U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-271/92-08

Docket No. 50-271

License No. DPR-28

Licensee: Vermont Yankee Nuclear Power Corporation
Brattleboro, Vermont 05301

Facility Name: Vermont Yankee Nuclear Power Station

Inspection At: Vernon, Vermont and King of Prussia, Pennsylvania

Inspection Conducted: April 13 - 17, 1992 (on site)
April 20 - May 7, 1992 (in office)

Inspectors: D. Chawaga, Radiation Specialist — Date 5-28-92
FRPS, FRSSB, DRSS

Approved by: W. Pasciak, Chief, FRPS, FRSSB, DRSS — Date 5-28-92

Areas Inspected: Unannounced inspection of the radiological controls program including previously identified NRC items, respiratory protection, ALARA, access control, facilities and equipment, outage staffing, and operational incidents including an administrative overexposure.

Results: Within the areas inspected, many program improvements were noted. One violation and one non-cited violation were noted for noncompliances with station procedures (see Sections 4.0 and 6.0).

DETAILS

1.0 Personnel Contacted

1.1 Licensee Personnel

D. Bruce, Radiation Protection Assistant
*R. Grippardi, Quality Assurance Supervisor
*E. Lindamood, Radiation Protection Supervisor
*T. McCarthy, ALARA Engineer
*R. Morrissette, Radiation Protection Training Coordinator
R. Pagodin, Technical Services Superintendent
*D. Reid, Plant Manager
R. Wanczyk, Operations Superintendent

1.2 NRC Personnel

*H. Eichenholz, Senior Resident Inspector
P. Harris, Resident Inspector

* Denotes those present at the exit interview on April 17, 1992.

2.0 Purpose

This inspection was an unannounced inspection of the licensee's radiological controls program during the final stages of the 1992 refueling outage. Subject areas targeted in the review included previously identified NRC items, respiratory protection, ALARA, access control, facilities and equipment, outage staffing, and operational incidents.

3.0 Status of Previously Identified Items

(Closed) 50-271/91-23-01, Violation. During an NRC inspection conducted on September 3-6, 1991, a violation of NRC requirements was identified. 10 CFR 71.5 requires that each licensee who transports or offers for transport licensed material outside the confines of its plant shall comply with the applicable requirements of the regulations appropriate to the mode of transport of DOT in 49 CFR 170 through 189. 49 CFR 172.203 requires in part that the description for a shipment of radioactive material must include the name of each radionuclide in the radioactive material and the activity contained in each package of the shipment.

On June 25, 1991, the licensee shipped contaminated equipment as Radioactive Material, to Wyle Laboratories in Huntsville, Alabama, and failed to include Iron-55 (Fe-55) as an isotope on the manifest, or to account for its activity on the manifest. In addition, the manual calculations utilized to determine isotopic activity for the gamma emitting isotopes present in this shipment were based upon plant data that was at least three years out of date, and no longer accurately reflected current plant conditions.

The licensee's corrective actions included removal of the provision in the Station Procedure, AP 0504, "Shipment of Radioactive Material" which allowed manual completion of the shipping manifest for radwaste from the plant's waste stream. Computer generated waste stream profiles which automatically incorporate scaling factors for hard to detect isotopes (such as Fe-55) will be solely used for manifesting such radwaste shipments. The isotopic distribution of waste stream radionuclides used by the computer is updated yearly. According to licensee policy, only shipment manifests involving isotopes and quantities that are clearly known (i.e., a sealed radiation sources with a manufacturer's certificate) may be done manually.

This item is closed.

4.0 Respiratory Protection

A review of respiratory protection practices and procedures resulted in the finding of three areas where personnel failed to adhere to station procedures.

Respirator filter testing was not being performed in accordance with Station Procedure, AP 0505, "Respiratory Protection" which described the operation of the PortaCount particle counting instrument. In particular, AP 0505 described methods and an acceptance criteria for filter testing achievable only through use of the "fit test" mode of PortaCount operation. On April 15, 1992, the inspector observed licensee personnel performing filter tests using the PortaCount in the "count" mode of operation. According to several persons interviewed in the Respiratory Protection group, at about halfway through the 1992 refueling outage, the "fit test" mode was abandoned and the "count" mode was adopted in order to expedite filter testing. The licensee failed to modify AP 0505 to reflect the change in PortaCount operating procedures. In addition, the licensee failed to evaluate the adequacy of "count" mode prior to implementing its use. After inspector identification, the licensee discontinued the use of the "count" mode of operation until the process could be better evaluated and proceduralized.

Station Procedure AP 0505 required that, "Replacement of parts or repair will be performed by personnel who have received documented training in the maintenance of the subject equipment". The contract Senior Radiation Protection Technician (SRPT) who was responsible for and performed replacement of parts and repairs did not have

documented training in those subject activities. Documentation of training was performed after inspector identification on March 29, 1992. Interviews with the SRPT and other plant personnel indicated that the SRPT had performed repair and part replacement on several occasions prior to March 29, 1992. According to licensee personnel, the SRPT's training was performed on February 28, 1992 which was prior to initiating unsupervised maintenance work on respirators. However, that training was not documented in accordance with AP 0505 prior to initiation of unsupervised respirator repair work.

Station Procedure DP 0539, "Radiation Protection Department Contractor Training Program", required that, for Junior Radiation Protection Technicians (JRPTs), "An oral or written exam shall be administered by the Training Department. The completed exam will be retained as documentation of training". The Training Department did not provide training or administer an oral or written exam to a number of JRPTs working in Respiratory Protection. Some training was given to the JRPTs who were performing respiratory protection equipment testing. However, for some JRPTs, this training was administered by the SRPT who was not a member of the Training Department. During interviews with some JRPTs, it was apparent to the inspector that they were not familiar with some key aspects related to the basic operation of the PortaCount equipment. The licensee's program should have precluded the JRPTs who did not receive adequate training from performing unsupervised work. This weakness may have been the result of delegation of training duties to the SRPT who was not an Adjunct Instructor or otherwise a qualified member of the Training Department. The training provided to JRPTs was not consistent with that described in Station Procedure AHP-05-005, "Radiation Protection Training Instructor Guide" (dated 1/92) and less rigorous than the Systems Approach to Training used for in-house technicians.

In the aggregate these findings constitute an apparent violation of licensee Technical Specifications (TS) 6.5.B. which requires, in part, that "Radiation control standards and procedures shall be prepared, approved and made available to all station personnel. These procedures shall show permissible radiation exposure, and shall be consistent with the requirements of 10 CFR Part 20". 10 CFR Part 20.103 (c) describes, in part, that the licensee may make allowance for this use of respiratory protective equipment in estimating exposures to individuals provided that the licensee maintains and implements a respiratory protection program that includes as a minimum written procedures regarding selection, fitting and maintenance of respirators and written procedures regarding supervision and training of personnel (50-271/92-08-01).

5.0 ALARA

Personnel radiation exposure totaled approximately 265 person-rem during the 1992 refueling outage. This exceeded the licensee's original estimate of 179 person-rem by approximately 143 percent. Increased work scope on several jobs contributed to the unexpected exposure. The inspector found that RP personnel were well aware of the causes for their underestimate of outage exposure totals. No specific programmatic weaknesses were identified in this area which may have contributed to the exposure in excess of station goals. Overall performance in this area remained good.

6.0 Operational Incidents

Licensee personnel identified an administrative overexposure of a contract worker on March 3, 1992. The individual was performing work on motor operated valve RD-18 on the Reactor Water Clean-Up (RWCU) room mezzanine when the administrative overexposure occurred. The room is posted and controlled as a High Radiation Area. The workers were aware of the exposure rates in the room and were equipped with alarming dosimeters in accordance with Technical Specification requirements for entry to the area. The worker was assigned a 250 mrem administrative whole body dose limit. After two entries to the RWCU room, the worker's whole body TLD exposure totaled 297 mrem.

Licensee review of records and interviews with personnel indicated that the following scenario likely occurred which resulted in the overexposure incident. The workers signed in on their RWP and obtained the key to the area at around 0830 on the morning of the incident and proceeded to the area. The workers exited the area and signed off of the RWP at 1155. At 1300, the workers signed in again on the RWP, obtained alarming dosimeters and ЬZA air samplers and proceeded to the work area. The RWP stated, "Contact Radiation Protection prior to work on this RWP". However, it could not be ascertained if the workers actually spoke with Radiation Protection personnel at the checkpoint prior to the second entry. In any case, RP personnel failed to become aware of and properly control the second entry.

The workers were aware of the exposure rates in the work area and were wearing alarming dosimeters set at 200 mrem for both entries. The alarming dosimeters reached the alarm setpoint on both entries. RP personnel reset the worker's alarming dosimeter after the first entry without questioning the applicable exposure limit for the worker. Had RP questioned the worker about his administrative limit, the limit would likely not have been exceeded.

The worker who received the administrative overexposure failed to notify RP personnel of his visitor status, radiation exposure margin and accumulated dose after the first entry. RP personnel did not have a program in place to prevent a worker from entering the High Radiation Area with an insufficient exposure margin. RP personnel may have been alerted to the worker's 250 millirem limit had they noticed that the individual was wearing a visitor's security badge. However, the worker's badge was worn beneath his protective clothing and was not readily visible to RP personnel at the checkpoint and instrument issue area.

An alert RP Technician overheard the workers talking about their pocket dosimeter readings as they were leaving the RWCU work area. Good performance was noted on the part of the RP Department and station management from the moment of identification, throughout the analysis of the event and in the timely implementation of corrective actions.

There were some indications that the worker may have been aware of the administrative limit but did not understand the importance of complying with it in light of the interest of minimizing overall exposure and expediting work. It was not clear if this was a result of a failure on the part of the licensee's training program to emphasize the importance of procedural compliance. This approach to radiological work was strongly condemned by all levels of plant management. Personnel involved in the incident were counseled and, although they were essential support personnel involved in critical path work, they were restricted from entry to the RCA. Senior plant management personnel expressed concern over the incident and reminded outage maintenance workers of their expectation that adherence to procedures takes precedence over outage work schedule concerns. The licensee's plan for implementation of additional corrective actions to prevent recurrence included the following:

1. Review the process of issuing and resetting alarming dosimeters. Develop a method which requires some check of available dose by RP personnel when resetting an alarming dosimeter.

2. Develop a dose limit margin to prevent entry into a High Radiation Area with a low margin.

3. Prohibit personnel with a 250 mrem/qtr limit from entering a High Radiation Area.

4. Perform a broad review of how workers and supervisors ensure a proper dose margin and recommend appropriate changes.

According to station personnel and based on a review of station records, the inspector determined that there had been no other administrative overexposure incidents in recent history. This violation will not be subject to enforcement action because the licensee's efforts in identifying and correcting the violation meet the criteria specified in Section V.G. of the Enforcement Policy.

The inspector will review the final actions taken to prevent recurrence of such incidents during a future inspection (20-271/92-08-02).

7.0 Access Control

The licensee recently purchased an integrated access control/alarming dosimeter system which consists of 450 dosimeters, 9 readers and 2 file servers which will be linked to the licensee's Microvax computer system. Implementation of the system was tentatively scheduled for June of 1993. At full implementation, the system will be capable of cross-referencing the plant's personnel data base which contains training and exposure history information. Licensee personnel expect that the system will greatly improved the RP Departments ability to monitor and control worker exposures at the station. The inspector viewed the access control initiatives as significant and worthwhile.

As part of a plan to better control the movement of potentially contaminated material and personnel from the RCA, licensee personnel increased control on the passage of personnel and materials through the door from the turbine building to an outside area near the AOG building (AOG door). The need for better control was identified after evidence of poor frisking practices was discovered. In addition, the recurring problem of contaminated material being found outside of the RCA had not yet been totally resolved.

Denying use of the door would result in a significant loss of productivity and, due to increased traffic, could create potential industrial safety problems in the Maintenance shop. Personnel were allowed to enter and exit via the door. However, potentially contaminated material could not be removed from the RCA via the AOG door. Engineering personnel provided continuous coverage of access and egress while the door was available for use. Postings clearly communicated instructions on door use to the workers in the field. Interviews with plant personnel including door watch personnel indicated that this door was well controlled. In addition, a PCM-1B "half body" monitor was installed for monitoring personnel. The inspector found no weakness in control of activities in this area.

8.0 Outage Staffing and Utilization of Personnel

Lessons learned from prior outages were incorporated into the 1992 outage plan. For example, after problems were encountered on the turbine floor during the 1990 refueling outage, the 1992 outage staff was increased by one extra technician on day shift and two additional technicians were added to the night shift. As a result, the licensee achieved better control of turbine floor work. Difficulties in obtaining adequate numbers of highly qualified RP Technicians may have contributed to some of the radiological control problems experienced during the 1990 refueling outage. For the 1992 outage, incentives were incorporated into technician contracts which enabled RP to achieve desired staffing levels.

Based on numerous findings of contaminated material outside the RCA after past outages, poor frisking practices were suspected to have occurred at remote exit locations. The licensee developed a lesson plan describing radiological door watch duties and posted trained personnel at the remote exit points to monitor frisking practices (see Section 7 of this report for details).

The use of satellite control points allowed RP Technicians and their equipment to be closer to work locations. This change removed congestion from the main control point and helped RP personnel to better control radiological activities in the field. In addition, satellite control points were provided with telephones, fax machines and other supplies such as air samplers, postings, and instruments. The availability of supplies and communication equipment improved the overall efficiency of the RP Department in the field.

9.0 Plant Tours and Postings Practices

It has been the licensee's practice to post the entire Reactor Building as a Radiation Area. Smaller areas within the Reactor Building were again posted as Radiation Areas. In some cases, exposures rates at the boundaries to these smaller discretely posted areas were found to be 15-20 mR/hour. In other cases, the Radiation Area postings did not clearly indicate sources of exposure and dose gradient information to workers in the field. For example, an area which was contaminated was also posted as a Radiation Area even though the exposure rate at the boundary to the area and just outside the area was higher than any exposure rate inside the posted area. The inspector found such posting practices to be confusing and did not clearly indicate dose rate gradient information to the workers.

The licensee supplements the "Radiation Area" posting requirement of 10 CFR 20.202 with additional informational postings. These informational postings often contained local exposure rates and useful information to aid workers in reducing exposure. However, the use of informational signs containing statements such as "Low Dose Waiting Area" or "ALARA Alert - Do Not Loiter", although considered a good practice, does not satisfy the posting requirements of 10 CFR 20.202 for "Radiation Areas".

According to NRC Health Physics Position (HPPOS) #36, which contains a letter dated January 27, 1984 from the NRC's Regional Administrator (Region II) to Carolina Power and Light, posting the entrances to a very large room or building is inappropriate if most of the area is not a radiation area and only discrete areas or individual rooms actually meet the criteria for a Radiation Area. It further explains that posting the entrances to such areas did not provide a substitute for the information or worker awareness provided by a posted sign that identifies the presence and approximate boundary of specific Radiation Areas and do not support ALARA as discussed in 10 CFR 20.1. HPPOS #66 contains IE Information Notice 84-82: "Guidance on Posting Radiation Areas" which supports the NRC's position described in HPPOS #36.

10 CFR 20.202 states that "Radiation Area" means any area accessible to personnel, in which there exists radiation, ... at such levels that a major portion of the whole body could receive in any one hour a dose in excess of five millirem, or in any five consecutive days a dose in excess of 100 millirem.

In establishing an administrative limit for posting radiation areas the licensee should use a reasonable occupancy factor. Continuous occupancy for five consecutive days at approximately 0.8 millirem/hour would result in a cumulative exposure of approximately 100 millirem. However, in practice, 24 hour/day occupancy would not occur in a commercial power reactor's Radiologically Controlled Area. After a reasonable occupancy factor is determined and subsequent Radiation Area posting threshold is established, a determination should made as to whether most of the building, room or area is a Radiation Area or if discrete areas should be posted individually.

Licensee personnel committed to review facility exposure rates, occupancy factors and, if needed, practical methods of implementing programmatic changes to improve worker awareness of Radiation Area boundaries at the facility (50-271/92-08-03).

10.0 Facilities and Equipment

In addition to the access control equipment described in Section 7.0 of this report, the licensee had acquired a versatile equipment decontamination unit and had developed a portable noble gas sampler/detector capable of identifying small noble gas leaks from plant systems. Management support for such acquisitions demonstrated a strong commitment toward improvement of the HP program.

11.0 Exit Meeting

The inspectors met with the licensee representatives listed in Section 1.0 of this report at the conclusion of the inspection on April 17, 1992. The inspector summarized inspection findings during the meeting.