U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report Nos. 50-245/93-12
50-336/93-08
50-423/93-09

Docket Nos. 50-245
50-336
50-423

License Nos. DPR-21 Category C
DPR-65 Category C
NPF-49 Category C

Licensee: Northeast Nuclear Energy Company
P. O. Box 270
Hartford, Connecticut 06141-0270

Facility Name: Millstone Nuclear Generating Station
Units 1, 2, and 3

Inspection At: Waterford, Connecticut

Inspection Conducted: March 30 - April 1, 1993

Inspector: RL Nimitz 4/15/93
R. L. Nimitz, CHP date
Senior Radiation Specialist

Approved by: W. J. Pasciak 4-19-93
W. J. Pasciak, Chief date
Facilities Radiation Protection Section

Areas Reviewed: The inspection was an announced radiological controls inspection. Areas reviewed during the inspection were important to health and safety and included action on previous NRC findings, audits and assessments, organization and staffing, training and qualifications, routine radiological controls, the ALARA Program, planning and preparation for the Unit 3 outage and the condenser tube replacement at Unit 2, efforts to plan and prepare for the implementation of the revised 10 CFR Part 20, and radwaste reduction initiatives.

Results: No safety concerns or violations were identified. The inspector's review identified that generally very good radiological controls were implemented at each of the three units. The enhancement of radiological controls technical support was considered a very good initiative. Very good planning efforts for the upcoming Unit 3 refueling outage and condenser tube replacement at Unit 1 were noted. Very good efforts on preparation for implementation of the revised 10 CFR Part 20 was also noted. Overall station housekeeping was very good. Additional planned efforts to further enhance station housekeeping were also noted.

DETAILS

1.0 Individuals Contacted

1.1 Northeast Nuclear Energy Company

*H. Haynes, Director, Unit 1
*R. Factora, Unit Services Director
*J. Sullivan, Manager, Health Physics Operations
*C. Palmer, Manager, Health Physics Support
*J. Laine, Senior Scientist
*P. Strickland, Unit 1, Radiation Protection Supervisor
*D. Hagan, Unit 2, Radiation Protection Supervisor
*D. Regan, Unit 3, Assistant Radiation Protection Supervisor
*D. Harris, Licensing Engineer
*K. Z. Hannon, Associate Analyst
*R. J. Schmidt, Manager, Radiological Assessment
*T. Burns, Health Physics Training Supervisor
*R. Sachatello, Unit 3, Radiation Protection Supervisor
*J. Doroski, Senior Engineer, Health Physics Support

1.2 USNRC

*P. Swetland, Senior Resident Inspector, Millstone
*S. Shankman, Deputy Director, Division of Radiation Safety and Safeguards, Region I

* Denotes those individuals attending the exit meeting on April 1, 1993.

The inspector also contacted other licensee employees.

2.0 Purpose and Scope of Inspection

Announced inspection of routine radiological controls. The following areas were reviewed:

- previous inspection findings
- audits and assessments
- the ALARA Program including planning and preparation for the Unit 3 refueling outage and replacement of condenser tubes at Unit 1
- organization and staffing
- training and qualifications including training of radiation workers
- radwaste reduction initiatives
- efforts on 10 CFR Part 20
- plant tours

3.0 Licensee Action on Previous Inspection Findings

3.1 (Closed) Inspector-Follow Item (50-245/90-15-01)

NRC to review licensee efforts to remove residual radioactive waste from the Unit 1 "C" Concentrated Waste Tank. The inspector's review indicated that the tank had been about 96% full and that the licensee was able to remove all but about 200 gallons (by volume) of solidified material from the bottom of the tank. The licensee believed that it was not cost-beneficial to remove any additional material since the system was not used, the access point to the tank area was locked, there was no concern regarding water intrusion, and that any further attempts to remove material would result in unnecessary personnel exposure to radiation. The licensee indicated that the removal of 4,000 gallons of residual waste resulted in actual generation of about 22,000 gallons of waste to be treated as a result of flushing operations with a total person-rem expenditure of about 10.7 person-rem. The licensee indicated that the remaining material would be dispositioned following decommissioning. The inspector did not have any additional questions. This item is closed.

3.2 (Closed) Violation (50-336/92-16-01)

The licensee did not provide training for users of powered air purifying respirators. This was a violation of radiation protection procedures. The inspector's review indicated that the licensee implemented the corrective actions outlined in a September 3, 1992, letter to the NRC. The corrective actions included immediate training of personnel when respirators were issued and subsequent development and implementation of a special training course for users of the respirators. This item is closed.

3.3 (Closed) Violation (50-336/92-16-02)

The violation involved the failure to perform an adequate physical measurement of an area traversed by a radiation protection technician. The area was flooded by about 10 inches of water which precluded detection of sources of exposure to the technician's lower extremities. The inspector reviewed this matter relative to the corrective actions outlined in the licensee's September 2, 1992, letter to the NRC. The licensee implemented the procedure enhancements identified in the letter and provided appropriate training of personnel. The licensee reviewed this matter and concluded that, based on physical measurements made after draining of the water, that no apparent unplanned exposure to the individual's lower extremities occurred due to the absence of any significant radiation sources. This violation is closed.

3.4 (Closed) Unresolved Item (50-336/92-26-01)

NRC to review the circumstances and licensee follow-up of a contaminated gauge (moisture separator level transmitter) found in Unit 1 storage area of Warehouse No.4

on October 28, 1992. The warehouse is located within the radiation protection Restricted Area but outside the Radiological Controlled Area. The gauge had apparently been removed from the RCA without an adequate contamination survey. At the time of identification (October 28, 1992), an instrument and control (I&C) technician, who had disassembled the gauge, noted some debris inside the gauge. This prompted him to notify the radiation protection group and request a radiation and contamination survey of the gauge. The subsequent survey identified about 50,000 counts per minute (cpm) by direct frisk of the inside of the gauge with a thin window GM tube and about 10,000 disintegrations per minute (DPM)/100 centimeters squared (cm^2) removable contamination inside the gauge.

The inspector's review indicated that, immediately upon discovery, the licensee's radiation protection group took control of the gauge and initiated an in-depth investigation as to the circumstances surrounding the gauge's release to the warehouse. The I&C technician's hands and the area where he was working were checked and found to be free of contamination. The licensee's radiation protection group also coordinated efforts with the I&C group in order to be notified of the check out of any such gauges from the warehouse so that the gauges could be individually frisked. An inventory of all such gauges was also initiated. The licensee's radiation protection group also initiated comprehensive surveys of all similar type equipment (that could contain residual internal contamination) at the warehouse for each of the three units. A Radiological Deficiency Report was issued. The surveys were made with recently purchased high sensitivity small articles monitors (SAMs). The results of the survey were as follows:

Unit 1: About 6100 individual items in the warehouse were evaluated. Four hundred of the objects were surveyed and 17 objects were indicated as contaminated based on surveys made using high sensitivity SAMs. (Note: The licensee found that of the 17 objects, three were indicated as slightly contaminated by subsequent direct frisking with a thin window GM tube. The remaining articles did not show any indication of contamination when frisked with the GM tube survey meter.)

Unit 2 : Eight hundred objects were surveyed. Nineteen objects were indicated as contaminated based on surveys made with the high sensitivity SAMs. (Note: The licensee found that of the 19 objects, one indicated slight contamination by subsequent direct frisking with a thin window GM tube. The remaining articles did not show any indication of contamination when frisked with the GM tube survey meter.)

Unit 3 : Forty transmitters and other objects were surveyed. No contaminated objects were found.

The inspector's review and evaluation of all survey results indicated that with the exceptions identified above, the above objects would have been considered non-

contaminated using conventional contamination frisking techniques and that the survey results indicated low levels of contamination at general instrument detection limits. The inspector noted that, as indicated above, the objects had been surveyed with high sensitivity equipment recently available. In addition, the inspector noted that the identified contaminated items apparently had been released from the RCA at some time prior to the extensive enhancements made by the licensee to the on-site contamination control program. The inspector was unable to identify under what procedure controls the gauges may have been released. However, the inspector's review noted that the controls established by the enhanced program would preclude release of material that may be internally contaminated.

The inspector concluded that the identified examples were additional examples of weaknesses in the licensee's contamination control program that had been previously identified and the subject of escalated enforcement action taken by the NRC (reference NRC Inspection Report No. 50-245/89-13, dated August 31, 1989). Subsequent to identification of program weaknesses by the NRC and licensee, the licensee took extensive corrective action to preclude release of potentially contaminated material from the RCA. In light of the above and the observations that 1) no programmatic breakdown was indicated, 2) no personnel contaminations or facility contamination occurred, 3) current program controls were acceptable, 4) there was no indication of any willful violation of controls, 5) the event would not have been prevented by the corrective actions for a previous problem since none had been identified, 6) the levels of contamination did not present a significant safety hazard, and 7) the licensee had additional back-up contamination detectors at the exit of the restricted area to identify contaminated material being removed, it was appropriate that this matter be considered as an additional example of a program weakness that prompted the above referenced escalated enforcement action. The inspector also noted that the licensee issued a Radiological Deficiency Report for the above matter and subsequent closed that report. This item is closed.

3.5 (Open) Unresolved Item (50-245/92-03-02)

NRC to review the licensee's methods for providing annual re-training of personnel on procedures. The inspector's previous review (reference NRC Combined Inspection Report No. 50-245/92-03; 50-336/92-03; 50-423/92-03) indicated that the principal training method was apparently by read-and-sign. It was unclear how the licensee evaluated the effectiveness of this read-and-sign training. The inspector's review indicated that in addition to the reading and signing of procedures, the licensee provided training on an annual basis of certain procedures (e.g., emergency plan procedures). Also, the licensee provided significant event training on important matters identified in the industry or at the station. The licensee also provided training on those procedures specifically requested by the on-site radiation protection group. Procedure training administered within the past year included radiation work permits, contamination controls, internal exposure controls, HEPA ventilation system use and instrumentation.

Evaluation methods (e.g., an oral board) were used to evaluate student knowledge of subject material. The licensee informed the inspector that a Training Program Control Committee was used, in part, to select training topics. The licensee also administered confidence weighted testing of students to determine understanding of personnel responsibilities in a number of areas including hot particle monitoring, radiological surveys, and control and labeling of radioactive material. Based on the above, the inspector concluded that additional training on appropriate topics was being provided over and above that provided by the read-and-sign program and that means were in place to verify its effectiveness. This item remains open pending the inspector's review of the program for selection of training topics.

4.0 ALARA Program and Outage Planning and Preparation

The inspector reviewed the licensee's ALARA Program performance including planning and preparation, in the area of radiological controls, for the Unit 3 outage. The inspector also discussed and reviewed the licensee's planning and preparation for the planned condenser tube replacement at Unit 1.

The evaluation of the licensee's performance in this area was based on discussions with cognizant personnel and review of documentation.

The review was with respect to criteria contained in the following:

- Regulatory Guide 8.8, Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations will be As Low As Is Reasonably Achievable
- Regulatory Guide 8.10, Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable

No safety concerns or violations were identified. The inspector's review indicated that very good planning and preparation activities were underway. The inspector also noted that overall ALARA Program performance was very good. The following observations were made:

- The licensee established a multi-disciplinary integrated outage planning team to plan for the Unit 3 outage. This team concept will be used to plan future outages at the other units.

- The licensee's ALARA group provided overview of the Unit 1 drywell hardpipe vent modification efforts. The overview resulted in modification of pipe route for ALARA purposes.

- The licensee's ALARA group reviewed the planned construction locations for several new buildings to be constructed on site. The building locations were

moved to reduce potential personnel exposure from Unit 1 turbine sky shine.

- The licensee will commence, within about a week, injection into the primary system at Unit 1 of depleted zinc (1% Zinc-64). The depleted zinc will be injected in lieu of natural zinc (64% Zinc-64) which has been injected at Unit 1 since 1987. The depleted zinc will minimize generation of Zinc-65. Injection of zinc reduces, based on industry studies, the deposition on internal piping surfaces of Cobalt-60, a large contributor to external personnel radiation exposure.

- The licensee established a corporate ALARA Committee. The committee is chaired by a Vice President. The committee is comprised of representatives from Northeast Utilities Service Company, Northeast Nuclear Energy Company, and Connecticut Yankee Atomic Power Company. The purpose of the committee is to ensure implementation of exposure reduction initiatives.

- The licensee performed extensive planning and preparation, including use of mock-ups, to prepare for the injection of about 124 millicuries of Sodium-24 into the Unit 2 steam generators for purposes of moisture carry-over determination.

- The licensee performed testing of a new design of fuel skeleton compaction equipment at Unit 2 prior to its use on contaminated components. The testing reduced the potential for unplanned personnel exposures during initial handling and operation of the equipment.

- The licensee planned to use a reactor cavity shield for Unit 3 refueling activities.

- The three year average aggregate (1990, 1991 and 1992) radiation exposure at Unit 1 was about 206 person-rem. This value compared very favorably to industry performance for boiling water reactors.

- The three year average aggregate (1990, 1991, and 1992) radiation exposure at Unit 3 was 66 person-rem. This was, according to the licensee, the lowest three year average (for this same time period) aggregate radiation exposure of any pressurized water reactor in the United States.

5.0 Organization and Staffing

The inspector reviewed the organization and staffing of the radiological controls organization. The licensee's Technical Specifications for Unit 1, 2 and 3 and applicable procedures were used as acceptance criteria.

The licensee's performance in this area was evaluated by review of documentation and discussions with cognizant personnel.

No safety concerns or violations were identified. The licensee implemented new initiatives to enhance the capability of the radiological controls organization. The following observations were made:

- The inspector's discussions indicated 24 additional radiological controls technicians were added to the permanent staff.

- The licensee established an operational radiological controls technical group. The group provides technical support in the area of operational radiological controls.

6.0 Training and Qualifications

The inspector reviewed training and qualification program initiatives. The review was with respect to applicable requirements of Technical Specifications and training program procedures.

The inspector evaluated the licensee's performance in this area by review of training records, observation of demonstrations, and discussions with cognizant personnel.

No safety concerns or violations were identified. The inspector's observations indicated that the licensee was proactive and innovative in the establishment of new training opportunities for the radiological controls staff. The following observations were made:

- The licensee developed an interactive computer assisted training program that allows examinations to be taken by students using hand-held key pads. Student answers, entered via the key pads, are immediately available to the instructor for review and evaluation. The use of the key pads allowed the instructor the opportunity to provide additional training, as appropriate, on missed questions. The program was also used by other station organizations.

- The licensee used large scale model radioactive waste transportation vehicles to train personnel for shipping activities. Personnel were required to inspect the vehicles, survey them, and properly placard them as if they were a real shipment of radioactive waste. QA personnel also performed receipt and final inspection of the shipments.

- Special training was developed for personnel responsible for set-up and operation of portable ventilation systems.

- The licensee developed and implemented an in-depth training program to train radiological controls personnel on the revised 10 CFR Part 20.

- The licensee developed an enhanced respiratory protective equipment training program to train personnel on equipment use.

7.0 Audits and Assessments

The inspector reviewed licensee efforts in the area of audits and assessments of program activities. The inspector reviewed audits, assessments, and radiological controls supervisor tour findings for 1992 and 1993. The inspector also reviewed the results of independent industry audits of the program.

No safety concerns or violations were identified. The inspector made the following observations:

- The licensee was in the process of revising the audit program in order to implement the requirements of the revised 10 CFR Part 20 (effective January 1, 1994). The licensee's on-site audit staff and corporate radiological controls staff were developing draft audit schedules. Inspector discussions with QA audit personnel indicated that the audit plan would provide for complete program review in two year cycles.

- Audits and assessments were of good scope and depth and findings were promptly resolved

8.0 Radiological Controls

The inspector reviewed the implementation and adequacy of radiological controls at Units 1, 2 and 3.

The evaluation of the licensee's performance was based on discussions with cognizant personnel, independent inspector observations during tours of Millstone, Units 1 and 3, observations of on-going activities, and review of documentation.

The following elements of the licensee's radiological controls program was reviewed:

- posting, barricading and access control as appropriate, to Radiation, High Radiation, and Airborne Radioactivity Areas
- High Radiation Area access point key control
- personnel adherence to radiation protection procedures, radiation work permits and good radiological control practices
- use of dosimetry devices
- airborne radioactivity sampling and controls
- contamination controls.

No safety concerns or violations were identified. The inspector's review indicated that very good radiological controls were implemented for the program attributes reviewed.

9.0 Revised 10 CFR Part 20 Efforts

The inspector reviewed the licensee's efforts in the area of planning and preparation for the implementation (January 1, 1994) of the revised 10 CFR Part 20. The inspector's review indicated the following:

- The licensee is currently re-writing all radiation protection procedures to provide for implementation of the revised 10 CFR Part 20. The licensee has dedicated procedure writers working full time on this task.

- The licensee was developing basis documents, technical documents, and position papers to support implementation of the revised 10 CFR Part 20.

- The licensee was creating a Radiation Protection manual format for the procedures.

- The progress on the revised program was aggressively monitored with status reports periodically provided to management.

- The licensee was planning implementation of an extensive computerized records management system to implement the revised 10 CFR Part 20.

No safety concerns were noted. The licensee was effectively planning and preparing for implementation of the revised 10 CFR Part 20.

10.0 Radioactive Waste Reduction Initiatives

The inspector reviewed licensee radwaste reduction initiatives. The following observations were made:

- The licensee has implemented an enhanced awareness program to make employees aware of the need to reduce radioactive waste.

- The licensee implemented the use of reusable material and incinerable materials.

- The licensee recently formed a Radioactive Waste Reduction Committee.

- Observations during station tours did not identify any apparent radwaste concerns.

11.0 Plant Tours

The inspector toured the station periodically during the inspection. The following observations were noted:

- Overall housekeeping and plant conditions were considered very good. The extensive painting and decontamination efforts in Unit 1 were noteworthy as were the painting efforts in Unit 3. The licensee plans additional painting efforts in Unit 1. Also initiatives to improve housekeeping at Unit 2 were being developed.

12.0 Exit Meeting

The inspector met with licensee representatives (denoted in Section 1.0) on April 1, 1993, 1992. The inspector summarized the purpose, scope and findings of the inspection. No written material was provided to the licensee.