

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report No. 50-309/94-02  
Docket No. 50-309  
License No. DPR-36  
Licensee: Maine Yankee Atomic Power Company  
83 Edison Drive  
Augusta, Maine 04336  
Facility Name: Maine Yankee Nuclear Generating Station  
Inspection At: Wiscasset, Maine  
Inspection Conducted: January 18-21, 1994

Inspector:

Randolph C Ragland, Jr  
R. Ragland, Radiation Specialist,  
Facilities Radiation Protection Section (FRPS),  
Facilities Radiological Safety and Safeguards  
Branch (FRSSB), Division of Radiation Safety  
and Safeguards (DRSS)

2/8/94  
date

Joseph J. Furia  
J. Furia, Senior Radiation Specialist,  
FRPS, FRSSB, DRSS

2/8/94  
date

Approved by:

R. Bores  
R. Bores, Chief, FRPS, FRSSB, DRSS

2/11/94  
date

Areas Inspected: Announced inspection of the radiation protection program at Maine Yankee Atomic Power Plant. The inspection focused on routine radiological controls, ALARA, outage performance, management organization, internal and external dosimetry, and Quality Assurance.

Results: Performance in maintaining occupational doses ALARA during the 1993 outage was commendable. Plant material condition, housekeeping, and maintenance of radiological control boundaries was considered good. Efforts in self assessment continue to be considered a licensee strength. Also, recent changes in the organizational staff were noted as improvements. No safety concerns or violations of NRC requirements were identified.

## DETAILS

### 1.0 Personnel Contacted

#### 1.1 Licensee Personnel

- \* R. Blackmore, Plant Manager
- \* D. Caristo, Radiological Programs Section Head
- M. Finn, Dosimetry Administrator
- \* R. Hayward, Quality Assurance Supervisor
- \* E. Heath, Radiological Controls Section Head
- \* S. Nichols, Technical Support Manager
- \* G. Pillsbury, Radiation Protection Manager
- M. Readinger, Radiological Controls Supervisor
- T. Shippee, ALARA Coordinator
- C. Smith, Radwaste Coordinator
- G. Stewart, Internal/External Dosimetry Coordinator
- \* J. Weast, Licensing Engineer
- B. Tracy, Quality Controls

#### 1.2 NRC Personnel

- \* J. Yerokun, Senior Resident Inspector
- \* W. Olsen, Resident Inspector

#### 1.3 Other Personnel

- \* P. Dostie, State of Maine Nuclear Safety Inspector

\* Denotes those present at the exit interview on January 21, 1994.

### 2.0 Background and Areas Inspected

During the time of the inspection, the station was in full power operation with no major in-plant maintenance activities in-progress. The following areas were reviewed during the inspection.

- housekeeping and plant condition;
- routine radiological controls;
- ALARA;
- radiological control outage performance;
- management and organizational staffing;
- internal and external dosimetry; and
- quality assurance and self assessment.

### 3.0 Housekeeping and Plant Condition

The inspectors toured the Maine Yankee Station periodically during the inspection and reviewed station conditions. Areas inspected were neat and orderly, station lighting was good, and walkways and aisles were uncluttered and free of debris.

The inspectors also toured the Low Level Waste and Equipment Temporary Storage Building (LLWETSB). This facility was also neat and orderly with adequate lighting. Stored equipment and materials were well marked. No safety concerns or violations were identified.

### 4.0 Routine Radiological Controls

The inspectors reviewed routine radiological controls including control of work in radiologically controlled areas, and radioactive material, contaminated material, and contamination control. The evaluation of the licensee's performance in this area was based on discussions with cognizant personnel, a selected review of Radiation Work Permits (RWPs), in-plant tours, and independent observations. The following specific items were evaluated.

- o posting, barricading and access control as appropriate to Contaminated, Radiation, and High Radiation areas;
- o posting and labeling of contaminated and radioactive material;
- o use of calibrated and source checked equipment;
- o personnel frisking techniques;
- o use of RWPs; and
- o personnel adherence to radiation protection procedures, RWPs, and good radiological control practices.

Radiological control boundaries were clearly delineated and posted properly. All Locked High Radiation areas checked were securely locked according to procedures. All RWPs reviewed had proper authorizations, and satisfactorily addressed radiological hazards. All portable survey instruments checked displayed evidence of calibration and daily source check. Also, the inspectors observed personnel frisking techniques. No inadequacies were identified.

The inspectors also reviewed a breakdown of the number of Personal Contamination Reports (PCRs) by apparent cause. The total number of PCRs reported for 1993 was 786. These were broken down into categories based on root cause. 85% of the PCRs were grouped into the following categories:

- o Radiological work practices;
- o Use of protective clothing;
- o Undressing technique;
- o Contaminated PCs; and
- o Contamination in clean areas.

The inspectors acknowledged that the majority of the contaminations were low level contaminations less than 10,000 dpm beta-gamma, and did not present a significant exposure hazard. Nonetheless, the root-cause breakdown did indicate that there were opportunities for improvement. The licensee acknowledged this and indicated that the following actions were taken in response to an initial high rate of PCRs that occurred during the first weeks of the outage.

- o A contract quality assurance inspector was assigned to observe worker practices in the restricted area;
- o Additional inspections of radiological worker practices were performed by radiological controls supervisors; and
- o Plant supervision were directed to perform additional restricted area inspections to observe and correct worker performance.

These actions reduced the rate of occurrence of PCRs. The licensee also indicated that the root causes of PCRs is being reviewed, and that lessons learned will be used to make improvements in training, use of protective clothing, and contamination control. The inspectors noted that these actions appeared to be appropriate.

During the review of routine radiological controls, no significant safety concerns or violations of NRC requirements were identified.

## **5.0 Maintaining Occupational Exposure ALARA**

The evaluation of the licensee's performance in this area were based on interviews with cognizant individuals, and a review of documentation. The evaluation focused on the ALARA organization, and ALARA initiatives during refueling outage number 13 (RFO13) performed in the fall 1993. In comparison to previous history, a very challenging outage exposure goal of 396 person rem was established for RFO13. The total exposure for the 1993 refueling outage was approximately 362 person-rem. This is the lowest outage total for the licensee since 1977. Significant exposure reductions during the refueling outage were realized as a result of an improved outage planning process, prejob and in-process ALARA reviews, use of shielding, and reduced reliance on respiratory protection.

### **5.1 Outage Planning**

An individual from the radiation protection group was assigned to work full time in the Outage Planning group. As a result, all work scheduled in the Restricted Area (RA) was initially reviewed by Radiation Protection personnel. This resulted in better scheduling, better communication, incorporation of ALARA activities into the outage schedule, development of many pre-job ALARA reviews, and heightened station awareness of the concept of ALARA.

## 5.2 ALARA Reviews

ALARA reviews were performed on jobs that required either additional planning or had the potential for increased exposures. The majority of prejob reviews were performed prior to the start of the outage. This enabled ALARA technicians and supervision to spend a greater portion of time in the RA conducting in-process job reviews, and "coaching" the workers in exposure saving techniques. The inspectors were also notified that major outage projects were presented to the Station ALARA Committee for review. These activities reviewed accounted for approximately 71% of outage exposure.

## 5.3 Shielding

Approximately 27 General Area shielding installations and 10 Job Specific shield installations were installed during refueling outage 13 (RFO13). Due to the difficulty in estimating staytimes or personnel occupancy near general area shielding, actual exposure estimates of exposure savings were not calculated. However, the licensee felt strongly that significant exposure savings were realized as a result of the temporary shielding program, and that costs associated with installation and removal of the shielding were justifiable. The licensee indicated that lessons learned during RFO13 would be incorporated into future outages.

## 5.4 Reduced Respirator Use

Additional exposure reductions were realized via the significant reduction in the use of respirators in the plant. During the 1992 outage, approximately 2200 respirators were issued for work in the RA based on the presence or anticipated presence of radioactive materials in the air. In 1993, extensive review of air samples taken during previous outages, together with appropriate consideration of the Total Effective Dose Equivalent (TEDE), as required under the "new" Title 10, Code of Federal regulations, Part 20 (10 CFR 20) implemented by the licensee prior to the commencement of the outage, led to a total respirator usage of less than 100 for radiological reasons. Again, exposure savings were not readily quantifiable. However, the licensee feels that reduced respirator use led to reduced time in radiation areas. The licensee noted that reduced respirator use occurred without a corresponding increase in internal uptakes of radioactive materials.

## 5.5 ALARA Goals

Another ALARA tool used by the licensee was the use of ALARA goals. ALARA goals were established for major work performed during the outage. Upon review, these goals appeared to be reasonable and based on a comprehensive evaluation of work scope. Although no outages are scheduled during 1994, the licensee established a very challenging ALARA goal for the Maine Yankee Station of 48.0 person-rem.

In addition, the licensee informed the inspectors that they have projected, and are attempting to reduce the rolling three-year average station exposure to below 300 person-rem.

The inspectors noted that the ALARA program was continuing to be refined and that results of the Radiation Protection Improvement Program (RPIP), internal surveillances, and lessons learned during the outage were being incorporated into the ALARA program. No safety concerns or violations were identified by the inspectors.

#### **6.0 Post Outage ALARA Summary Report**

After completion of RFO13, the ALARA supervisor directed the compilation of a Post Outage ALARA Summary Report. This document was released the week of this inspection, and included a very critical self-assessment of all exposure significant work undertaken during the outage. This report indicates that in spite of notable ALARA initiatives such as use of lead and water shielding, audio/visual equipment, mock-up training, low-dose areas, reduced reliance on respirators, remote electronic dosimetry, there is still ample room for improvement. This was the first time that an ALARA review of a refueling outage has ever been assembled by the licensee, and is envisioned by the licensee as a "living document", providing ideas and suggestions to all plant management on the planning and preparation of future outages.

#### **7.0 Management Organization and Structure**

Since the last inspection in this area, the licensee has re-evaluated its personnel placement in the Radiation Protection Department, and chose to add an ALARA Engineering position to its staff, and to transfer one technician out of the Respiratory Protection area to Radiological Controls. The position of ALARA Engineer was filled by the former Respiratory Protection Supervisor, and the vacancy created was filled by the Radiological Engineer. This transfer of resources highlights the licensee's continuing commitment to improving its total site exposure and ALARA.

#### **8.0 Internal and External Dosimetry**

The evaluation of the licensee's performance in this area was based on interviews with cognizant individuals, a review of documentation and representative records, and observations made by the inspectors.

The inspectors reviewed Procedure No. 9-7-100 "Dosimetry Program." This procedure describes the major elements and responsibilities of the Maine Yankee Dosimetry Program. The program includes establishing exposure limits, providing for proper records, and publishing of periodic reports. The inspectors made the following observations.

- o The procedure adequately addressed applicable changes required by the new 10

- CFR 20 revision;
- o Responsibilities were clearly delineated;
- o Specific implementing procedures were identified and referenced as necessary;
- o Instructions for in-vivo and in-vitro bioassay, issuance and use of dosimetry, dose extensions, use of control levels, quality assurance, exposure investigations, planned special exposures, etc. appeared appropriate.

No safety concerns or violations were identified.

The inspectors also randomly selected individual dosimetry files and reviewed the following.

- o Skin dose assessments and dose assignments;
- o Entrance and Exit Whole Body Counts (WBC);
- o NRC Form 4, Occupational Exposure History;
- o NRC Form 5, Current Occupational Exposure;
- o Letters to individuals.

All records reviewed were neat, orderly, and complete. No inadequacies or discrepancies were identified.

#### **9.0 Assurance of Quality**

As it has during the past two outages (in 1991 and 1992), the licensee hired a contractor Quality Control inspector, who has experience as a radiation protection technician, to conduct extensive reviews of work in progress and programmatic observations of the Radiation Protection Department, during the 1993 refueling outage. The end result of this effort was the issuance of a Surveillance Report at the conclusion of the outage. This report documented an improving trend in Radiation Protection performance, but also indicated that there continued to be problems in contamination control.

In addition, the inspectors also were briefed on the status of an assessment of the licensee's Radiation Protection Improvement Program (RPIP). All procedural and program enhancements were completed in April 1993, and this effort represents the licensee's final evaluation of the effectiveness of this program, together with attempting to assure that all program deficiencies identified at the start of the RPIP have been adequately addressed.

#### **10.0 Exit Interview**

The inspector met with the licensee representatives denoted in Section 1 at the conclusion of the inspection on January 21, 1994. The inspector summarized the purpose, scope and findings of the inspection. The licensee acknowledged the findings of the inspection.