

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 85-09

Docket No. 50-29

License No. DPR-3 Priority - Category C

Licensee: Yankee Atomic Electric Company
1671 Worcester Road
Framingham, Massachusetts 01701

Facility Name: Yankee Nuclear Power Station

Inspection At: Rowe, Massachusetts

Inspection Conducted: May 6 - 10, 1985

Inspectors: Jason C. Jang
Jason Jang,
Radiation Dosimetry Specialist

June 3, 1985
date

Thomas Dragoun
Thomas Dragoun,
Radiation Specialist

June 3, 1985
date

Approved by: M. Shanbaky
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PWR Radiation Protection Section

6/13/85
date

Inspection Summary: Inspection on May 6 - 10, 1985 (Report No. 50-29/85-09)

Areas Inspected: Routine, unannounced inspection of the licensee's radiation protection program including: status of previously identified items; dosimetry; control of work; and routine radiological surveys. This inspection involved 72 inspector-hours on site by two region-based inspectors.

Results: No items of non-compliance were identified.

DETAILS

1.0 Persons Contacted

During the course of the routine inspection the following personnel were contacted or interviewed:

1.1 Licensee Personnel

- *L.H. Heider, Vice President-Operations, Yankee Atomic Electric
- *N.N. St. Laurent, Plant Superintendent, Yankee Rowe
- *T.K. Henderson, Technical Director
- *B.L. Drawbridge, Assistant Plant Superintendent
- *G.M. Babineau, Radiation Protection Manager
- *R.A. Mellor, Chemistry Manager
- *P. Hollenbeck, Radiation Protection Engineer
- *M.T. Vandale, Radiation Protection Engineer
- **D. McCurdy, Environmental Laboratory Manager
- **N. Stanford, Radiation Dosimetry Section Supervisor
- **E. Dorois, Special Projects Supervisor

1.2 NRC Personnel

- *H. Eichenholz, Senior Resident Inspector

*Attended the exit interview on May 10, 1985 at Yankee Rowe.

**Attended the exit interview on May 8, 1985 at Environmental Laboratory in Framingham, Massachusetts.

2.0 Purpose

The purpose of this routine inspection was to review the licensee's radiation protection program with respect to the following elements:

- o Status of Previously Identified Items
- o Personnel and Environmental Dosimetry
- o Control of Work
- o Routine Radiological Surveys

3.0 Status of Previously Identified Items

3.1 (Closed) Violation (84-05-01) Failure to provide documented training and maintenance procedures for respirators. Licensee procedure AP 8001 Revision 2 issued in August, 1984, section IV C.2.(f) describes the training and qualification of respirator repair technicians. Licensee procedure DP8421 issued in April, 1984, provides specific maintenance and repair information for the respirators currently in use. Licensee action is described in letter dated June 20, 1984 is complete and satisfactory.

3.2 (Closed) Follow up Item (84-05-04) Review corrective action taken for failures to record inspections of HRA and HREA under procedure AP8010. HP supervision now reviews the inspection records for

completeness per procedure OP8403.

- 3.3 (Open) Follow up Item (84-15-02) Conduct ALARA review of calibration facilities. A review has been initiated but has not been completed.
- 3.4 (Open) Follow Item (84-15-03) Revise calibration procedures to incorporate Reg. Guide 8.25. The procedures are under review.
- 3.5 (Closed) Follow Item (84-22-02) Classify contaminated laundry as LSA shipment. The licensee is conservatively using type A packaging rather than strong tight containers.
- 3.6 (Closed) Follow Item (84-22-04) Develop a method to track radioactive waste shipments. Licensee procedure OP8301 has been revised to include waste shipment tracking as required by 10CFR 20.311(h).
- 3.7 (Closed) Follow up Item (85-04-03) Verify radiation areas are appropriately posted. A special 4 hour training program was provided to all HP technicians and supervisors regarding the identification and posting of radiologically controlled areas.
- 3.8 (Closed) Follow up Item (81-09-02): Quality Control for TLD measurements. The licensee issued a new procedure (Procedure Number DP-9710) to implement the quality control program for the environmental radiation measurement using TLDs.
- 3.9 (Closed) Follow up Items (81-07-02, 81-07-03): No self absorption correction in the gross alpha analysis and reevaluation of the alpha counting efficiency. The inspector reviewed Procedure DP-9501 and determined corrective actions were satisfied.
- 3.10 (Closed) Follow up Item (81-07-04): Addition of strontium carrier before passing the liquid sample through ion exchange resin. The inspector reviewed Procedure OP-9246 and found corrective actions were adequate.

4.0 Dosimetry

4.1 Personnel Dosimetry

The Personnel Dosimetry program was reviewed against criteria contained in:

- 10CFR 20.101 Radiation dose standards for individuals in restricted areas.
- 10CFR 20.102 Determination of prior dose.
- 10CFR 20.202 Personnel monitoring.

- 10CFR 20.408 Reports of personnel monitoring on termination of employment or work.
- Reg. Guide 8.3 Film Badge Performance Criteria.
- Reg. Guide 8.4 Direct-Reading and Indirect-Reading Pocket Dosimeters.
- Reg. Guide 8.7 Occupational Radiation Exposure Records Systems.
- Reg. Guide 8.14 Personnel Neutron Dosimeters.
- Licensee procedures 8403, 8404, 8407, 8408, 8409, 8430, 8431, 8432, and 8433.

The licensee uses the 4 chip Harshaw TLD badge system to monitor whole body and skin exposure while loose TLD chips are mounted as required for extremity monitoring. The badge is processed quarterly at the corporate Environmental Laboratory while the loose chips are processed and evaluated on site.

All personnel exposure records are maintained on site by an Engineering Assistant under direction of the Radiation Protection Manager. Exposure data including self reading dosimeter results are entered into a computer data bank, summarized, compared and printed out quarterly. Duplicate hard copy of data similar to NRC Form 5 are retained as the permanent record.

During the quarter, administrative exposure limits are established for workers by HP supervisors based on exposure history and totaled daily SRD readings. Only qualified radiation workers are issued an SRD and allowed into the radiologically controlled area. Within the scope of this review of the on-site dosimetry program no violation was observed. However, the inspector noted some weakness regarding the licensee's dosimetry procedures as follows:

- Procedure OP8403 requires all personnel to complete several forms prior to issuance of dosimetry. The forms are not attached to the procedure nor are the forms identified by number.
- Procedure DP8404 provides a method for irradiating TLD badges to check the Environmental Lab results. Key factors, such as, type of radionuclide, source strength and amount of exposure are omitted from the procedure and left to the discretion of the Radiation Protection Manager.

This matter is discussed further in Section 1 "Procedures."

The operations at the Environmental Lab in Framingham, Massachusetts were also reviewed. This lab processes the TLD dosimetry for several

nuclear plant sits in the Yankee Atomic Electric Company and is NVLAP accredited.

The lab has conducted independent study of the characteristics and performance of the Harshaw badge system. Combined with several experience with this equipment the measurement of personnel exposure has now been refined and improved to produce a very high level of confidence in the results. Although the inspectors were impressed with the quality and performance of the staff, the following improvement items were suggested:

- The lab routinely irradiates a random sample of TLD cards and processes the chips as part of an internal QA program. However, assembled badges are only irradiated at the user sites. The test conditions at the sites are unknown. The lab should also "spike" a sample of complete badges until the test conditions can be standardized at the various user sites.
- The lab has exhaustively studied the behavior of the Harshaw Calcium Sulfate TLD chips at low photon energies and low doses. To assure dosimetry performance under accident conditions, similar data should be obtained for high energies (to 6 MeV) and high exposures (to 1000 R).

Within the scope of this review, no violations were identified.

4.2 Environmental Dosimetry

The U.S. Nuclear Regulatory Commission (NRC) Direct Radiation Monitoring Network is operated by the NRC (Region I) to provide continuous measurement of the ambient radiation levels around nuclear power plants, (70 sites) throughout the United States. Each site is monitored by arranging approximately 30 to 50 thermoluminescent dosimeter (TLD) stations in two concentric rings extending to about five miles from the power plant. The monitoring results are published in NUREG-0837 quarterly.

One of the purposes of this program is to serve as a basis of comparison with similar programs conducted by individual utilities which operate nuclear power plants. Therefore, five NRC TLDs are co-located with each licensee's TLD stations.

During this inspection the monitoring results of co-located TLDs were compared and the results are listed in Table 2. Table 1 describes the NRC TLD location around the Yankee Rowe Nuclear Power Plant.

All NRC exposures are normalized to a 90-day quarter and reported in units of milliroentgens (mR), and uncertainties are the total uncertainty (random and systematic uncertainties).

Table 1. Co-location of the TLD Station

<u>NRC Station</u>	<u>Yankee Rowe Station</u>	<u>Location</u>	<u>Description</u>
1	6	N, 0°, 0.8 mi	Mass/Vt state line on Readsboro Road
5	10	E, 85°, 2.2 mi	Cross Road, West of Leshures Road
9	8	S, 176°, 1.1 mi	Monroe Hill Rd (W of Monroe Hill Barrier Stake)
12	5	WSW, 239°, 1.1 mi	Monroe Bridge, Gate to N.E. Electric Co. Property
14	11	WNW, 292°, 1.3 mi	On Main Road, near Adams High Tension Line

Table 2. Environmental Monitoring Results (mR/90 Days)

Monitoring Period		TLD Station: NRC Station Number/YR Station Number				
		1/6	5/10	9/8	12/5	14/11
3rd Qtr 1983	NRC (1)	17.9 \pm 3.7	14.7 \pm 3.4	14.7 \pm 3.4	18.3 \pm 3.8	N/C
	YR (2)	17.6	14.6	18.1	22.6	
4th Qtr 1983	NRC	N/C	12.0 \pm 3.4	12.3 \pm 3.4	17.1 \pm 4.0	14.6 \pm 3.7
	YR		14.1	17.4	20.7	17.7
1st Qtr 1984	NRC	17.1 \pm 2.6	13.5 \pm 2.0	13.6 \pm 2.1	17.2 \pm 2.6	N/C
	YR	15.9	13.2	15.8	20.6	
2nd Qtr 1984	NRC	N/C	13.5 \pm 3.7	19.0 \pm 4.4	18.8 \pm 4.4	17.8 \pm 4.3
	YR		14.2	17.6	21.7	18.2
3rd Qtr 1984	NRC	18.4 \pm 2.8	15.9 \pm 2.4	15.3 \pm 2.3	20.1 \pm 3.0	19.0 \pm 2.8
	YR	21.4	15.2	18.4	23.4	20.3
4th Qtr 1984	NRC	17.2 \pm 2.6	13.9 \pm 2.1	15.0 \pm 2.2	18.2 \pm 2.7	16.8 \pm 2.5
	YR	19.0	15.2	17.9	21.9	18.8

(1) NRC ; mR \pm total uncertainty, Panasonic TLD System

(2) YR(Yankee Rowe); only mR, no uncertainty reported, Teledyne Isotopes TLD System

(3) N/C (not compared because the NRC data were not available due to missing or damaged TLDs)

The licensee reports only monitoring results but does not report either random uncertainty or the systematic uncertainty. The inspector recommended that the licensee report uncertainty. The licensee stated that the reporting of the uncertainty would be reviewed and incorporated in the future.

The most licensee's monitoring results are slightly higher than the NRC's results as shown in Table 2, but results are generally in good agreement. It must be emphasized that the co-location TLDs are not necessary monitoring at the same station; tenth of a mile apart is not unusual.

4.3 Independent Performance Test

The inspector arranged to have 50 of the licensee's personnel dosimeters sent to Idaho National Engineering Laboratory for a test of their performance. The results of this performance test will be provided in a future inspection report.

5.0 Control of Work

The radiation work permit program was reviewed against criteria contained in:

- Technical Specification 6.11 Radiation Protection Program
- 10 CFR 19.12 Instruction to Workers
- 10 CFR 20.101 Radiation dose standards for individuals in restricted areas.
- Procedure OP 8415 Radiation Work Permits

The licensee's performance relative to these criteria was determined by interviewing selected personnel and examining selected records.

Within the scope of this review, no violation were identified. The licensee has revised and improved the RWP Procedures by requiring all workers to review the information on the RWP and is limiting the use of special extended RWPs. The inspectors noted that the following improvement items were needed:

- The need for special exposure monitoring (e.g. extremities) should be discussed in the procedure and highlighted on the RWP form OPF-8415.1
- The need to monitor radiological condition during work when conditions are expected to change should be discussed in the procedure and noted on the RWP form

The licensee stated that these changes would be incorporated in a future revision to the RWP procedure.

6.0 Routine Radiological Surveys

The conduct of routine radiological surveys was reviewed against criteria in:

10CFR 20.105 Permissible levels of radiation in unrestricted areas.

10CFR 20.201 Surveys.

10CFR 20.203 Caution signs, labels, signals and controls.

10CFR 20.206 Instruction of personnel.

10CFR 20.401 Records of surveys, radiation monitoring and disposal.

Reg. Guide 8.2 Guide for Administrative Practices in Radiation Monitoring.

Procedure AP 8010 High Radiation Area Control.

Procedure OP 8101 Plant Radiological Surveys.

Procedure OP 8100 Establishing and Posting Controlled Areas.

Procedure OP 8042 Radiation Protection Shift Personnel Duties and
Surveillances.

Procedure AP 8043 Radiation Protection Department Scheduling of Routine
Surveillances.

The licensee's performance relative to these criteria was determined by interviewing HP supervisors and reviewing survey records.

Within the scope of this review no violations were observed. However, the inspector noted the following improvement items:

- The degraded fuel conditions experienced during the current and previous fuel cycles suggests the need for increased attention to alpha activity on routine smear surveys and systems breaches.
- The chemistry department has improved the procedures for use of the proportional counting equipment. These procedures should be adopted by the HP department.

7.0 Procedures

During the course of this inspection, the inspector noted weakness in regards some of the HP procedures. The procedures often lack specific detail or allow such wide discretion by the user that the procedure becomes meaningless as a control document.

For example, Procedure OP 8101 requires a daily radiation survey and smear survey at the control point with data recorded on form OPF 8101.3. In fact, the data has been recorded on an area map since July, 1984, rather than the required form. Additional examples were noted in Section 4.0 "Dosimetry".

The NRC general concern with procedures was discussed with the licensee during the SALP review in April, 1985. The licensee stated that a major effort will be undertaken to improve the HP procedures. This matter remains unresolved and will be reviewed in a future inspection.
(85-09-01)

8.0 Exit Interview

The inspector met with licensee management denoted in section 1.0 at the conclusion of the inspection on May 10, 1985. The scope and findings of the inspection were discussed at that time. At no time during the inspection effort was written material provided to the licensee by the NRC Inspector.