the HPCI pumps operating at 5600 gpm. The licensee representative indicated that the testing identified had not been done and knew of no testing currently planned. The licensee representative indicated that he would investigate this area. This item is considered an unresolved item pending resolution. (352/84-71-02).

On several occasions during this inspection the inspector observed large numbers of personnel in the control room. Shift supervision has several times requested that all nonessential personnel leave the control room and requested those in the area to refrain from unnecessary communications. The observations were brought to the attention of licensee management who acknowledged the observation. Previous inspections identified the shift turnover period to be a noisy and distracting period. The inspector observed some improvement in the shift turnover period in this regard. This area will continue to be assessed in subsequent inspections.

4. Preoperational Test Exceptions

During this inspection, licensee resolution of several preoperational test exceptions was reviewed and found acceptable by the inspector. This review was conducted by both resident and region based inspectors. All the initial criticality preoperational test exceptions open in inspection report 50-352/84-70 were found to be acceptable. The following is a listing, by priority, of test exceptions considered open by the inspector and collectively constitute unresolved item 352/84-71-01. Previous unresolved item 352/84-70-01 concerning open test exceptions is closed.

Procedure No.	Short Title	Open Exception No.
Low Power Testing Items		
1P-13.5 (deferred test)	Fire Protection Halon	1 and 2
1P-44.1	Condensate	15
1P-76.1	Process Sampling	5
1P-41.1	Cooling Tower System	6 and 7
1P-83.1 (deferred test)	Main Steam System	6
1P-83.3 (deferred test)	Steam Leak Detection	5
Commercial Operation Items		
1P-41.1	Cooling Tower System	8
1P-7.1	Standby D.C. Lighting	2
1P-85.2	Freeze Protection	2,3,5,6 and 7
1st Refueling Outage Items		
1P-30.1	Control Encl. HVAC	14
1P-62.1	Reactor Vessel and Aux.	6
1P-44.1	Condensate	9 and 12
1P-37.1	Demin. Wtr. Transfer	10

Test Exceptions Considered Closed by the Licensee But Not Reviewed by NRC:RI

1P-34.1 (deferred test)	Reactor Encl. HVAC	13 and 18
1P-16.1 (deferred test)	RHRSW	12
1P-33.1 (deferred test)	Turb. Encl. HVAC	20
1P-76.1 (deferred test)	Process Sampling	4
1P-58.2 (deferred test)	RRCS	7

5. QA/QC Interfaces

The inspector reviewed the following QC Surveillance Reports:

MGH 84-0018
MGH 84-0020
LGE 84-0075
GPH 84-0041
LGE 84-0076
RTW 84-0053

The inspector reviewed the QC witness plans for conduct of ST-4.1 In-Sequence Critical.

The inspector reviewed the QC review of test results for:

STP 1.1-1, 1.1-2, 1.1-3, 2.1-2, 3.1-1, 5.1-1, 5.1-2, 5.2-1, 5.3-1, 5.4-1.

The inspector also ascertained that QC had no backlog of tests to review. The reviews were satisfactorily conducted. No unacceptable conditions were noted.

6. Independent Verification of Preservice Inspection Findings

During the period of December 20-28, 1984 and January 3, 1985, an NRC independent review was performed on reported nonconforming conditions. The licensee identified incomplete penetration welds on the main steam piping lugs and ultrasonic indications in the base material for the RHR piping. An NRC inspector visually examined the main steam piping lugs and the RHR line that contained the elongated indications. The licensee provided copies of nonconformance reports 10440, 10472, and FDDR HH8108 with supporting documentation and safety evaluation reports to the Region I inspector. An in-office review of the documents provided was performed and a telephone conference with the licensee on 12/28/84 discussed the following items:

a. NCR 10472 Linear indications in RHR piping - the reported linear indications were evaluated in accordance with ASME Section XI and found to be acceptable for "use as is".

b. NCR 10440 (81 minimum wall violations) reported minimum wall conditions were evaluated in accordance with ASME Section III and the disposition was "use as is".

c. FDDR HH1-8108 main steam piping lugs (16ea) contained unacceptable indications. An analyses was performed in accordance with 1980 edition of ASME Section III Para. NB-3324. This analysis accepted these lugs "Use as is".

An NRC specialist concluded that the reported "use as is" conditions were acceptable and no safety issues resulted from the above items.

On January 3, 1985, the NRC informed PECO of concerns resulting from this inspection:

a. Preliminary information provided to the NRC was not sufficiently accurate or specific. This lack of sufficiently specific information impaired the agency's ability to make engineering decisions.

b. It was the NRC understanding that PECO would follow up NCR 10472 with "N" finding N448, that would include the Section XI requirements for future inspections of the reported indications within the Limerick ISI program.

7. Plant Tours

The inspector made several tours of the facility during the course of the inspection including the reactor building, turbine building, control structures and control room. The inspector observed work in progress, housekeeping and cleanliness. No unacceptable conditions were noted.

8. Unresolved Items

Unresolved items are matters about which more information is needed to determine whether they are violations, deviations, or acceptable. The unresolved items identified during this inspection is discussed in paragraphs 2, 3.5 and 4.

9. Exit Interview

Two separate exit meeting were held on January 3, 1984, to discuss the inspection scope and findings as detailed in this report (see paragraph 1 for attendees). At no time during the inspection was written material given to the licensee. During the exit meeting, the licensee stated that no proprietary information appeared to be contained within the scope of the inspection.

Appendix A

Startup Procedure Review

1. STP-16.2 "Bottom Head Drain Temperature" Revision 0, dated July 12, 1984

2. STP-16.3 "Recirculation Pump Trip Recovery Data" Revision 0, dated July 12, 1984

3. STP-22.0 "Pressure Regulator-Main Body" Revision 0, dated October 15, 1984

4. STP-22.1 "Pressure Regulator Response - Control Valve Operation", Revision 0, dated October 15, 1984

5. STP-22.2 "Pressure Regulator Response - Control and Bypass Valve Operation", Revision 0, dated October 15, 1984

6. STP-22.3 "Pressure Regulator Response - Bypass Valve Operation, Revision 0, dated October 15, 1984

7. STP-23.0 "Feedwater System - Main Body" Revision 0, dated October 15, 1984

8. STP-23.1 "Feedwater System Startup Controller Level Step" Revision 0, dated October 15, 1984

9. STP-23.2 "Feedwater System Manual Flow Step" Revision 0, dated October 15, 1984

10. STP-23.2 "Feedwater System Level Setpoint Changes" Revision 0, dated October 15, 1984

11. STP-23.4 "Loff of Feedwater Heating" Revision 0, dated October 15, 1984

12. STP-23.5 "Feedwater Pump Trip", Revision 0, dated October 15, 1984

13. STP-23.6 "Feedwater RFPT Data" Revision 0, dated October 15, 1984

Appendix B

Surveillance Test Review for Conformance to Technical Specification

Technical Specification	ST	Date Completed
4.3.1.1-1.3	ST-2-042-447-1	12/1/84
	ST-2-042-448-1	12/2/84
	ST-2-042-646-1	12/12/84
	ST-2-042-647-1	12/1/84
	ST-2-042-648-1	12/2/84
4.3.1.1-1.7	ST-2-042-454-1	12/1/84
4.3.2.1-1.7b	ST-2-042-455-1	12/8/84
4.3.2.1-1.6b	ST-2-042-456-1	12/9/84
	ST-2-042-653-1	12/18/84
	ST-2-042-654-1	12/1/84
	ST-2-042-655-1	12/8/84
	ST-2-042-656-1	12/9/84
4.3.1.1-1.8a	ST-2-047-408-1	9/25/84
4.3.2.1-1.1f	ST-2-041-642-1	12/2/84
4.3.2.1-1.4h	ST-2-055-405-1	12/7/84
	ST-2-055-406-1	12/8/84
	ST-2-055-605-1	12/7/84
	ST-2-055-606-1	12/8/84
4.3.2.1-1.5b	ST-2-049-606-1	12/19/84
4.3.7.5-1.6	ST-2-042-400-1	1/12/84 Preop
3.6.1.4	ST-1-040-400-1	12/20/84
3.1.5	ST-5-048-800-1	12/13/84
3.6.6.1	ST-1-058-320-1	12/20/84
	ST-1-058-321-1	12/20/84
	ST-1-066-490-1	8/3/84 Preop