

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-387/85-17

Docket No. 50-387

License No. NPF-14

Priority -

Category C

Licensee: Pennsylvania Power and Light Company

2 North Ninth Street

Allentown, Pennsylvania 18101

Facility Name: Susquehanna Steam Electric Station, Unit 1

Inspection At: Berwick, Pennsylvania

Inspection Conducted: May 7-10, May 29-June 2, and June 24, 1985

Inspectors:

S. Kucharski
S. Kucharski, Reactor Engineer

8/7/85
date

Approved by:

Jon R. Johnson
J. Johnson, Chief, OPS, DRS

8/7/85
date

Inspection Summary: Inspection on May 7-10, May 29 - June 2, and June 24, 1985
(Report No. 50-387/85-17)

Areas Inspected: Routine, announced inspection of the Containment leakage testing program including procedure review of Containment Integrated Leak Rate Test (CILRT) and Local Leak Rate Test (LLRT) procedures, CILRT witnessing, CILRT and LLRT test review, Bypass test procedure review, LLRT, ILRT and Bypass test results evaluations and tours of the facility. The inspection involved 77 hours on site inspection by one region-based inspector.

Results: No violations or deviations were identified.

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DETAILS

1. Persons Contacted

- + J. Aten, Maintenance
- R. G. Byram, Technical Supervisor
- * T. R. Clymer, N.Q.A. Coordinator
- + J. Graham, Senior Compliance Engineer
- D. Heffelfinger, QA Engineer
- ++T. Iorfida, Plant Engineering
- *C. A. Myers, Assistant Superintendent of Plant
- R. M. Paley, Compliance Engineer
- ++D. Sadvory, Technical Engineer, ILRT Coordinator
- **S. Shah, Test Engineer, ILRT Director
- +R. Sherman, Maintenance
- *D. Thompson, Assistant Superintendent of Plant

Bechtel Corporation

- +D. Gower, Technical Staff
- **H. Hill, Technical Engineer
- ++A. Salley, Technical Engineer

United Energy Services

- +J. Blessing, Technical Engineer

NRC

- *R. Jacobs, SRI

*Denotes those present at exit meeting on May 10, 1985

**Denotes those present at exit meeting on June 2, 1985

+Denotes those present at Special Meeting on June 24, 1985

2. Containment Local Leakage Rate Testing

2.1 Documents Reviewed

- AD-QA-412, Local Leakage Rate Test Program, Revision 2, 8/20/84
- SE-59-022, LLRT, Main Steam Line Isolation Valves, penetration number X-7B, Revision 0, 2/14/85
- SE-59-026, LLRT, Feedwater line A (all) and Feedwater line B (Partial), penetration number X-9A/9B, Revision 0, 4/18/85

- SE-59-029, LLRT, HPCI Steam Supply, penetration number X-11, Revision 2, 2/7/85
- SE-59-087, LLRT, RCIC Turbine Exhaust, penetration Number X-215, Revision 0, 2/12/85
- SE-59-100, LLRT, RHR Relief valve Discharge, penetration number X-246A, Revision 0, 3/5/85
- SE-59-101, LLRT, RHR Relief valve Discharge, penetration number X-246B, Revision 0, 3/19/85
- Selected Piping and Instrument Drawings
- LLRT individual test results
- LLRT Instrumentation Calibration Records

2.2 Scope of Review

The inspector reviewed the above listed documents to determine compliance with the regulatory requirements of Appendix J to 10 CFR 50, Technical Specification and conformance with station administration guidelines and applicable industry standards. The inspector held discussions with the licensee regarding documentation of test results, the repair and retesting following failed tests, and the relationship of these items to the "As-Found" and "As-Left" conditions of containment. The inspector also reviewed the calibration records of the LLRT instrument boxes.

2.3 Procedure Review

The procedures reviewed were technically accurate and in conformance with the regulatory requirements of Appendix J to 10 CFR 50 and applicable industry standards. The procedural valve lineups and associated instructions were adequate to allow for the proper venting and draining of test boundaries. The LLRT coordinator and associated licensee personnel have made a concerted effort via plant systems walkdowns to assure that the valve lineups used for local leak rate testing are accurate and in accordance with leakage testing requirements. No unacceptable conditions were identified.

2.4 LLRT Instrument Calibration

The inspector reviewed the calibration records for the flow indicators and pressure gages used in the LLRT test boxes. The instruments were appropriately calibrated and were marked with current calibration stickers. No unacceptable conditions were identified.



2.5 Test Results

The inspector reviewed the LLRT results summary and discussed analysis of test failures, repairs and retests with the licensee. The "As-found" and "As-Left" leak rate for every test done on each penetration are documented by the licensee on the LLRT summary and will be in the CILRT test report. During the review process the inspector noted that on February 16, 1985, the LLRT for penetration X-11 (HPCI steam supply penetration) failed off scale. The licensee repaired both valves and performed another LLRT for which the penetration passed. The licensee contended that even though both valves were repaired, internal work was only performed on the known leaking valve. The valve that was not leaking had only minor work performed (preventive maintenance).

A meeting was held on June 24, 1985 on site (see Section 1 for Attendees) to review the events that occurred during the LLRT of penetration X-11. The test personnel indicated that it was common practice for them to utilize various methods to find the leak source once it is determined that there is an excessive leakage of the test valves. These methods included snooping the packing with liquid snoop, using a stethoscope, and checking vents. Mechanics performing the maintenance incorporated these methods and determined that the leakage was caused by one valve only. The licensee agrees that they should not have performed maintenance on both valves and that precaution will be taken to assure it will not occur in future tests. In reviewing this situation the inspector concluded that the test personnel performed all the necessary methods needed to determine the location of the leaking valve. The inspector had no further questions at this time.

3. Containment Integrated Leak Rate Test

3.1 Document Reviewed

- SE-100-003, Primary Containment Integrated Leakage Rate Test, Revision 2, May 3, 1985
- NQAP-12.1, NQA Surveillance of Plant Activities, Revision 2, May 7, 1984
- CILRT Log Book
- CILRT Computer Program
- CILRT Instrumentation Documentation (Calibration Records and Volume Fraction Calculations)
- CILRT Test results
- Selected Piping and Instrument Drawings

3.2 Scope of Review

The inspector reviewed the above listed documents for technical adequacy and to ascertain compliance with the regulatory requirements of Appendix J to 10 CFR 50, Technical Specification and applicable industry standards.

The inspector noted that the procedure required a minimum test duration of eight hours. This reduced duration test is acceptable to the NRC based on the requirements of Bechtel Power Corporation's Topical BN-TOP-1, "Testing Criteria for ILRT of primary containment Structures for Nuclear Power Plants". The applicable procedure referenced and was in general conformance with industry standards ANS/ANSI N45.4, Leakage Rate Testing of Containment Structures for Nuclear Reactors, and ANS/ANSI 56.8-1981, Primary Containment System Leakage Testing Requirements. The inspector witnessed a large portion of the activities related to the CILRT, verification test and the Bypass leakage test. The inspector also performed an independent calculation of the test results.

3.3 Procedure Review

The inspector reviewed the above documentation for technical adequacy and for consistency with regulatory requirements, guidance and licensee commitments. Review of the procedures' acceptance criteria, test methods, and references indicated adequate conformance with Appendix J to 10 CFR 50. On a random sampling basis, the inspector reviewed the procedure for valve lineups, Appendix C of procedure SE-100-003, for many of the piping penetrations. This review was to ensure that systems were properly vented and drained to expose the containment isolation valves to containment atmosphere and test differential pressure with no artificial boundaries. No unacceptable conditions were identified.

3.4 CILRT Instrumentation

The inspector reviewed the calibration records for the resistance temperature detectors (RTD's), dewpoint instruments, precision pressure detectors, and verification test flowmeters. Their calibrations prior to the CILRT were found to meet applicable accuracy requirements and were traceable to the National Bureau of Standards. No unacceptable conditions were identified.

3.5 CILRT Chronology

Date	Time	Activity
5/31/85	0615	Commenced pressurization of containment, four compressors in operation
	0750	Reached 10 psig in containment

CILRT Chronology (Cont)

Date	Time	Activity
5/31/85	0820	Check containment for leaks
	1115	Power failure on the computer circuit
	1220	Alternate source power for computer entered data manually up to present time
	1230	Data auto recorded
	1259	Stop pressurization at 46.25 psig
	1300	Began stabilization
	1304	Turned fans off in containment
	1710	Completed temperature stabilization period
	1745	Measured CRD Vent leakages - 19.4 gpm
	1830	Commenced ILRT
6/1/85	0045	Discovered leak in pressure sensing line, when leak was tightened, pressure increased
	0100	Restart of ILRT - Because of the leakage of the pressure sensing line
	0345	Several valves which closed because of a lightning strike had to be reopened and the test restarted
	0500	Test was restarted.
	1300	Completed ILRT
	1330	Verification flow 9.5 SCFM was established-began one hour stabilization period
	1430	Started superimposed leak verification test
	1830	Completed data collection for verification test
6/2/85	2230	Perform CRD leakage test ~11.2 gpm as found, ~8.5 gpm as left
	0148	Began depressurization of containment



Date	Time	Activity
6/2/85	1100	Ceased depressurization of the containment. Isolated the drywell and continued suppression chamber depressurization
	1150	Ceased depressurization of suppression chamber and started stabilization period
	1300	Started Bypass test, Drywell pressure - 18.684 psia Suppression Chamber - 14.301 psia
	1500	Completed data collection for Bypass test.

3.6 Test Performance/Control

The test was performed within the guidelines of the procedure. Procedural precautions were adhered to, especially those related to manipulation of containment boundaries after the commencement of testing. One problem did occur during the test which the licensee handled adequately. An electrical storm caused the closure of several valves which affected the ILRT. The test was stopped, the valves were realigned and the test was restarted.

No unacceptable conditions were identified.

3.7 Test Results Review

The licensee evaluated the test results for the eight hour test between 0500 and 1300 on June 1, 1985. The calculated leakage rate at the upper 95% confidence limit was 0.322 wt %/Day for the mass point calculation and 0.430 wt %/Day for the total time method. The test acceptance criterion is 0.75 wt %/Day. The inspector performed an independent calculation of the test results using the raw data from the test to estimate the accuracy of the licensee's leak rate calculation. The inspector performed the calculation using first the air mass data and then the average temperature, pressure, and vapor pressure. The results are as follows:

1. Licensee

Mass point - 0.276 wt %/Day, UCL - 0.289 wt %/Day

Total Time - 0.268 wt %/Day, UCL - 0.397 wt %/Day

2. NRC

a. Air mass Calculation:

Mass point - 0.27592 wt %/Day, UCL - 0.28869 wt %/Day

Total Time - 0.26812 wt %/Day, UCL - 0.39254 wt %/Day



b. Average Temperature, Pressure, Vapor Pressure

Mass point - 0.27575 wt %/Day, UCL - 0.28878 wt %/Day

Total Time - 0.26749 wt %/Day, UCL - 0.40045 wt %/Day

The above values do not include the results of the LLRT's that were performed prior to the ILRT. A preliminary review of that data incorporated into the inspector's calculations with the added penalties for non standard alignment are as follows:

1. Licensee

a. Mass Point Data

ILRT - 0.276 wt %/Day, UCL - 0.289 wt %/Day

penalty nonstandard alignment - 0.033 wt %/Day, UCL - 0.033 wt %/Day

"As-Found" leakage - 0.338 wt %/Day, UCL - 0.338 wt %/Day

(1) Total "As-Found" Data - 0.647 wt %/Day, UCL - 0.66 wt %/Day

(2) Total "As-Left" Data - 0.309 wt %/Day, UCL - 0.322 wt %/Day

b. Total Time Data

ILRT - 0.268 wt %/Day, UCL - 0.397 wt %/Day

penalty non standard alignment - 0.033 wt %/Day UCL - 0.033 wt %/Day

"As-Found" leakage - 0.338 wt %/Day, UCL - 0.338 wt %/Day

(1) Total "As-Found" Data - 0.639 wt %/Day, UCL - 0.768 wt %/Day

(2) Total "As-Left" Data - 0.301 wt %/Day, UCL - 0.430 wt %/Day

2. NRC

a. Air Mass Calculation

(1) Mass Point Data

(a) "As-Found" Data - 0.64692 wt %/Day, UCL - 0.65978 wt %/Day

(b) "As-Left" Data - 0.30892 wt %/Day, UCL - 0.32169 wt %/Day



(2) Total Time Data

- (a) "As-Found" Data - 0.63912 wt %/Day, UCL - 0.76354 wt %/Day
- (b) "As-Left" Data - 0.30112 wt %/Day, UCL - 0.42554 wt %/Day

b. Average Temperature, Pressure, Vapor Pressure

(1) Mass Point Data

- (a) "As-Found" Data - 0.64675 wt %/Day, UCL - 0.65978 wt %/Day
- (b) "As-Left" Data - 0.30875 wt %/Day, UCL - 0.32178 wt %/Day

(2) Total Time Data

- (a) "As-Found" Data - 0.63849 wt %/Day, UCL - 0.77145 wt %/Day
- (b) "As-Found" Data - 0.30049 wt %/Day, UCL - 0.43345 wt %/Day

The inspector concluded that the licensee's calculations were appropriately performed and accurate and that the test was successful.

The CILRT was followed by a successful superimposed leak verification test. The licensee imposed a leak of 9.5 SCFM. The measured verification test leak was 1.199 wt %/Day for mass point calculation and 1.203 wt %/Day for total time.

The test result was within the acceptance band. The inspector also verified this result by independent calculation. The results were as follows:

a. Licensee

- 1. Mass point Band ($0.888 < 1.199 < 1.388$)
- 2. Total time Band ($0.880 < 1.203 < 1.380$)

b. NRC

1. Mass point Band ($0.888 < 1.19819 < 1.388$)
2. Total time Band ($0.880 < 1.20117 < 1.380$)

No unacceptable conditions were identified.

4.0 Bypass Leakage Test

Once the superimposed verification test was completed the licensee depressurized the containment and aligned the drywell and suppression chamber to perform a bypass test. The scope of this test was to determine the bypass leakage from the drywell to the suppression chamber. The duration of the test was a minimum of two hours and the acceptance criteria is a minimum allowable bypass area of .770 sq. in. The maximum bypass area achieved during the test, as witnessed by the inspector, was 0.007 in².

No unacceptable conditions were identified.

5. Facility Tours

The inspector conducted inspection tours independently and with licensee personnel both before and during the CILRT. During these tours the inspector observed operations and activities in progress, implementation of radiological controls, and the general condition of safety related equipment. In addition, the inspector examined the containment system boundaries, component tagging, and instrumentation to support the CILRT. During these tours the inspector also observed licensee personnel checking for evidence of leakage and verifying selected valves to be in the correct position according to procedural requirements. No unacceptable conditions were identified.

6. Independent Calculation

The inspector performed independent calculations of the test results of the CILRT and subsequent verification test. Details are included in Section 3.7 of this report.

7. QA/QC Involvement

The inspector reviewed the QA procedures which are listed in Sections 2.1 and 3.1 and found them to be adequate. The inspector also verified QA involvement in monitoring the testing activities. When questioned the QA personnel were knowledgeable of their responsibilities, how to perform their duties and report their findings. No unacceptable conditions were identified.



8. Exit Meeting

A meeting was held on May 10, 1985, June 2, 1985 and June 24, 1985 to discuss the scope and finding of the inspection as delineated in this report (see section 1 for attendees). At no time during this inspection was written information provided to the licensee.

