

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report Nos. 88-01
88-01
88-01

Docket No. 50-245
50-336
50-423

License No. DPR-21
DPR-65
NPF-49

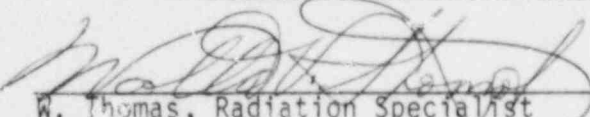
Category C

Licensee: Northeast Nuclear Energy Company
P. O. Box 270
Hartford, Connecticut 06101

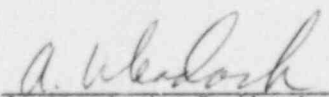
Facility Name: Millstone Nuclear Generating Station

Inspection At: Waterford, Connecticut

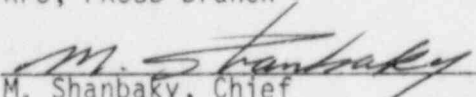
Inspection Conducted: January 12-15, 1988

Inspectors 
W. Thomas, Radiation Specialist
FRPS, FRSSB Branch

2/11/88
date


A. Weadock, Radiation Specialist
FRPS, FRSSB Branch

2/11/88
date

Approved by: 
M. Shanbaky, Chief
Facilities Radiation Protection Section,
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Safeguards Branch

2/16/88
date

Inspection Summary: Inspection on January 12-15, 1988, (Report Nos.
50-245/88-01, 50-336/88-01, 50-423/88-01)

Areas Inspected: Routine, unannounced inspection to review radiation protection activities associated with the Unit 2 outage. Areas reviewed included internal and external exposure controls, posting and labeling, and station ALARA practices. The inspection also included a review of the Unit 1 drywell personnel access controls during refueling.

Results: No violations were identified. The radiation protection program was being effectively implemented during the outage.

DETAILS

1.0 Persons Contacted

M. Bigiarelli, Unit 1 Reactor Engineer
*M. Brennan, Unit 1 Radiation Protection Supervisor (RPS)
J. Keenan, Unit 2 Superintendent
*D. Fitts, Unit 2 Alara Coordinator
*B. Granados, Station Health Physicist
*H. Haynes, Station Services Superintendent
*J. Laine, Unit 2 RPS
*F. Perry, Unit 3 Asst. RPS
*R. Sachatello, Unit 3 RPS
*S. Scace, Millstone Station Superintendent
*P. Simmons, RPS, Services

*Attended the exit meeting on January 15, 1988

Other licensee personnel were also contacted during the course of this inspection.

2.0 Purpose

The purpose of this routine, unannounced inspection was to review the implementation of the Radiation Protection Program during the Unit 2 outage. The following areas were included in this review:

- Posting and Labeling,
- External Exposure Controls,
- Internal Exposure Controls,
- ALARA,
- Unit 1 Drywell Personnel Access Controls during Refueling.

3.0 Posting and Labeling

The licensee's program for the posting and labeling of radioactive materials and radiological areas was reviewed against criteria contained in the following:

- 10 CFR 20.303, "Caution signs, labels, signals and controls,"
- Procedure SHP 4906, "Posting of Radiological Controlled Areas."

The licensee's performance relative to these criteria was determined from discussion with cognizant personnel and tour of Unit 2 controlled areas.

Within the scope of this review, no violations were identified. All observed radiological areas and radioactive material were satisfactorily posted and labeled; area radiological housekeeping was noted to be generally good. The inspector noted the licensee had extensively posted the Unit 2 containment with "ALARA Area" signs to inform workers as to low dose rate areas in an effort to reduce exposure. The licensee is also

evaluating the use of different colored signs at the station to emphasize differences in area dose rates to station workers.

4.0 External Exposure Controls

The licensee's program for controlling work activities and worker external exposure during the Unit 2 outage was evaluated by:

- interviews of cognizant personnel;
- observation of ongoing steam generator (S/G) eddy-current testing (ECT) and sludge lancing activities;
- review of selected radiation work permits (RWPs) and ALARA control sheets associated with S/G maintenance ; and
- review of selected radiological surveys and S/G entry sheets associated with the S/G maintenance activities.

Within the scope of the above review, no violations were identified. The licensee was noted to be effectively controlling worker exposure associated with S/G maintenance. Remotely-operated equipment was being utilized to perform S/G ECT and tube-plugging activities. New CCTV equipment had been installed since the previous outage to improve visual surveillance over the S/G channel head and handhole platforms. Contractor HP technicians were knowledgeable of area dose rates, worker stay times and licensee procedures.

The licensee's ALARA exposure estimates for S/G primary-side maintenance during the current outage reflect an approximate 50% decrease from 1986 actual exposure, as noted below:

<u>Task</u>	<u>1988 estimate (person-rem)</u>	<u>1986 actual(person-rem)</u>
nozzle dam installation removal	79	92
Eddy-Current Testing (ECT)	33	50
tube plugging	26	138 (includes sleeving)
	<u>138 Total</u>	<u>280 Total</u>

The licensee indicated that with the utilization of more effective remote equipment, S/G ECT and tube-plugging activities are increasingly well-controlled and that the majority of S/G exposure stems from nozzle dam installation and removal. Licensee efforts to reduce exposure for this task currently include evaluating whether to purchase new nozzle dams.

A previous NRC inspection of Unit 2 outage activities (see NRC Report No. 50-336/86-20) noted effective radiological control of high-attention, high-exposure work activities, but noted the need for increased licensee surveillance of more routine radiological operations. This was

demonstrated by observations of various poor work practices, including worker failures to sign in and out on controlling RWP's, worker disregard for contaminated area boundaries, etc. Adequate numbers of qualified HP technicians were available to support all ongoing outage activities during the current outage. Area HP technicians appeared vigilant towards routine activities and no such deficiencies were observed by the inspectors. This was noted to represent a licensee improvement in this area.

5.0 Internal Exposure Controls

The licensee's program for monitoring and limiting intakes of airborne radioactive materials was reviewed against the following criteria:

- 10 CFR 20.103, "Exposure of individuals to concentrations of radioactive materials in air in restricted areas,"
- Procedure SHP 4905, "Radiological Surveys,"
- Procedure SHP 4907, "Internal Exposure Control (Bioassays),"
- Procedure 908/2908/3908I, "Whole Body Counting (chair)."

Licensee performance in this area was evaluated by the following methods:

- review of selected air sample counting records,
- review of respirator qualifications for selected workers signing in on RWP's requiring respiratory protection,
- review of selected worker contamination reports and whole body count (WBC) records,
- discussion with cognizant personnel.

Within the scope of the above review, no violations were identified. The licensee was performing adequate air sampling to monitor airborne radioactive materials and support work evolutions. Review of selected licensee contamination and WBC records indicated the licensee was complying with bioassay procedures in the follow-up of those few workers with identified minor intakes.

The inspector noted however, the large number of collective MPC-hours accrued during the initial containment decontamination effort (approximately 1200-1500 MPC-hours). The licensee has no capability for airborne radioiodine cleanup other than containment purge. During the first few shifts after initial containment entry, up until containment purge was initiated, workers performed decontamination activities in airborne radioiodine concentrations ranging up to 6 MPC. No respiratory protection was used during this effort. Individual MPC-hour totals ranged up to approximately 33 MPC-hours, typically accumulated over several entries. The licensee stated that no individual exceeded the administrative limit of 35 MPC-hours; inspector review of MPC-hour tracking records substantiated this statement.

The inspector stated that although no administrative or regulatory limits were exceeded, the licensee's practice was of concern in that it placed additional demands on the HP staff's system for tracking and controlling MPC-hours. The licensee stated that the decision to begin immediate decontamination efforts, rather than wait until after containment purge, was an extension of the overall goal to reduce outage time (see section 6.0). The licensee also indicated the decision was made at the station management level, with appropriate regard for radiological safety ramifications. The inspector stated that future licensee utilization of this or similar practices will continue to receive close examination to ensure decisions are made at the appropriate level and effective MPC-hour tracking is established.

6.0 ALARA

The inspector reviewed licensee ALARA efforts in support of the Unit 2 outage. Licensee performance in this area was evaluated by:

- discussion with the Unit 2 ALARA coordinator and staff;
- discussion with station management;
- observation of work in controlled areas;
- review of selected ALARA exposure control sheets;
- review of the 1986 Unit 2 outage ALARA report;
- review of current outage task exposure estimates and ALARA reviews for refueling and steam generator maintenance;
- review of the following memos:
 - o NE-87-RA-1030, dated December 8, 1987, titled "Three Year 1987-1989 Exposure Budgets and Forecasts,"
 - o MP-2-6585, dated January 4, 1988, titled "Three-Year 1987-1989 Exposure Budgets and Forecasts."

Within the scope of the above review, no violations were identified. Overall exposure for the current outage has been estimated at approximately 564 person-rem, as compared to an actual 1986 outage exposure of approximately 873 person-rem. The current outage has been scheduled to last approximately 60 days, which represents a significant reduction when compared to previous Unit 2 outage durations. The licensee indicated the decrease in duration reflects station desires to better organize and manage the outage, as well as decrease collective exposure.

Several improvements in performance were noted since the previous review of Unit 2 ALARA (see NRC Report No. 50-336/96-20). These include the following:

- One exposure goal was being used for outage tasks, rather than independently derived corporate and station goals for each task, as was noted during the 1986 outage. Exposure goals are now established as a joint venture; the corporate Radiological Assessment Branch (RAB) proposes goals, based on Station input and long-range exposure reduction plans. Proposed goals are then reviewed and approved by station management. This goal-setting process is common to all three units.

The inspector noted, however, that improvements in timeliness and communication relative to this process are still necessary. Revised RAB goals for the 1988 outage were not received by the Millstone HP staff until mid-December, 1987, approximately 10 days before the outage began. Additionally, despite apparent on-going station input to RAB during the formulation of these goals, significant revisions to the RAB goals had to be made by the station prior to approval.

Licensee management stated the need for further refinement of the goal setting process had been recognized and additional improvements were being evaluated.

- Input from the station work groups to the Unit ALARA staff was more timely than in 1986, allowing for more effective ALARA planning.
- Effective daily tracking of accruing outage exposure and man-hours was being performed and results were widely communicated.
- The licensee had utilized the station Preventive Maintenance Management System (PMMS) in the exposure estimating process to provide for more accurate exposure estimates for large preventive maintenance tasks.
- The level of Station management support and concern for ALARA was significant and highly noticeable.
- The ALARA staff was actively researching and requesting additional technology to reduce exposure (quick-close hatch on fuel transfer chute, WEPA cavity decon, etc.)

The inspector did note, however, that several outage tasks (including refueling, S/G radiography and S/G sludge-lancing) were estimated at higher man-hours and exposure than during the previous outage. Review of previous outage task man-hour totals and discussion with the ALARA coordinator identified that man-hour estimates provided by the work groups were not always competitive with previous performance and did not always reflect the use of time-saving tools, etc. Consequently, the inflated man-hour estimates occasionally resulted in exposure estimates higher than previous years.

The licensee acknowledged the above concern and indicated the impact of man-hours and worker efficiency on goal-setting would be reviewed. Effectiveness of ALARA goals will continue to be reviewed during future inspections.

7.0 Unit 1 Drywell Access Controls

The inspector reviewed licensee restrictions and controls over Unit 1 drywell access during refueling and fuel movement. The need for such controls was discussed in two GE generic information letters, sent to licensees in 1973 and 1980. These letters communicated information concerning the potential for extremely high dose rates which could be generated in BWR drywells in certain refueling situations.

During this inspection, NRC review consisted of discussion with cognizant personnel and review of the following:

- General Electric Nuclear Fuel transfer bridge drawing No. 572-RN02, dated 25, February 1972,
- Procedure OP 328B, "Fuel Loading/Unloading/Shuffling,"
- Procedure 0328G, "Upper Level Drywell Access Control During Spent Fuel and Irradiated Component Transfer."

The inspector verified the licensee was aware of the GE informational material and the potential for high dose rates in the drywell. During refueling, personnel access in the Unit 1 drywell is limited to elevations below the 54' elevation, well below the bioshield wall (which extends to approximately the 71' level). All RWPs during the refueling period are stamped in red ink with the upper elevation access limitations; ladders to elevations above 54' are locked and posted "no-entry."

The licensee utilizes a shielded "Fuel Transfer Bridge" (cattle chute) during refueling to reduce dose rates in the drywell during fuel transfer operations. The inspector verified that the cattle chute is located at Unit-1 and has been used for spent fuel and irradiated materials transfers to the spent fuel pool. A review of the drawing provided by the Unit-1 Reactor Engineer indicated that the cattle chute contains 6 inches of poured lead. A copy of the General Electric drawing was provided to the inspector. Additionally, a copy of OP 328G, effective date February 3, 1988 was provided to the inspector, this procedure provides guidelines and defines the responsibilities for coordination of work activities and implementation of administrative controls for performing work above the 54' elevation of the Unit-1 drywell during transfers from the Reactor cavity to the spent fuel pool. The Station Health Physicist indicated that this procedure will be included as a part of the Health Physics Technician Training Program.

8.0 Exit Meeting

The inspectors met with the licensee personnel denoted in Section 1.0 of this report on January 15, 1988. At that time the inspector summarized the purpose, scope and findings of this inspection.