

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report No. 77-11
Docket No. 50-29
License No. DPP-3 Priority -- Category C

Licensee: Yankee Atomic Electric Company
20 Turnpike Road
Westborough, Massachusetts

Facility Name: Yankee Rowe

Inspection at: Rowe, Massachusetts

Inspection conducted: June 10-17, 1977

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7/8/77
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Inspection Summary:

Inspection on June 10-17, 1977 (Report No. 50-29/77-11)

Areas Inspected: Routine, unannounced inspection of containment integrated leak rate test; refueling procedures; new fuel receipt and inspection; spent fuel storage rack modification; pipe support and restraint systems; and, outage maintenance items. The inspection involved 114 inspector hours onsite by four NRC inspectors.

Results: Of the six areas inspected, no items of noncompliance were found in five areas and two apparent items of noncompliance were found in one area (infraction - failure to properly conduct surveillance test - Paragraph 2.f; infraction - failure to implement procedures - Paragraph 2.d).

DETAILS

1. Persons Contacted

The below technical and supervisory level personnel were contacted.

Mr. D. Army, Technical Assistant
Mr. R. Aron, Engineering Assistant
*Mr. H. Autio, Plant Superintendent
Mr. T. Cizauskas, Engineer
Mr. R. Durfey, Technical Assistant
Mr. M. Ebert, Reactor Engineer
*Mr. T. Henderson, Assistant Reactor Engineer
Mr. P. Laird, Maintenance Supervisor
Mr. R. Randall, Engineering Assistant
*Mr. L. Reed, Quality Control AC
*Mr. N. St. Laurent, Assistant Plant Superintendent
*Mr. J. Shippee, I&C Supervisor
*Mr. J. Staub, Technical Assistant to Plant Superintendent
Mr. E. Tarnuzzer, Senior Engineer

*denotes those present at the exit interview.

2. Containment Integrated Leak Rate Test (CILRT)

a. Procedure Review

The inspector reviewed the licensee's CILRT procedure, OP-4701, Rev. 3, titled "Vapor Container Type A Leakage Test," prior to the test performance. Based on that review, the following potential problems with the procedure were identified to the licensee.

- (1) No apparent plans to vent the primary system.
- (2) No apparent plans to vent and drain lines penetrating containment.
- * (3) No apparent plans to account for water in-leakage from pressurized systems.

* denotes items resolved by licensee prior to CILRT conduct.

- * (4) No apparent plans to prevent air in-leakage from pressurized systems.
- * (5) Plans to improperly isolate containment pressure switches.
- * (6) No precaution and limitation statements relative to fixing identified leakage paths.
- * (7) Stabilization criteria unacceptable.
- * (8) Supplemental test criteria and repeat criteria unacceptable.
- (9) Data rejection criteria not specified.
- * (10) No apparent plans for a significant events log.
- * (11) No plans to correct pressure sensor readings for temperature.
- (12) No apparent plans to pressure compensate flow-meter.
- * (13) No apparent plans to capture periodic pump-back data.
- * (14) Vapor pressure curve interpolation errors excessive.
- * (15) No apparent plans to correct for instrument errors.
- (16) No valve lineups specified and no provisions for documenting the valve lineups during the test.

Since the procedure will be used for the licensee's next CILRT, this item remains unresolved pending revision of the procedure (29/77-11-03).

* denotes items resolved by licensee prior to CILRT conduct.

b. CILRT Witness

The inspector witnessed portions of the CILRT conducted June 11-13, 1977, for technical adequacy and licensee adherence to procedures and regulatory requirements. As a result of the inspector's independent calculations and inspections, problems with instrumentation, calibration, and computations were identified to the licensee. With the exception of those items discussed in subsequent paragraphs, the identified problems were corrected by the licensee.

c. Containment Isolation

As pressure was increased in the containment, in preparation for conduct of the CILRT, automatic circuits sensed high pressure and signaled containment isolation. All CIVs functioned as required except the air to open CIV associated with the Vapor Containment Drain. Initially, this CIV failed to close and the licensee made the decision to conduct the CILRT in the as found condition. Subsequent inspections found that the subject valve had closed, apparently with no assistance. The licensee plans to report the CIV closure failure in a 30 day report.

d. Data Collection

Procedure OP-4701 requires data collection on an hourly basis. Attachment A to OP-4701, "Vapor Container Atmosphere Hourly Data," provides spaces for recording outside atmospheric conditions. This data is needed to verify minimum test differential pressures are reached and maintained and provides data for interpretation of external heating and cooling effects. Outside weather data was not recorded at 2300 and 2400 hours on June 11, 1977, and 0400, 0600, 1100 and 1200 hours on June 12, 1977. This Item of Noncompliance with Technical Specification 6.8.1, which requires implementation of licensee procedures, is an Infraction (29/77-11-02).

e. Preliminary Results

The Yankee-Rowe CILRT was conducted at a reduced pressure (Pt) of 16 psig. The maximum allowable leakage rate (Lt) is 0.1123%/day. Preliminary analyses by the licensee of test data taken from 0000 June 12 to 1900 June 13 indicate that this CILRT (without Type C corrections) met the acceptance criteria. The inspector's independently calculated leak rate by the mass point technique was 0.0079%/day. Conservative corrections must be made to this number for a 170 gallon sump level increase during the test and for Type C leakage paths discussed below. The sump level increase correction is 0.0015%/day giving a mass point leakage of 0.0094%/day with a 95% upper confidence level of 0.0430%/day.

f. Verification Test

4.6.1.2.c

At the completion of the CILRT the licensee conducted the required supplemental verification test using the pump back method. As stated in Technical Specification 4.6.2.1.c the verification test must meter into containment a mass (M_{pg}) which is between 50% and 100% of the allowable 24 hour mass loss (M_{24}). Acceptability is demonstrated if the mass change as measured by the CILRT instrumentation (ΔM) agrees with M_{pg} to within 25% of M_{24} . The licensee used a Singer, American Meter Division, AL-800, gas flow meter to measure the air injected into containment. Due to incorrect interpretation of the temperature and pressure compensation features of the meter, the licensee injected only 38.7% of M_{24} into containment. This is an Item of Noncompliance at the Infraction level (29/ 77-11-01).

The following data for the verification test was independently calculated by the inspector:

$$\begin{aligned}\Delta M &= 63.9 \text{ llm} \\ M_{pg} &= 56.6 \text{ llm} \\ M_{24} &= 146.4 \text{ llm}\end{aligned}$$

Thus, preliminary results indicate agreement to within 5% of M_{24} .

g. CILRT Additions

Section III.A.1.(d) of Appendix J to 10 CFR 50 requires the venting and draining of the primary system and systems with Containment Isolation Valves (CIVs) for the conduct of the CILRT. Systems need not be vented and drained where plant safety requires system operation; but results of Containment Local Leak Rate Tests (CLLRTs), for the CIVs in those systems, must be added to the CILRT results to conservatively compensate for the incorrect alignments. The licensee did not vent or drain the primary system or any system penetrating containment. The licensee has yet to specify the CIVs that must be subject to CLLRTs for addition to the CILRT result, to justify the limitation of the list of CIVs subject to this treatment, and to quantify the individual CLLRT results. This item is unresolved (29/77-11-04).

h. CILRT Instrumentation(1) Pressure Instrumentation

Vapor Containment pressure was monitored by two Hamilton Standard Resonant Cavity Pressure Sensors. In reviewing the installation and use of these instruments, the inspector identified two potential problems associated with the instrument calibration.

- (a) Half the CILRT data had been captured when it was noted that the pressure sensors were oriented horizontally, as contrasted to a vertical orientation specified for the calibration tables.
- (b) Instrument readings must be corrected for temperature deviations from calibrated conditions, but the technique for correction is not clear.

The licensee has contacted the instrument manufacturer for resolution of both of these problems. These items are unresolved (29/77-11-05).

(2) Temperature Instrumentation

The licensee was unable to provide traceability of calibration to nationally recognized standards for his temperature instrumentation (RTDs, digital voltmeter and decade box used to calibrate the signal conditioner) as required by: 10 CFR 50, Appendix B, Criterion XII; Section XII to YOQAP-I and YOQAP-I-A; and, ANSI N45.4-1972. This item is unresolved (29/ 77-11-06).

(3) Humidity Instrumentation

The licensee has not conducted a calibration check of his humidity instrumentation with an aspiration psychrometer as required by his own technical manual and by ANSI N45.4-1972. Additionally, the licensee did not provide traceability of calibration to nationally recognized standards for the Honeywell Calibration Standard (SSP126) and for the psychrometer as required by 10 CFR 50, Appendix B, Criterion XII and by Section XII of YOQAP-I and YOQAP-I-A. These items are unresolved and designated (29/77-11-07).

(4) Instrument Error

10 CFR 50, Appendix J, section III.A.3.c requires that test leakage rates be calculated using absolute values corrected for instrument error. The licensee's formulae for applying these corrections were still in question at the completion of the test. This item is unresolved (29/77-11-08).

3. Refueling Procedure Reviewa. References

- | | |
|---------|--|
| OP-1100 | Dismantling and Reassembly of Reactor Systems for Core XIII Refueling |
| OP-1209 | Operation of the VC Manipulator Crane Handling Fixtures and Transfer Equipment |

OP-1214	Transfer of New Fuel from the New Fuel Vault to the Spent Fuel Pit
OP-1700	Core XIII Reactor Refueling and Component Inspection
OP-3117	Refueling Accidents
OP-4226	Testing of Fuel Handling Equipment with the Dummy Fuel Assembly
OP-4505	Inspection and Testing of Fuel Handling Equipment
OP-4239	Setting VC Integrity and Operability Check of VC and SFP Ventilation Systems

b. Findings

The above referenced procedures specify the actions for fuel transfer and core verification. They were evaluated for conformance to ANSI N18.7-1972 and for incorporation of Technical Specification requirements. With the exception of the below listed items, the inspector had no further questions on these procedures.

- (1) Technical Specification 3.9.6 requires the setting of the overload cut off limit ≤ 4800 pounds above base load. There is currently no provision for documenting the actual setting. The licensee acknowledged this fact and stated that he would incorporate this documentation into the appropriate procedure. This item will be reviewed at a subsequent inspection. (29/77-11-09)
- (2) Five recycled fuel assemblies will be inspected during the current outage. To date, an approved procedure had not been completed for this inspection. The licensee stated that a PORC approved procedure was being developed. This item will be inspected at a subsequent inspection. (29/77-11-10)

- (3) During a tour of the spent fuel pit area, the inspector stated that a hole had been cut into the wall for maintenance activities and the spent fuel pit cooling discharge line wall penetration had degraded. The licensee acknowledged this fact and stated that the opening would be sealed. The item is unresolved and will be reviewed at a subsequent inspection (29/77-11-11).

4. New Fuel Receipt and Inspection Audit

a. References

AP-0601	New Fuel Receiving Report
OP-1213	Unloading Exxon Fuel
OP-7001	New Fuel Receiving
OP-7200	New Fuel Inspection
OP-8304	Receiving New Reactor Fuel

b. Findings

- (1) The above referenced procedures which specify actions for new fuel receipt and inspections, were reviewed prior to conducting the audit.
- (2) The records maintained by the reactor engineering department and health physics department were reviewed. No inadequacies were noted.
- (3) An inspection of the new fuel vault was conducted. The actual storage locations of a selected number of assemblies were verified to correspond to the documented locations of the latest inventory. A visual inspection of accessible areas of the new assemblies was conducted. No inadequacies were noted.

5. Review of Spent Fuel Storage Rack Modification

The inspector examined the modified design Spent Fuel Storage Racks (SFSR) and the associated quality assurance documentation to verify their conformance to the Facility License DPR-3, amendment No. 33. The following items were inspected:

a. Verification of Safety Evaluation Criteria

The inspector selected seven of the features described by the Safety Evaluation supporting Amendment No. 33 and verified that they had been implemented during the SFSR fabrication and installation. The following features were examined:

- (1) The maximum capacity for spent fuel storage is 391 spaces.
- (2) The "Boral" poison sheets were specified to contain 35 w/o of Boron Carbide dispersed in a matrix of 1100 Aluminum.
- (3) The "Boral" sheets were specified to be .084" thick and clad with .050" (nominal) of type 1100 Aluminum.
- (4) A quality assurance program was established to assure the presence of "Boral" at each fuel assembly position.
- (5) The onsite use of a neutron source test to verify the presence of "Boral" at each fuel location.
- (6) A corrosion study of the rack materials to monitor the effects of the borated spent fuel pool water.
- (7) Written procedures to assure safe removal and replacement of the spent fuel pool roof hatches.

The foregoing features were verified through the review of specifications, drawings, procedures, and inspection data.

A review of the quality assurance documentation for the "Boral" panels was performed. The documentation consisted of the chemical certifications for the Boron Carbide powder, the thickness measurements for "Boral" core material, and the quantitative analysis program for the "Boral" panels. Some of the initial lots of "Boral" panels did not meet the specification requirements. This was previously identified and reviewed by the inspector and was found to be acceptable.

The inspector had no further questions concerning these items.

b. Review of SFSR Welding Program

The inspector selected seven welder's symbols from the inspection data sheet for the 1X5 Module Assembly; Assembly No. A-18390-D, Revision E, Model No. 3010. He was able to verify six of the seven welders qualifications. Welder symbol W-18 did not have a qualification record posted in the documentation and welder W-10 did not have a signed copy available.

This item (29/77-11-12) is considered unresolved pending verification of the welders qualifications.

He also selected four weld filler metal heat numbers from the above referenced inspection data sheet to verify the material certification. Weld filler metal heat number AA1009035, 3/64" diameter, type 5356 could not be verified.

This item (29/77-11-13) is considered unresolved pending verification of the material certification.

c. Review of Nondestructive Examiner's Qualifications

The inspector selected one of the nondestructive test examiners, QC-10, listed on the inspection data sheet, and verified that he was qualified to perform liquid penetrant tests.

No items of noncompliance were identified.

d. Visual Examination of SFSR

The inspector examined the SFSR numbers 30-001, 30-002, and 30-003. He made selected dimensional measurements and verified that welds and structural components were as specified on the applicable drawings.

No items of noncompliance were identified.

6. Pipe Supports and Restraints

a. General

The inspector reviewed the licensee's surveillance program for safety related pipe and component supports and restraint systems; including a review of the program and related procedures for technical adequacy and completeness, observations of various installed dynamic and fixed pipe supports, review of completed surveillance records and a review of the design change package for the conversion to mechanical snubbers. With the exception of the items listed below, the inspector identified no significant problems.

b. Mechanical Snubbers

The licensee currently has eight safety related Grinnell hydraulic snubbers in the plant located on the pressurizer relief lines. These will be replaced by Pacific Scientific PSA-3 snubbers this outage. The inspector reviewed the design change information and the draft Technical Specification. The licensee stated that procedures for mechanical snubber inspections would be prepared. This item will remain unresolved pending submittal of the Technical Specification change to the NRC and pending review of the inspection procedure (29/77-11-14).

c. Inspection of Pipe Support Systems

The inspector, accompanied by licensee personnel, toured various areas inside the Vapor Container and inspected pipe and component supports on the following systems: Main Coolant, Main Coolant Bypass and Bleed, Pressurizer Spray, Pressurizer Relief, Steam Generator, and Component Cooling.

The inspection included a verification that:

- deterioration and corrosion were not evident;
- mechanical components and fittings were not loose or damaged;

- Lubricants were applied where required;
- bleed/vent holes were open and clear;
- equipment was not locked up or frozen;
- fluid levels were proper and no leaks existed; and,
- adequate stroke remained to allow for thermal expansion of piping on snubbers and spring hangers.

With the exception of the below items, no discrepancies were noted.

- (1) Spring Hanger BRLH-12 on the pressurizer relief line was noted to be out of its operating range and in a position such that it would possibly be driven into its stops on plant heatup.
- (2) An unnumbered Grinnell lightweight spring hanger on the pressurizer spray piping was observed with a bent extension rod and a loose connecting nut.

The licensee stated that these hangers would be evaluated and that he would consider invoking Procedure No. OP-5107 "Inspection and Adjustment of Pipe Hangers" for the involved systems. These items are considered unresolved pending further review and are designated Item No. (29-77-11-15).

7. Outage Maintenance

The inspector reviewed three Job Order Packages for major maintenance items scheduled during this outage to verify that approved procedures existed for the Jobs and that the Jobs would be performed in accordance with regulatory requirements. The packages and procedures reviewed were:

a. ECCS Backfit	Job Order No. 76-143, EDCR 76-6
OP 2000.37	Pneumatic Test Procedure
*OP 2000.38	Functional Test of ECCS Mod for Core XIII
OP 5000.65.2	Installation of N ₂ bottles for ECCS Alteration
OP 5000.65.3	Installation of ECCS Alteration Piping
OP 6000.74.3	Instrumentation Installation for ECCS Alteration

- b. CRDM Replacement Job Order No. 77-8
 OP 5230 Removal and Handling of CRD and
 Indicating Light Coil Stacks and
 Cables
 OP 5235 Removal and Handling of CRDM
 OP 5236 Inspection and Repair of CRDM
 OP 5237 Installation of CRDM
 *Procedure for Remote Control Seal Welder Operation

Latest information indicates that a CRDM may not be removed during this outage.

- c. VC Piping Pene- Job Order No. 76-247 with 8 enclosures
 tration Test Taps
 PDCR-76-17 System Upgrading to Allow VC Penetration
 Isolation Tests
 OP 2000.27 - Installation and Hydrostatic Tests of the
 2000.34 eight Test Tap Arrangements
 OP 5000.61 Installation of VC Penetration Test Taps

The inspector stated that one Job would receive further witnessing and review at a future inspection and had no further questions on these Jobs.

8. Unresolved Items

Items about which more information is required to determine acceptability are considered unresolved. Paragraphs 2.a, 2.g, 2.h(1), 2.h(2), 2.h(3), 2.h(4), 3.b(1), 3.b(2), 3.b(3), 5.b, 6.b, and 6.c of this report contain unresolved items.

9. Exit Interview

At the inspection's end the inspectors held a meeting (see Paragraph 1 for attendees) to discuss the inspection scope and findings. The Items of Noncompliance and Unresolved Items were identified.

* Procedure discussed with licensee personnel only, not reviewed.