

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-272/84-26

Docket No. 50-272

License No. DPR-70 Priority - Category C

Licensee: Public Service Electric and Gas Company
P.O. Box 236
Hancock's Bridge, New Jersey 08038

Facility Name: Salem Nuclear Generating Station, Unit 1

Inspection At: Hancocks Bridge, New Jersey

Inspection Conducted: July 5-6, August 6-10, 15, 16, 1984

Inspectors: *D. J. Vito* 9/21/84
D. J. Vito, Reactor Engineer date

Approved by: *L. H. Bettenhausen* 9/21/84
L. H. Bettenhausen, Chief date
Test Programs

Inspection Summary: Inspection on July 5-6, August 6-10, 15, 16, 1984
(Inspection Report Number 50-220/84-26)

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 results review, followup to previous inspection findings, and general tours of the facility. The inspection involved 66 hours on site by one region based inspector.

Results: No violations were identified.

Details

1. Persons Contacted

Public Service Electric and Gas

- #R. Brant, Nuclear Plant Services Engineer
- C. Connor, ISI Supervisor
- G. Druffner, Test Engineer, PSE&G Research and Test Lab (RT&L),
Maplewood, N. J.
- B. Hicks, Materials Test Engineer, PSE&G-RT&L
- *L. Lane, ISI Engineer
- M. Malony, QC Inspector
- #L. Miller, Technical Manager
- *P. Patwell, Nuclear Licensing and Regulation
- *D. Rogozenski, ISI Supervisor
- S. Sienkiewicz, ISI Supervisor
- M. Stives, Test Technician, PSE&G-RT&L
- #R. Skibinski, Senior Staff QA Engineer
- *D. Tauber, QC Supervisor
- #*W. Treston, Senior ISI Supervisor
- *J. Zupko, Plant Superintendent-Salem Unit 1

Gilbert/Commonwealth

- J. Blessing, Shift Test Director

NRC

- #*J. Linville, Senior Resident Inspector
- *R. Summers, Resident Inspector

*denotes those present at exit interview on July 6, 1984

#denotes those present at exit interview on August 16, 1984

2. Followup on Previous Inspection Findings

(Closed) Unresolved Item (272/82-23-05) This item relates to the comprehensiveness of the licensee's containment isolation valve local leakage rate testing program. Several check valves and normally closed manual containment isolation valves were not being leak rate tested as required by Appendix J of 10 CFR 50. The licensee has performed an extensive review of the local leakage rate test program in response to this concern. As a result of this review, approximately 45 valves have been added to the Type C local leak rate testing program. The inspector reviewed the revised version of the local leakage rate testing program and concluded that the licensee's present program is acceptable and in conformance with Appendix J requirements. This item is closed.

3. Containment Local Leakage Rate Testing

3.1 Documents Reviewed

- Maintenance Procedure M16E-Containment Isolation Type B&C Tests, Revision 16
- Field Directive S-C-A900-MFD-068, 12/14/82, Update of Type C Leak Rate Testing
- Calibration Records for Local Leak Rate Test Instrumentation
- Local Leak Rate Test Results Summary
- Selected System Piping and Instrument Drawings

3.2 Scope of Review

The inspector reviewed the documents listed above to determine compliance with the regulatory requirements of Appendix J to 10 CFR 50, Technical Specifications and applicable industry standards and with station administrative guidelines. The inspector also held discussions with the licensee's staff regarding test performance, instrument calibration, documentation of test results, repair and retesting following Failed tests, and the relationship of these items to the "As-Found" and "As-Left" conditions of containment as applied to containment integrated leak rate test (CILRT) results.

3.3 Test Program

The local leak rate test procedures and calibration records reviewed were technically accurate and in conformance with the regulatory requirements of Appendix J to 10 CFR 50 and applicable industry standards. The test personnel interviewed by the inspector were familiar with the use of the procedures and knowledgeable of the test equipment used.

In addition, the licensee has performed a comprehensive evaluation of the local leak rate program in response to previous NRC concerns. Several check valves and normally closed manual containment isolation valves had been identified previously as not being tested as required by Appendix J to 10 CFR 50. The licensee has included the NRC identified valves and others resulting from the evaluation in the local leak rate test program. The inspector reviewed the licensee's revised program against related piping and instrument drawings and Appendix J to 10 CFR 50 and found it to be technically accurate and acceptable.

3.4 Test Results Review

The inspector reviewed the local leak rate test results summary and discussed analysis of the test results with the licensee. The inspector found that although the licensee documents "As-Found" leakages from local leak rate testing, these leakage values had not been used for determination of compliance with the Technical Specification operational containment leakage limit (1.0La). The inspector explained that in order to determine compliance with the 1.0La limit in the absence of a quantitative continuous containment leakage monitoring system, the licensee should subtract previous or current "As-Left" leakages from the current "As-Found" leakages and add the difference to previous or current Type A (CILRT) test results to determine an operational integrated leakage rate. The licensee has committed to including this type of operational monitoring in the containment leak rate test program. This item is unresolved (50-272/84-26-01) pending NRC review of the program change.

The inspector noted during review of the containment isolation valve "As-Found" leakage values that the total leakage approached 1.0La. The inspector inquired as to why a reportable occurrence had not been identified by the licensee due to the exceedence of the Type B&C total leakage limit (0.6La) and the potential exceedence of the overall operational containment leakage limit. The licensee noted that the major portion of the Type B&C leakage total was due to the "As-Found" leakages from the four (4) steam generator blowdown isolation valves. The licensee further explained that the testing of these valves was to be eliminated from the Type C testing program because the valves were on the secondary side of the steam generator tubes and were not part of a viable containment atmosphere leakage path. When the leakage from blow down valves was not included, neither leakage limit was approached.

The inspector consulted a member of the Containment Systems Branch of NRR/DL for an NRC staff position regarding this subject. The NRR reviewer stated that these valves should be considered in the same light as PWR main steam and feedwater lines and that their leakage need not be included in the Type B & C leakage total. The inspector commented that steam generator blowdown isolation was assumed for the Main Steam Line Break and Steam Generator Tube Rupture Accidents and that consideration of isolation valve leakage may be warranted for offsite accident dose assessments depending on assumed amounts of steam generator tube leakage. However, the NRR reviewer stated that the Large Break LOCA was the governing accident assumption for inclusion of containment isolation valves in the Type B & C leakage total.

As a result of these discussions, the inspector agreed that the removal of steam generator blow down isolation valve leakage from

the Type B & C leakage total was acceptable. However, Section 15.4.2.6 and 15.4.4.5 of the Salem Generating Station FSAR indicate that no steam generator blowdown is assumed for the projection of offsite doses after a Main Steam Line Break (MSLB) or Steam Generator Tube Rupture (SGTR) accident. Excessive leakage from the steam generator blowdown isolation valves in the event of a MSLB or STGR accident would result in offsite doses in excess of those assumed in the FSAR. As such, the existing condition of excessive measured leakage of the Salem 1 steam generator blowdown isolation valves represents a deviation (50-272/84-26-02) from conditions assumed in the FSAR. Resolution of this deviation should include a description of modifications or maintenance proposed to reduce excessive leakage, maintenance of a leak testing program for the steam generator blowdown isolation valves (leakages not to be included in the Type B & C total), and consideration of the effect that leakage from these valves will have on assumptions made in the FSAR.

4. Containment Integrated Leak Rate Test (CILRT)

4.1 Documents Reviewed

- Procedure MP-ILP-CT-1, Revision 4, Reactor Containment Integrated Leak Rate Test
- Calibration Documentation and Records for CILRT instrumentation and associated data acquisition system
- Selected Piping and Instrument Drawings
- Maintenance Department Testing Manual Procedure A-21, Maintenance Department Testing and Retest Notification Procedure, Revision 2
- Test Data and Results
- Test Log

4.2 Scope of Review

The inspector reviewed the test procedure and related documents for technical adequacy and to determine compliance with the regulatory requirements of Appendix J to 10 CFR 50, Technical Specifications, and applicable industry standards. The inspector performed a pre-test inspection of containment and witnessed portions of the subsequent CILRT. The inspector also performed an independent calculation of the test results.

4.3 Procedure Review

The inspector reviewed the "as-run" copy of the CILRT procedure with related changes, attachments, and test log for technical adequacy

and for consistency with regulatory requirements, guidance, and licensee commitments. Review of procedure acceptance criteria, test methods, and references indicated adequate conformance with Appendix J to 10 CFR 50. The procedure referenced and was in general conformance with industry standard ANSI/ANS 56.8-1981, Containment System Leakage Testing Requirements. The CILRT valve lineups were reviewed 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. Valve lineups were also checked on a sampling basis by the inspector during tours taken before the performance of the test. No unacceptable conditions were identified.

At the conclusion of the test, the inspector noted a lack of descriptive information in the test log entries. The entries contained very little information with regard to regulatory, procedural, and technical considerations applied to actions performed and decisions made. The test coordinator acknowledged this and stated that test log entries would be improved in future tests.

4.4 Test Instrumentation

The inspector reviewed the calibration records for the resistance temperature detectors, dewcells pressure sensors, gas meter (for metered flow verification test), and data acquisition system equipment. The calibrations were in accordance with applicable accuracy requirements and were traceable to the National Bureau of Standards. Onsite calibration checks of test instrumentation verified the accuracy of the calibrations.

The inspector verified that the the instrument calibration errors and weighting factors were properly incorporated into the computer program for integrated leak rate calculations. The inspector also observed the placement of the CILRT instrumentation during a tour of the containment building. Placement of the RTD's and dewcells was appropriate and consistent with assigned volume fractions. No unacceptable conditions were identified.

4.5 Test Witnessing/Chronology

Portions of the CILRT test sequence were witnessed by NRC Personnel. The test chronology was as follows:

TEST CHRONOLOGY

DATE	TIME	
8/9/84	1100	Commenced pre-test inspection.
	1230	Completed pre-test inspection.
	1500	Commenced pressurization of containment.
	2105	Indication of water leakage within containment via decreasing pressurizer level and increasing Reactor Coolant Drain Tank and containment sump level. Isolation of charging header appeared to mitigate the leak (original test lineup had charging to the Volume Control Tank through the Reactor Coolant Pump seals with Seal Return isolated). Decided to depressurize and look for leak. Containment pressure at 33.6 psia.
8/10/84	0625	Commenced depressurization from 33.6 psia.
	1300	Entered containment for leak search. Found no obvious sources of leakage. Decided to isolate charging header and repressurize.
	2200	Found problem with outer seal of inner airlock door on 100' airlock. Possibly damaged during containment inspections after depressurization. Seal replaced.
8/11/84	0200	Verified valve realignments for second pressurization. Completed successful seal test on 100' airlock doors.
	0222	Commenced second pressurization
	1737	Reached test pressure. Began temperature stabilization period.
	2150	Completed temperature stabilization period. Acceptance criteria met.
	2300	Commenced CILRT data acquisition
8/12/84	2300	Completed test. Acceptance criteria met. Measured leak rate = 0.033 wt% per day, 95% UCL = 0.041 wt% per day (Type C additions not included). Acceptance criteria is 0.075 wt% per day.

8/13/84	0200	Sample taken for containment air blowdown. Results within acceptance criteria.
	0221	Commenced instrumentation verification test (mass step change method)
	0325	Completed instrumentation verification test. Results within acceptance criteria.
	0405	Commenced depressurization
	1522	Reached 0 psig.

4.6 Test Results Review

The calculated leakage rate at the 95% upper confidence limit (UCL) was 0.041 wt% per day. The leakage corrections for Type C penetrations in use or isolated during the CILRT had not been tabulated by the conclusion of the inspection. However, since the total Type B&C penetration leakage (assuming single failure) at the time of the CILRT was approximately 0.014 wt% per day, the inspector concluded that the overall integrated leakrate is below the allowable limit of 0.75La (0.075 wt% per day). The inspector performed an independent calculation of the test results using a sample of raw data from the test to estimate the accuracy of the licensee's leak rate test calculations. The results were as follows:

	<u>Lam (Mass Point)</u>	<u>UCL (Mass Point)</u>
Salem 1	0.033	0.041
NRC	0.036	0.052

As a result of the independent calculation, the inspector concluded that the licensee's calculations were appropriately performed and accurate and that the test results were successful.

4.7 Venting of Containment Liner Weld Channels

During the review of the CILRT Procedure, the inspector noted that no mention was made of the disposition of the containment liner weld test channels within the Salem Unit 1 containment. The licensee stated that this concern had been brought up previously during a 1983 NRC Region I inspection at Salem Unit 2 (Inspection No. 50-311/83-17, Salem Unit 2 CILRT). During that inspection, an unresolved item (50-311/83-17-02) was identified because the licensee elected to perform the test with the channels not vented and obtain NRC approval at a later date. A contingency placed on the unresolved item was that final determination of the validity of the Unit 2 CILRT test result would be subject to NRR review and approval of the licensee's justification for not venting the liner weld channels. The licensee included its justification of the qualification of the liner weld channels in the test report for the Salem Unit 2 CILRT performed in May 1983 (Letter 10/13/83 E. Liden, PSE&G to S. Varga, Chief, ORB1, NRR). The inspector contacted the NRR Project manager for the Salem Units and found that neither he nor the NRR technical review branches had reviewed the report. The inspector requested that similar justification be provided by the licensee for not venting the liner weld channels on Salem Unit 1 and that attempts to obtain NRR approval be continued so that the situation will be resolved for subsequent CILRT's performed at the Salem site. This item is unresolved (50-272/84-26-03) pending the above actions by the licensee and approval by NRR.

5.0 QA/QC Involvement

Both local leak rate testing and integrated leak rate testing were monitored by plant QA/QC personnel. The inspector verified this through discussions with QA management and other QA/QC audit personnel and by review of QA checklists and audit reports. The inspector ascertained by review of documentation and by observation that QA/QC personnel monitored the following leak rate testing activities:

1. Procedure review
2. Test performance
3. Pre-CILRT containment inspection
4. CILRT valve lineup verification
5. Repair and replacement of Type B&C penetration components and subsequent retesting.

The inspector concluded that QA/QC coverage of containment leakage testing activities is appropriately planned and documented. No unacceptable conditions were identified.

6. Tours

The inspector made several tours of various areas of the facility to observe leak rate testing activities, component tagging, other work in progress and general housekeeping. No unacceptable conditions were identified.

7. Exit Interview

A management meeting was held on July 6, 1984 and on August 16, 1984 to discuss the scope and findings of the inspection as detailed in this report. No written information was provided to the licensee at anytime during the inspection.