

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-352/84-70

Docket No. 50-352

License No. NPF-27 Priority -- Category --

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

Facility Name: Limerick Generating Station, Unit 1

Inspection At: Limerick, Pennsylvania

Inspection Conducted: November 20-29, 1984

Inspectors: D. Florek 1/7/85
D. Florek, Lead Reactor Engineer date
L. E. Briggs 1/3/85
L. Briggs, Lead Reactor Engineer date
M. Gaudino 1/3/85
M. Gaudino, Reactor Engineer date
Approved by: L. Bettenhausen 1/7/85
L. Bettenhausen, Chief, Test Programs date
Section

Inspection Summary: Inspection on November 20-29, 1984 (Inspection Report No. 50-352/84-70)

Areas Inspected: Routine, onsite, unannounced inspection on previous inspection findings; startup test program including startup test procedure review, startup test results evaluation; preoperational test results evaluation and test exceptions; independent calculations; surveillance test compliance for initial criticality; QA/QC interfaces and tours of the facility. The inspection involved 73 hours on site by three region based inspector.

Results: No violations were identified.

DETAILS

1.0 Persons Contacted

J. Doering, Operations Engineer - PECO
P. Fleckser, Startup Test Program Planning - GE
K. Folta, Operations Quality Control (QC) Site Supervisor - Gilbert
*J. Franz, Assistant Plant Superintendent - PECO
*G. Gilbody, Quality Assurance (QA) Engineer - PECO
*M. Held, Quality Engineer - PECO
R. Hennessey, QC Site Supervisor - PECO
*A. Jenkins, Startup Test Program Supervisor - GE
*G. Leitch, Plant Superintendent - PECO
*A. MacAinsh, QA Site Superintendent - PECO
*W. McCullough, Project Startup Engineer - PECO
*J. McElwain, QA Auditor - PECO
*J. Murphy, BOP Test Supervisor, Bechtel
V. Nilekani, BOP Test Engineer, Bechtel
*P. Pagano, NSSS Test Supervisor, GE
*J. Phillabaum, Engineer, PECO
*W. Rekito, Regulatory Engineer, PECO
*L. Wink, Lead Shift Test Coordinator, GE

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

*Denotes those present at exit meeting conducted on November 30, 1984.

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

2.0 Licensee Action On Previous Inspection Findings

(Open) Unresolved Item (352/84-67-01). This item dealt with procedure modification to startup test procedures STP-10.1, 13.2, 14.3, 14.7, 14.8, 14.9, 32.1 and 34.1. The inspector reviewed startup test change notice STCN-8 and verified the modification to STP-10.1 was made. The other procedures were still in process of revision and will be assessed in a subsequent inspection.

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 12 procedures of Appendix A were reviewed for the attributes indicated in inspection report 50-352/84-50. Procedures relating to core performance were also reviewed for acceptance criteria for TIP reproducibility, heat balance and power operation on or below the licensed flow control line; testing performed at various power levels; test conditions that included determination of core thermal power and operation below the heat flux and thermal limits. The licensee's representative satisfactorily resolved the inspectors questions regarding the procedures. The licensee's representative agreed to modify STP-21 to record recirculation pump speed at which the test was performed since specific limits are imposed on recirculation pump speeds when the test is performed. The licensee representative agreed to review the inlet subcooling equations in STP-19.1 to determine if WBLDN (blowdown flow from the reactor water cleanup system) should be included. Initial evaluation concluded that it was required, but the licensee representative requested an additional evaluation before any further action is taken. These two items will be followed up in the next inspection.

3.3 Startup Test Results Evaluation

The following completed startup tests were reviewed.

- STP-1.1 "Chemistry Pre-Fuel Load Data", Test implemented October 22, 1984
- STP-2.1 "Radiation Surveys," Test implemented November 14, 1984
- STP-3.1 "Fuel Load," Test implemented October 25, 1984
- STP-5.1 "Control Rod Drive Insert Withdraw Checks," Test Implemented October 18, 1984
- STP-5.1 "Control Rod Drive Insert Withdraw Checks," Test Implemented October 26, 1984
- STP-5.2 "Control Rod Drive Zero Reactor Pressure Friction Testing" Test implemented Post fuel load

The completed startup tests were reviewed to assess that:

- Each was approved in accordance with administrative procedures;
- Test changes were annotated and completed if appropriate;
- Basic test objectives were met;
- Changes and test exceptions were noted;
- Test exceptions were resolved and accepted by management;
- Retests were completed if required;
- System or process changes necessitated by a test deficiency were properly documented and reviewed;
- Proper reporting of deficiencies;
- Data sheets were completed;
- Data was within tolerances;
- Test steps and data sheets were properly signed and dated;
- Engineering evaluation of test data;

- Test results were compared with established acceptance criteria;
- Documented review and acceptance of tests results;
- Offsite review committee and followup if audited;
- QA or independent review of tests results; and
- Test results have been approved by appropriate management.

Findings

Each test result met the attributes listed above, except that engineering evaluation of test data was not completed for all tests reviewed and test results had not been reviewed by Quality Control or by licensee management. These will be verified in a subsequent inspection. A summary of each test follows.

- STP-1.1 Chemistry Pre-fuel load. All acceptance criteria were satisfied.
- STP-2.1 Radiation Survey - Post Fuel Load. All acceptance criteria were satisfied. STCN 2 and 7 were appropriately processed.
- STP-3.1 Initial Fuel Load

Independent evaluation of test results was performed, as well as the verification of core loading. The 1/M plots were renormalized after fuel loading chamber moves and when the source range monitors (SRM) were utilized. The first fuel bundle was inserted into the core on October 26, 1984. The last bundle (764) was inserted into the core on November 13, 1984. STCN-5 and 6 were appropriately processed. Two test exception reports were issued, TER-8 and 9; these have not yet received management acceptance.

- STP-5.1 Insert/Withdrawal Checks

This test was performed before and after fuel loading. All acceptance criteria were satisfied. One test exception (TER-10) was identified when control rod 50-23 did not indicate position 6-8. Management approval of test exception resolution has not yet been provided.

- STP-5.2 Zero Pressure Friction Test

All control rods except rod 02-31 met the acceptance criteria for continuous rod insert and did not require a settling test to be performed. Rod 02-31 required a settling test and met the acceptance

criteria. One test exception was identified due to a filter being installed on the signal input to the data recording system which required a repeat of the test on half of the control rods.

4.0 Preoperational Test Procedure Review for Test Results Evaluation

4.1 Test Procedure Review

The completed test procedure listed below was reviewed during this inspection to verify that adequate testing had been conducted to satisfy regulatory guidance, licensee commitments and FSAR requirements and to verify that uniform criteria are being applied for evaluation of completed test results in order to assure technical and administrative adequacy.

The inspector reviewed the test results and verified the licensee's evaluation of test results by review of test changes, test exceptions, test deficiencies, "As-Run" copy of test procedure, acceptance criteria, performance verification, recording conduct of test, QC inspection records, restoration of system to normal after test, independent verification of critical steps or parameters, identification of personnel conducting and evaluating test data, and verification that the test results have been approved.

-- IP-83.3, Revision 0, Steam Leak Detection System, Results approved November 17, 1984.

4.2 Test Exceptions

No unresolved discrepancies or violations were noted in the above review. However, one open test exception from IP-83.3 requires licensee resolution. During this inspection, licensee resolution of several other test exceptions was reviewed and found acceptable by the inspector. The following is a listing, by priority, of test exceptions considered open by the inspector and collectively constitute unresolved item 352/84-70-01. Previous unresolved item 352/84-67-03 concerning open test exceptions is closed.

Open Reoperational Test Exceptions

Initial Criticality Items

<u>Procedure No.</u>	<u>Short Title</u>	<u>Open Exception No.</u>
1P-66.1	Reactor Encl. Cooler	2
1P-80.1	Reactor Vessel Instr.	29
1P-30.1	Control Encl. HVAC	13
1P-30.2	Control Encl. C.W.	13
1P-58.1	Reactor Prot. Sys.	57
1P-59.1	Cont. Isol. & NSSS	7, 10, 11 & 12

<u>Procedure No.</u>	<u>Short Title</u>	<u>Open Exception No.</u>
1P-59.2	ILRT	3
1P-66.2	Control Encl. Unit Coolers	1
1P-99.2	Seis. Monitoring Sys.	2
1P-100.1	Loss of Offsite Power	2
1P-60.1	D.W. HVAC	35
1P-99.1	Reactor Encl. Crane	4
1P-69.1	Equip. Dr. Collection & Stor.	11
1P-85.2	Freeze Protection	9, 11, 16 & 17

Low Power Testing Items

1P-13.5 (deferred test)	Fire Protection Halon	1 & 2
1P-44.1	Condensate	15
1P-76.1	Process Sampling	5
1P-41.1	Cooling Twr. Sys.	6 & 7
1P-83.1 (deferred test)	Main Steam System	4, 6, 10 & 12
1P-83.3 (deferred test)	Steam Leak Detection	5

Commercial Operation Items

1P-41.1	Cooling Twr. Sys.	8
1P-7.1	Standby D.C. Lighting	2
1P-85.2	Freeze Protection	2, 3, 5, 6 & 7

First Refueling Outage Items

1P-30.1	Control Encl. HVAC	14
1P-62.1	Reactor Vessel and Aux.	6
1P-44.1	Condensate	9 & 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	18
1P-16.1 (deferred test)	RHRSW	12
1P-33.1 (deferred test)	Turb. Encl. HVAC	20
1P-76.1	Process Sampling	4
1P-58.2 (deferred test)	RRCS	7

As of the close of Inspection 50-352/84-64 (November 2, 1984), the licensee had physically completed all preoperational tests including those tests that had been deferred until after initial fuel load. The deferred preoperational tests are currently in the process of licensee results review and approval. Unresolved test exceptions will be evaluated and prioritized to determine if any unresolved test exceptions could impact initial criticality. The licensee's priority listing will be reviewed and evaluated by NRC:RI during routine inspection.

5.0 Independent Calculation

During review of Test Exception No. 13 of 1P-30.1, Control HVAC, the inspector performed several independent flow calculations of various areas to verify the licensee's results. The licensee's calculation agreed with the inspectors. Several open test exceptions remain in the air flow and hydronic balance procedure. Test Exception No. 13 of 1P-30.1 remains open pending licensee resolution.

During the review of test results for STP-5.2, the inspector reviewed the output of 9 control rod traces and independently determined compliance with the acceptance criteria.

During the review of procedure STP-19.1, the inspector independently derived equations for the heat balance and inlet subcooling to compare with the licensee's procedure. As a result the licensee actions described in section 3.2 were taken.

6.0 Surveillance Tests Required for Initial Criticality

Scope

The inspector reviewed the 120 Surveillance Tests associated with the Technical Specifications listed in Appendix B to verify their completion prior to entering operational condition 2 and, subsequently, initial criticality. The inspector reviewed 12 selected completed surveillance (denoted by R in Appendix B) for specific compliance with the technical specifications and also reviewed seven selected procedures (denoted by P in the appendix) to determine that the procedure was in compliance with the technical specification identified therein. In addition Administrative Procedures A-43 "Surveillance Testing Program", Revision 3, dated October 15, 1984, and A-47 "Procedures for Preparation and Control of Surveillance Test Procedures" Revision 3, dated October 17, 1984, were also reviewed.

Findings

All technical specifications reviewed were included in the licensee surveillance testing tracking system. Of the surveillance tests reviewed, all have been completed or are scheduled to be completed prior to entering operational condition 2. The surveillance tests yet to be completed will be assessed in a subsequent inspection.

The completed surveillance tests and surveillance test procedures reviewed were found to be consistent with the technical specifications. Partially completed surveillance tests will be further reviewed in a subsequent inspection. No unacceptable conditions were noted. The inspector also observed that the licensee has a few surveillance procedures to issue and subsequently perform. The licensee system to track these was reviewed. These surveillance procedures will also be assessed in a subsequent inspection.

7.0 Quality Assurance/Control Interfaces

The inspector reviewed Quality Control (QC) surveillance activities associated with startup tests STP-3.1, STP-5.1 pre-fuel load, and STP-5.1 post fuel load. The QC organization completed their previously established witness activities. QC had not yet initiated completed test packages review per the administrative procedure, since completed test packages were still being assembled by the startup test group. No unacceptable conditions were noted.

The Quality Assurance (QA) organization is conducting an audit of the startup test program. Several deficiencies in the implementation of the administrative procedures were identified. The QA audit is still in process. However, the inspector verified that these identified deficiencies were provided to the Startup Test Program Supervisor and corrective action was in the process of being implemented. No unacceptable conditions were noted.

8.0 Plant Tours

The inspector made several tours of the facility during the course of the inspection including the reactor building, drywell, turbine building, control structure and control room. The inspector observed work in progress, housekeeping and cleanliness.

The inspector witnessed portions of the preparation for tensioning the reactor head and verified that the reactor vessel flange and top head flange were greater than 80°F in compliance with Technical Specification 3.4.6.1.d. Vessel flange temperature was 110°F and the vessel top head flange was 90°F on instrument recorder TRS-42-1R006. No unacceptable conditions were noted.

On several occasions, the inspector witnessed shift turnover activities. The inspector observed that the shift turnover activities resulted in a very noisy and distracting period, principally due to the various work groups and other personnel not displaying the discipline that should be exercised in the control room while they were waiting for the shift superintendent to conduct the shift meeting. This was brought to the

attention of the Operations Engineer, who indicated that he observed similar conditions in recent shift turnovers and was considering means to improve the situation. Activities under consideration include controlling access to the control room during the shift turnover meeting and training of personnel. The licensee's representative indicated that he would improve the situation within a week. This will be assessed in subsequent inspections.

9.0 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 are discussed in paragraphs 2 and 4.2.

10.0 Exit Meeting

An exit meeting was held on October 29, 1984 to discuss the inspection scope and findings, as detailed in this report (see paragraph 1 for attendees). At no time was written material given to the licensee. The licensee indicated that no proprietary information was provided during the inspection.

Appendix A

Startup Test Procedure Review

1. STP-18.0 "TIP Uncertainty - Main Body," Revision 0, dated October 11, 1984.
2. STP-18.1 "TIP Uncertainty Determination," Revision 0, dated October 11, 1984.
3. STP-19.0 "Core Performance Main Body," Revision 0, dated March 23, 1984.
4. STP-19.1 "BUCLE Calculation," Revision 0, dated March 23, 1984.
5. STP-19.2 "Process Computer Calculation," Revision 0, dated March 23, 1984.
6. STP-21.0 "Core Power - Void Mode Response - Main Body," Revision 0, dated October 15, 1984.
7. STP-21.1 "Core Power - Void Mode Response to Control Rod Movement," Revision 0, dated October 15, 1984.
8. STP-21.2 "Core Power - Void Mode Response to Reactor Pressure Changes," Revision 0, dated October 15, 1984.
9. STP-24.0 "Turbine Valve Surveillance - Main Body," Revision 0 dated October 11, 1984.
10. STP-24.1 "Stop Valve Testing," Revision 0, dated October 11, 1984.
11. STP-24.2 "Control Valve Testing," Revision 0, dated October 11, 1984.
12. STP-24.3 "Bypass Valve Testing," Revision 0, dated October 11, 1984.

Appendix B Surveillance Tests

<u>Technical Specification</u>	<u>Surveillance Requirement</u>	<u>ST-Number</u>	<u>Status</u>
3.1.5	4.1.5.b.2	ST-5-048-800-1	P Rev. 2
3.3.1	T4.3.1.1-1.3	ST-2-042-445-1	C
		ST-2-042-446-1	C
		ST-2-042-447-1	S
		ST-2-042-448-1	S
		ST-2-042-645-1	C
		ST-2-042-646-1	S
		ST-2-042-647-1	S
		ST-2-042-648-1	S
	T.4.3.1.1-1.4	ST-2-042-449-1	C
		ST-2-042-450-1	C
		ST-2-042-451-1	C, R 10/23/84
		ST-2-042-452-1	C
		ST-2-042-649-1	C
		ST-2-042-650-1	C
		ST-2-042-651-1	C
		ST-2-042-652-1	C
	T.4.3.1.1-1.7	ST-2-042-453-1	C
		ST-2-042-454-1	S
		ST-2-042-455-1	S
		ST-2-042-456-1	S
		ST-2-042-653-1	S
		ST-2-042-654-1	S
		ST-2-042-655-1	S
		ST-2-042-656-1	S
	T.4.3.1.1-1.8a	ST-2-047-407-1	C
		ST-2-047-408-1	C, R Partial 9/4/84
		ST-2-047-409-1	C
		ST-2-047-410-1	C
		ST-2-047-608-1	C
		ST-2-047-609-1	C
		ST-2-047-610-1	C
		ST-2-047-611-1	C
	T.4.3.1.1-1.8.b	ST-2-047-600-1	C, P Rev. 3
		ST-2-047-601-1	C
		ST-2-047-602-1	C
		ST-2-047-603-1	C
	T.4.3.1.1-1.12	ST-C-071-306-1	C
		ST-6-071-307-1	C

<u>Technical Specification</u>	<u>Surveillance Requirement</u>	<u>ST-Number</u>	<u>Status</u>
3.3.2	T.4.3.2.1-1.1.f	ST-2-041-440-1	C
		ST-2-041-441-1	C
		ST-2-041-442-1	C
		ST-2-041-443-1	C
		ST-2-041-640-1	C
		ST-2-041-641-1	C
		ST-2-041-642-1	S
		ST-2-041-643-1	C
	T.4.3.2.1-1.3.d	ST-2-048-600-1	C
		ST-2-048-601-1	C, R 11/2/84
	T.4.3.2.1-1.4.h	ST-2-055-405-1	S
		ST-2-055-406-1	S
		ST-2-055-605-1	S
		ST-2-055-606-1	S
	T.4.3.2.1-1.5.b	ST-2-049-405-1	C
		ST-2-049-406-1	C, R 11/2/84
		ST-2-049-407-1	C
		ST-2-049-408-1	C
		ST-2-049-605-1	C
		ST-2-049-606-1	S
		ST-2-049-607-1	C
		ST-2-049-608-1	C
	T.4.3.2.1-1.6.b and	ST-2-042-453-1	C
		ST-2-042-454-1	S
	T.4.3.2.1-1.7.b	ST-2-042-455-1	S
		ST-2-042-456-1	S
		ST-2-042-653-1	S
		ST-2-042-654-1	S
		ST-2-042-655-1	S
		ST-2-042-656-1	S

<u>Technical Specification</u>	<u>Surveillance Requirement</u>	<u>ST-Number</u>	<u>Status</u>
3.3.3	T.4.3.3.1-1.1.a and	ST-2-042-405-1	C
	T.4.3.3.1-1.2.a	ST-2-042-406-1	C
		ST-2-042-407-1	C
		ST-2-042-408-1	C
		ST-2-042-409-1	C
		ST-2-042-410-1	C
		ST-2-042-411-1	C
		ST-2-042-412-1	C
		ST-2-042-600-1	C, R 11/17/84
		ST-2-042-601-1	C
		ST-2-042-602-1	C
		ST-2-042-603-1	C
		ST-2-042-604-1	C
		ST-2-042-605-1	C
		ST-2-042-606-1	C
		ST-2-042-607-1	C
	T.4.3.3.1-1.1.c	ST-2-042-421-1	C
		ST-2-042-422-1	C
		ST-2-042-423-1	C
		ST-2-042-424-1	C
		ST-2-042-425-1	C
		ST-2-042-426-1	C
		ST-2-042-427-1	C
		ST-2-042-428-1	C
		ST-2-042-429-1	C
		ST-2-042-430-1	C
		ST-2-042-431-1	C
		ST-2-042-432-1	C
		ST-2-042-616-1	C
		ST-2-042-617-1	C
		ST-2-042-618-1	C
		ST-2-042-619-1	C
		ST-2-042-620-1	C
		ST-2-042-621-1	C
		ST-2-042-622-1	C
		ST-2-042-623-1	C
		ST-2-042-624-1	C
		ST-2-042-625-1	C
		ST-2-042-626-1	C
		ST-2-042-627-1	C

<u>Technical Specification</u>	<u>Surveillance Requirement</u>	<u>ST-Number</u>	<u>Status</u>
	T.4.3.3.1-1.2.d	ST-2-051-420-1	C
		ST-2-051-421-1	C
		ST-2-051-422-1	C
		ST-2-051-423-1	C
		ST-2-051-620-1	C, R 11/17/84
		ST-2-051-621-1	C
		ST-2-051-622-1	C
		ST-2-051-623-1	C
	T.4.3.3.1-1.5.a	ST-1-092-111-1	C
		ST-1-092-112-1	C
		ST-1-092-113-1	C
		ST-1-092-114-1	C
	T.4.3.3.1-1.5.b	ST-2-092-325-1	C
		ST-2-092-500-1	C
3.3.6	T.4.3.6.1.7	ST-6-097-300-1	C
3.3.7.5	T.4.3.7.5-1.1	ST-2-042-461-1	C
		ST-2-042-462-1	C
	T.4.3.7.5-1.3	ST-2-052-400-1	C
		ST-2-052-401-1	C
	T.4.3.7.5-1.5	ST-2-057-408-1	C
		ST-2-057-409-1	C
	T.4.3.7.5-1.6	ST-2-042-400-1	S
		ST-2-057-400-1	C, R 11/6/84
		ST-2-057-401-1	C
	T.4.3.7.5-1.7	ST-2-088-401-1	C, R 10/2/84
		ST-2-057-410-1	C
	T.4.3.7.5-1.13	ST-2-074-400-1	C
		ST-2-074-401-1	C
		ST-2-074-402-1	C
		ST-2-074-403-1	C
3.4.1.2	4.4.1.2.a	ST-6-043-320-1	P Rev. 0
3.4.3.2	4.4.3.2.2.a	ST-1-051-491-1	P Rev. 1

<u>Technical Specification</u>	<u>Surveillance Requirement</u>	<u>ST-Number</u>	<u>Status</u>
3.5.1	4.5.1.C.3	ST-2-051-404-1	C
		ST-2-051-405-1	C, R 9/24/84
		ST-2-051-406-1	C, R 9/25/84
		ST-2-051-407-1	C
		ST-2-051-408-1	C
		ST-2-051-409-1	C
		ST-2-052-4J5-1	C
		ST-2-052-406-1	C, R 10/8/84
		ST-2-055-400-1	C, R 11/18/84
			4.5.1.C.2.b
3.6.1.4	4.6.1.4.C.2.a and 4.6.1.4.C.2.b	ST-1-040-400-1	S
3.6.5.1.1	4.6.5.1.1.C.1	ST-1-076-310-1	P Rev. 2
3.6.5.3	4.6.5.3.a	ST-1-076-250-1	P Rev. 1

STATUS CODES

S - scheduled to be done prior to initial criticality

C - completed

R - completed test results reviewed

P - procedure reviewed