

U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report Nos. 50-245/94-16
50-336/94-15
50-423/94-14

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

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

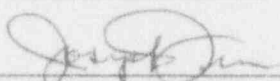
Licensee: Northeast Nuclear Energy Company
P. O. Box 270
Hartford, Connecticut 06141-0270

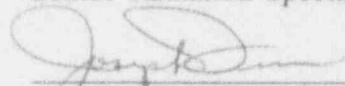
Facility Name: Millstone Nuclear Generating Station
Units 1, 2, and 3

Inspection At: Waterford, Connecticut

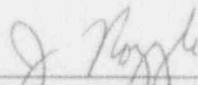
Inspection Conducted: March 22-25, 1994

Inspectors:

 4/4/94
for R. L. Nimitz, CHP date
Senior Radiation Specialist

 4/4/94
for L. Eckert, Radiation Specialist date

Approved by:

 4/7/94
for R. J. Bores, Chief date
Facilities Radiation Protection Section

Areas Reviewed: This inspection was an announced radiological controls inspection. Areas reviewed during the inspection included previous findings; changes; audits and appraisals; organization and staffing; training and qualification; external and internal exposure controls; radioactive material and contamination controls; radioactive waste handling, storage processing, shipping; and station conditions. Also reviewed were routine radiological controls activities at Units 1,2, and 3.

Findings: The inspection identified that generally very good radioactive waste handling, storage, processing, and transportation programs were implemented. The programs were generally well managed with a good level of technical expertise available to support these programs. Radiological controls for on-going activities at Unit 1,2 and 3 were generally effective. Three licensee-identified violations of radiation protection procedures were reviewed. Consistent with the criteria specified in 10 CFR 2, Appendix B, these violations were not cited.

DETAILS

1.0 Individuals Contacted

1.1 Northeast Nuclear Energy Company

- *T. Burns, Supervisor, Health Physics Training
- *J. Burdick, Radiation Protection Supervisor, Support
- *F. Dacimo, Director, Unit 3
- *J. Duroski, Senior Engineer, Radiation Protection
- *R. Dougherty, ALARA Coordinator, Unit 1
- *R. Factora, Director-Unit Services
- *J. Goergen, Radiological Engineering Supervisor
- *D. Hagan, Radiation Protection Supervisor, Unit 2
- R. King, ALARA Coordinator, Unit 3
- *A. Klotz, Senior Scientist, Radiological Assessment Branch
- *J. Laine, Radiological Engineering Supervisor
- *A. LaMan, Radiation Protection Specialist
- D. Miller Jr., Vice-President, Millstone
- *F. Perry, Assistant Radiation Protection Supervisor, Unit 3
- *W. Robinson, Radiation Protection Supervisor, Support
- R. Sachatello, Radiation Protection Supervisor, Unit 3
- *G. Seckinger, Assistant Radiation Protection Supervisor, Radioactive Materials Handling
- *P. Simmons, Radiation Protection Supervisor
- *T. Stafford, Assistant Radiation Protection Supervisor, Unit 1
- *P. Strickland, Manager Technical Training
- *S. Turowski, Acting Manger Health Physics Support
- P. Weekley, Acting Director, Unit Services
- *C. Wend, Radiation Protection Supervisor, Unit 1

1.2 USNRC

- R. Arrigi, Resident Inspector, Millstone Unit 3
- R. DeLaEspriella, Resident Inspector, Millstone Unit 2
- D. Dempsey, Resident Inspector, Millstone Station
- K. Kolaczyk, Resident Inspector, Millstone Unit 1
- *P. Swetland, Senior Resident Inspector, Millstone

* Denotes those individuals attending the exit meeting on March 25, 1994.

The inspectors also contacted other licensee employees.

2.0 Purpose and Scope of Inspection

The following areas were reviewed during this announced radiological controls inspection.

- changes
- organization and staffing
- training and qualifications
- audits and appraisals
- solid radioactive waste program
- transportation program
- storage facilities
- external and internal exposure controls
- radioactive material and contamination controls
- station conditions

3.0 Changes

The inspector reviewed selected changes made by the licensee since the previous inspection in the area of radioactive waste processing, handling and shipping. Items reviewed included organization, processes, procedures, and facilities and equipment.

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

The inspector's review indicated there were no significant changes in the organization. The licensee implemented Radioactive Waste Reduction Committees at each Unit. For example, these committees have spearheaded licensee efforts to: use metallic staging rather than wooden planking on scaffolds, strategically place additional outage tool cribs, and substitute consumable materials for disposable materials. This was considered a very good initiative.

No safety concerns or violations were identified.

4.0 Organization and Staffing

The inspector reviewed the organization and staffing of the on-site radiological controls organization. The review was with respect to criteria contained in applicable Technical Specifications and licensee administrative documents.

The inspector evaluated licensee performance in this area by review of applicable documentation, discussions with cognizant individuals, and independent observation of on-going work activities during tours of the facility. There was generally very good supervisory and management oversight of work activities.

No changes that would adversely affect the organization were identified. The licensee's Radiation Protection Manager recently left the station for another position. The licensee identified personnel to fill positions in acting capacities. No unqualified personnel were identified temporarily filling positions.

No safety concerns or violations were identified.

5.0 Training and Qualification

The inspector reviewed the training and qualification of individuals involved with the storage, handling, processing, transportation, and generation of radioactive waste. The review was with respect to criteria contained in the following.

- IE Bulletin No. 79-19, Packaging of Low-Level Waste Radioactive Waste for Transport and Burial, dated August 10, 1979
- NRC Information Notice No. 92-72, Employee Training and Shipper Registration Requirements for of Transportation Radioactive Material, dated October 28, 1992, and
- 10 CFR 50.120, Training and Qualification of Nuclear Power Plant Personnel

The inspector reviewed organizational charts and shift manning schedules and selected for review those individuals involved with the aforementioned activities. The inspector reviewed the qualification and training documentation, and scope of training for radiation protection personnel, support personnel, and operations personnel. The inspector also reviewed the training and qualification of radiation workers relative to minimization of radioactive waste. No discrepancies were noted.

Several existing lesson plans and instructor guides were reviewed by the inspector. At the time of the inspection, the licensee was taking efforts to revise their radioactive materials lesson plans to a more task-based format.

Two individuals within the Training Department were responsible for providing training to those individuals with the responsibility of preparing and certifying the adequacy of radioactive waste shipments. Both of these trainers have experience in radioactive materials handling. The licensee has a program which provides for the professional development of their trainers.

At the time of the inspection, the licensee had provided training regarding gas generation in waste liners but that training was specific to nitrogen inerting of waste liners, to prevent hydrogen generation. A methane generating microbe is currently believed to exist in the Unit 1 filter sludge tank. The inspectors suggested that more specific training on methane generating microbes be provided to those individuals with

the responsibility of preparing and certifying the adequacy of radioactive waste shipments.

Training regarding changes to existing procedures appeared good based on discussion with personnel and review of procedure changes.

The inspector noted that the licensee was developing a qualification matrix, to be maintained by radwaste supervision, in order to provide ease of identification as to who is qualified to perform various tasks. This was considered a good initiative.

No safety concerns or violations were identified.

6.0 Audits and Appraisals

The inspector reviewed audits and appraisals of radiation protection and radioactive waste activities, including transportation, relative to criteria contained in Technical Specification 6.5, Audits.

The evaluation of the licensee's performance in this area was based on review of audits, appraisals and surveillances, and discussions with cognizant personnel. The following audits, reviews and appraisals were considered.

- QAS Audit Report No. A24041, Millstone Health Physics Program, dated March 4, 1994
- Radiological Quarterly Tracking Reports for 1993 and 1994
- Evaluation of 1993 Pocket Dosimeter/TLD Dose Accounting, dated February 8, 1994
- QAS Audit Report No. A23058, Technical Specification Implementation Verification-1993, dated January 24, 1994
- Millstone Health Physics Radioactive Waste Appraisal, dated November 15, 1993
- Millstone Postings for 10 CFR Part 20, dated January 13, 1994
- QAS Audit No. A60559, Radwaste Process Control Program, dated November 24, 1992
- Radwaste Program Appraisal, dated November 15, 1993

The inspector's review indicated an effective quality assurance program for radiation protection and radioactive waste activities was in place. Audits and appraisals were generally thorough and exhibited a good balance between performance-based and document reviews. The inspector noted that appropriately qualified individuals performed the audits and surveillances, and checklists, as appropriate, were prepared for use during the audits and surveillances.

No safety concerns or violations were identified.

7.0 Procedures and Records

The inspector reviewed the procedures and records associated with the radioactive waste storage, handling, and transportation program and discussed the program with cognizant personnel. Documents relative to criteria contained in applicable licensee administrative procedures, Technical Specifications, and procedures were reviewed as were changes made in these procedures since the previous inspection in this area.

The review indicated that the procedures provided a good level of guidance to personnel. The inspector noted that the licensee's procedures included suggestions contained in NRC Information Notice No. 92-62, Emergency Response Information Requirements for Radioactive Material Shipments.

No safety concerns or violations were identified.

8.0 Radioactive Waste Handling and Storage

The inspector toured the station and reviewed handling and storage of radioactive waste. The evaluation of the licensee's performance was based on independent observations during station tours and discussions with cognizant personnel.

The inspector's review of storage facilities within the facility indicated the licensee was appropriately storing radioactive waste. At the time of the inspection, the licensee believed that an anaerobic microorganism resides in the Unit 1 filter media sludge tank. This microorganism generates methane gas. The licensee believes that this microbe only resides in the Unit 1 filter media storage tank because there are few tie-ins into this system and a liner of spent reactor water clean up filter media (originating from another filter media tank) was prepared and shipped in January 1994 with no detectable levels of methane found. However, the inspector noted that conditions may not have been favorable for significant microbial reproduction, as the shipment was shipped in cold weather conditions. This was also recognized by the cognizant engineer.

The inspectors did note that there is no way of regulating temperature in the existing low-level waste storage facility (LLWSF). Therefore, waste stored in the LLWSF will be subjected to seasonal temperature variations. As a consequence, prediction of microbiological activity will be difficult.

The inspectors did inform the licensee of the specific regulations prohibiting the transport (and others prohibiting burial) of materials that generate harmful gases. In the long-term, the licensee will need to solve this problem whether LLW is stored on-site or continued to be buried in an out-of-state burial facility. If burial privileges are lost in the future, the licensee will need to set up appropriate surveillances for spent Unit 1 filter media liners stored in the LLWSF. The licensee recognizes the significance of this situation, and was taking action to resolve these matters at the time of the inspection.

The inspector noted that the licensee has developed a review plan for on-site storage of radioactive waste. The inspector indicated that definitive storage and radioactive waste surveillance programs should be developed, as appropriate, to support the potential closing of waste burial sites in the summer of 1994.

No safety concerns or violations were identified.

9.0 Radioactive Waste Shipping Activities

The inspector reviewed radioactive waste shipping activities. The review was with respect to criteria contained in the following:

- 10 CFR 71, Packaging and Transportation of Radioactive Material
- 49 CFR, Transportation
- applicable licensee procedures

The evaluation of the licensee's performance in this area was based on discussions with personnel, review of documentation, and observation of two waste shipments.

The inspector selected for review 1993 and 1994 radioactive waste shipments and other shipments of radioactive material representative of those routinely and non-routinely shipped from the site (e.g., de-watered resins, filter cartridges and irradiated hardware). The inspector reviewed applicable documentation (including radiation and contamination survey data), Part 61 analyses, certificates of compliance, and procedure adherence. The inspector also visually inspected an out-going spent resin shipment and a shipment of dry-active waste. Matters reviewed during the inspection included performance of applicable radiation and contamination surveys, use and adherence to procedures, and loading of the waste. No concerns were noted.

The following radioactive waste/material shipment records were reviewed (Table 1).

Table 1
Radioactive Waste Shipping Documents

Shipment Number	Description	Total Activity	DOT Type
94-011-3	Dewatered Unit-3 bead resin	95 Ci	LSA > A ₂
94-093-1	2 Seavans DAW for processing	147 mCi	LSA
94-016-1	Dewatered Unit-1 ecodex resin	55.3 Ci	LSA > A ₂
94-003-3	DAW and oil for processing	24 mCi	LSA
94-068-1	7 SBA-4 metal boxes containing Unit-1 condenser tubing for processing	44 mCi	LSA
93-034-1	2 Unit-1 liners of dewatered condensate resin	1.4 Ci	LSA > A ₂

These records were found complete. The licensee maintained copies of the consignee's licenses as required. The inspector verified that the licensee was a registered user of the shipping casks used for the shipments noted above.

The inspector's review indicated that the transportation program was generally well managed. The licensee maintained comprehensive documentation packages for all out-going shipments.

No safety concerns or violations were identified.

10.0 Part 61 Analyses

The inspector reviewed the licensee's scaling factors used for radioactive waste classification purposes. The evaluation of the licensee's performance in this area was based on discussions with cognizant personnel and review of procedures. The inspector reviewed this area relative to guidance and suggestions provided in NRC Information Notice No. 86-20, Low-Level Radioactive Waste Scaling Factors, 10 CFR Part 61, dated March 28, 1986, and the NRC Branch Technical Position (BTP) on waste classification, dated May 11, 1983. The inspector reviewed all waste streams and waste types generated.

Good efforts were made by the licensee to develop representative scaling factors. Scaling factors for nine different waste streams were developed for Unit 1 while nine and eight waste streams were characterized for Units 2 and 3 respectively. For example, scaling factors were developed for the following waste streams from Unit 1:

condensate resin, RWCU resin, spent fuel pool resin, Ecodex resin, zeolite resin, liquid radioactive waste filter, CRD suction filters, concentrates, and dry active waste. Considering system design (for example, a lack of recirculation capability and/or a single spent resin tank), adequate measures were taken to ensure representative samples.

The inspector's review indicated that the licensee established and implemented appropriate scaling factors and that factors were being updated in accordance with recommendations contained within the above BTP.

No safety concerns or violations were identified.

11.0 External and Internal Exposure Controls

11.1 General

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

The inspector toured the radiologically controlled areas of the plant and independently reviewed the following elements of the licensee's external and internal exposure control program:

- 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 personnel contamination control devices;
- use of dosimetry devices;
- use of respiratory protection equipment;
- adequacy of airborne radioactivity sampling and analysis to plan for and support ongoing work;
- timeliness of analysis of airborne radioactivity samples including supervisory review of sample results;
- installation, use and periodic operability verification of engineering controls to minimize airborne radioactivity;
- records and reports of personnel exposure;
- adequacy of radiological surveys to support pre-planning of work and on-going work;
- adequacy of supply, maintenance, calibration, and performance checks of survey instruments; and
- hot particle controls.

The review was with respect to criteria contained in applicable licensee procedures and the revised 10 CFR Part 20, Standards for Protection Against Radiation.

The evaluation of the licensee's performance was based on discussions with cognizant personnel, independent inspector observations during tours of Millstone Units 1, 2 and 3, observations of on-going work activities, and review of documentation. During the inspection, the inspectors entered the Unit 1 main condenser and observed on-going work activities. The inspectors also entered and toured the Unit 1 drywell. The inspectors' review principally focused on review of outage activities at Millstone Unit 1. The inspectors' review indicated the radiological controls program was effectively implemented. Proper adherence to radiation work permits was noted and contamination controls were appropriate. Oversight of activities by radiation protection personnel appeared very good. Posting, barricading and access control (as appropriate) to radiological controlled areas also appeared very good.

The inspector noted that licensee efforts were underway to provide real time review of personnel signing in on RWPs to ensure individuals only sign in on authorized RWPs.

The licensee implemented an effective radiation protection program.

11.2 Whole Body Counting Program

During the inspection, the inspector reviewed the licensee's whole body counting program. The licensee's primary method for the evaluation of internal doses was the utilization of whole body counters (WBC). A stand-up model and a chair model whole body counter were used for this purpose. Each unit was subject to a daily background check, and daily source checks with the results plotted so that trends might be more readily discernable. An action level of +/- 15% was established and WBC instruments falling outside this range were taken out of service. An annual calibration is performed with an eight radionuclide mixed source. Quality control checks were conducted quarterly using blind samples provided by a vendor. The licensee conducted an additional quality control test by using a phantom on April 7, 1993, and stated their intent to continue testing in this manner on a once-every-three-year basis. The most recent quality control tests have identified no programmatic deficiencies.

The licensee stated that it was their perspective that new 10 CFR 20 would initially have little impact on the number of individuals monitored by whole body counting. The licensee will continue to conduct baseline, annual, and termination whole body counts. The licensee will also conduct random whole body counts. The random whole body counting process has not been procedurally detailed but, in practice, the sample set will be biased through the selection of target groups of radiation workers (for example, respirator users on a radiologically challenging job).

The inspector concluded the licensee implemented an effective whole body counting program.

12.0 Review of Radiological Control Events

The inspector reviewed selected radiological controls matters identified during the inspection. The matters reviewed and inspector findings are discussed below.

12.1 Fall of Individual Into the Unit 2 Spent Fuel Pool

The inspector reviewed the circumstances surrounding, corrective actions taken, and radiological consequences associated with an individual who fell into the Unit 2 spent fuel storage pool on March 8, 1994.

The inspector's review indicated the individual had been originally involved in work activities associated with installation of rodlets into fuel in the spent fuel storage pool since about February 2, 1994. On March 7, 1994, the individual became involved in the vacuuming of the spent fuel storage pool. On March 8, 1994, the individual signed in on a radiation work permit and started vacuuming the pool. During the vacuuming, the individual was crossing back and forth across an opening between the fuel transfer canal and the spent fuel pool. The individual's safety harness caught an "1" bolt, screwed into the wall between the canal and pool, causing the individual to fall into the spent fuel pool. The individual was not injured and was quickly removed from the water. The individual did not completely submerge but was wetted up to the shoulders. Subsequent personnel contamination surveys of the individual did not identify any contamination. Whole body counting did not identify any apparent intake of radioactive material. A bioassay for tritium did not identify any uptake of tritium. No alpha emitters were identified during the surveys. The licensee subsequently installed a small "bridge" over the opening connecting the fuel transfer canal with the spent fuel storage pool. The licensee initiated a plant incident report.

The licensee's review determined that the individual was logged in on the incorrect radiation work permit. The individual was logged in on an RWP associated with the rodlet work (RWP No. 19) when he should have been logged in on RWP No. 27, Task 2, associated with vacuuming of the fuel transfer canal. The licensee counseled the individual regarding the necessity of reading and logging in on the correct RWP. The individual was familiar with both RWPs since he had previously worked under both, and the protective clothing for the permits was the same. The licensee also counseled the radiation protection technician covering the work activity regarding the necessity to review the RWP during the pre-job briefing and the need to ensure that workers were using the correct RWP. A copy of a critique of the event was distributed to all Unit 2 radiation protection personnel and Unit 2 and 3 radiation protection supervisors. In addition, the critique was forwarded to the Training

Department for inclusion in upcoming continuing training of all radiation protection technicians at the station.

The inspector noted that the individual did not adhere to procedure RPM 5.22, Basic Worker Responsibilities, in that he did not review the RWP and note the job scope and allowable work activities prior to performing vacuuming activities. The vacuuming activities were not authorized under the radiation work permit the individual logged in on. This is an Apparent Violation of Technical Specification 6.11 which requires, in part, that radiation protection procedures be implemented. The inspector noted that the event had minor safety significance, it could not reasonably have been prevented as a result of corrective actions taken within the past two years for a previous event, it was quickly corrected with comprehensive action taken to prevent recurrence, it was not willful, and it was not required to be reported. Since this violation was identified by the licensee, consistent with the guidance in 10 CFR Part 2, Section VII. B. (2), this violation is not cited.

12.2 Airborne Radioactivity Event in Unit 1 Reactor Cavity

The inspector reviewed the circumstances and licensee evaluations associated with an airborne radioactivity event that occurred in the Unit 1 reactor cavity on March 20, 1994. The inspector also reviewed the applicable whole body count results for personnel involved in the event.

The inspector's review indicated several individuals were involved with replacing the motor operator (IC-1) in the upper elevation of the Unit 1 Drywell at about 4:00 a.m. on March 20, 1994, when it was decided to open a hatch that leads from the Unit 1 reactor cavity to the upper elevation of the drywell. The decision was made in order to allow the replacement motor operator to be lowered into position in the drywell. The planned activity was reviewed by radiation protection personnel and considered acceptable. Workers inside the drywell and in the reactor cavity were signed in on the applicable radiation work permits for the task and monitored by radiation protection personnel as appropriate. Unknown to the individuals involved, when the reactor cavity hatch to the drywell was open, a temperature difference between the drywell and reactor cavity apparently caused uplifting air currents that lifted contamination from surfaces in the reactor cavity, resulting in low levels of airborne radioactivity. The uplifting air currents resulted in low levels of contamination on various levels of the reactor building. The contamination was quickly identified when two individuals exhibited low level shoe contamination upon attempting to exit the radiological controlled area.

The source of the contamination was quickly determined and the hatch was closed. The reactor building was posted and controlled as appropriate and subsequently decontaminated.

Airborne radioactivity samples collected both inside the drywell at the work location and in the reactor cavity, during opening of the hatch, did not identify any significant airborne radioactivity. Two individuals within the cavity sustained facial contamination which was removed. Whole body counting of the individuals did not identify any intakes of airborne radioactive material.

The licensee subsequently took action to ensure contamination was non-susceptible to lifting via use of water sprays or strippable paint.

No apparent violations were identified.

12.3 Personnel Entry Into the Turbine Building Without Personnel Monitoring Device (TLD badge)

The inspector reviewed the circumstances and licensee corrective actions associated with 1) identification on January 29, 1994, of one individual who knowingly entered and remained (about 3 hours) in the radiological controlled area (RCA) without dosimetry on that date and, 2) a second individual who remained (about 1 hour) in the radiological controlled area on February 3, 1994, after recognizing that he did not have a TLD badge.

The inspector's review indicated both individuals apparently re-entered and/or remained within the radiological controlled area in order to find their TLD badges. The licensee evaluated the individuals' potentially unmonitored exposure and concluded that no significant radiation exposure occurred when the individuals did not wear their TLD badges. The individuals were counseled and were required to re-attend radiation worker training.

The inspector noted that licensee procedure RPM, 5.2.2, Basic Radiation Worker Requirements, states in Section 1.6, that personnel monitoring devices are required for all entries into the RCA and that if dosimetry is lost, personnel must exit the area and notify radiation protection personnel. The inspector concluded that the failure to adhere to radiation protection procedures was an apparent violation of Technical Specification 6.11, which requires adherence to such procedures.

The inspector noted that the events had minor safety significance, they could not have reasonably been prevented as a result of corrective actions taken within the past two years for a previous event, they were quickly corrected with appropriate action taken to prevent recurrence, they were not willful, and they were not required to be reported. Since this violation was identified by the licensee, consistent with the guidance in 10 CFR Part 2, Section VII. B. (2), this violation is not cited.

13.0 Radioactive Material Control and Contamination Control

The inspector reviewed the adequacy and effectiveness of radioactive material, contaminated material, and contamination controls at Units 1,2 and 3. The following matters were reviewed.

- personnel frisking practices
- use of proper contamination control techniques at work locations, including control of hot particles
- posting and labeling (as appropriate) of contaminated and radioactive material
- efforts to reduce the volume of contaminated trash, including steps to minimize introduction of unnecessary material into potentially contaminated areas
- adequacy of contamination surveys to support planning for and support of on-going work.

The inspector reviewed the radiological controls implemented for cutting and removal of condenser tubes for the Unit 1 main condenser. The project covered the period February 4-March 4, 1994, and involved removal of about 40,000 contaminated condenser tubes from four condenser segments (Segments A, B, C, D). The tubes exhibited generally low levels of contamination on their exterior surfaces. The licensee had performed a detailed evaluation of contamination to identify and evaluate the various radionuclides that would be present. The inspector reviewed major portions of the radiation and contamination surveys for the entire condenser project. Contamination levels on tubes in Segments A-C generally were under about 20,000 disintegrations per minute (dpm)/100 centimeters (cm) squared (dpm/100cm²). However, contamination levels in the D segment ranged up to 100,000 dpm/100cm². The higher levels in the D segment were attributed to a reactor water clean-up line that discharged to that condenser segment.

The licensee established a series of radiation work permits for the task and developed a detailed ALARA Plan for the work activity. The inspector reviewed applicable radiation work permits, including radiation work permits for all project sub-tasks. The inspector further reviewed personnel contamination reports and associated bioassay records to evaluate the adequacy and effectiveness of radiological controls implemented for the task. The licensee's planning and preparation for the cutting had been previously reviewed (Reference NRC Combined Inspection Report No. 50-245/94-06; 50-336/94-05; 50-423/94-05, dated March 18, 1994).

Initial extraction and cutting of tubes started on February 4, 1994, in the inlet side of the "A" condenser waterbox (14'6" elevation of the turbine building). The licensee effectively used water sprays and HEPA ventilation systems to effectively control contamination and minimize airborne radioactivity. During removal of the condenser tubes, the licensee needed to use two machines to extract the tubes. The originally selected machine, to be used to pull and chop the tubes, did not work properly. As a

result, the licensee switched to a "walking device" to extract the tubes, then subsequently cut the tubes with another machine. The inspector noted that no significant radiological concerns were encountered during removal of tubes from condenser segments A-C.

During initial extraction and cutting of condenser tubes from the D segment on February 18, 1994, elevated levels of contamination (up to about 200,00 dpm/100 cm²) were noted on the platform just outside the D waterbox. The work was immediately halted and a review performed. The licensee determined that the water sprays had not been turned on at the start of work that day. The area was decontaminated and work activities subsequently were restarted. No significant airborne radioactivity was identified. The licensee revised the radiation work permit for the sub-task (RWP No. 296, Revision 8, sub-task 5) on February 18, 1994, to ensure the area was kept wet with water sprays and plastic protective clothing was worn for wet work. The inspector's review indicated the licensee identified the elevated contamination levels promptly and took immediate action to identify and correct its cause.

The inspector's review of "personnel clothing contamination reports" for the period January 30 - March 9, 1994, identified about 20 personnel contaminations during condenser tube replacement activities. Two minor personnel contaminations were identified on February 18, 1994. The contamination events indicated very low levels of contamination which appeared to be attributable to personnel inadvertently touching the face. Personnel, as appropriate, were re-instructed in contamination controls. The inspector noted that individuals sustaining contamination signed "personnel clothing and contamination reports" acknowledging the circumstances surrounding the events. Review of whole body count data associated with the contaminations did not identify any apparent intakes of airborne radioactive material. The inspector considered the overall contamination controls on the project to be effective.

The inspector's review also noted that during the period, instances of very low levels of apparent personnel contamination were identified on individuals' exiting the radiological controlled area at the condenser bay control point. Upon alarm of the portal monitors, whole body frisking of personnel did not identify any apparent contamination of personnel. The licensee's review determined that the alarms were attributable to laundered protective clothing, being stacked in proximity to the portal monitors causing them to alarm when personnel used the portal monitors. The laundered clothing had low levels of fixed contamination which resulted in a slight increase in the radiation background. After movement of the protective clothing, the alarm rate significantly decreased.

The following matter associated with contamination controls was reviewed.

The inspector reviewed the implementation and adequacy of contamination controls for entry into the Unit 1 Xenon/Krypton Building. The building is part of the licensee's off-gas system and includes cyclic dryers and charcoal beds for waste gas hold-up. The building is located in the unrestricted area and is locked to control access thereto.

The inspector's review revealed that the exterior building doors were posted, among other signs, as a radiation area, radiological controlled area, radioactive materials, and "personnel monitoring required for entry." The building is controlled as a radiological controlled area. The building consists of two elevations. The top elevation contains fans and duct work. The lower elevation contains cyclic dryers and charcoal beds. The area which contains the dryers and charcoal beds is further controlled as a locked High Radiation Area and is posted and controlled as a contaminated area and airborne radioactivity area. A section of the lower portion of the building may be accessed in street clothing as can the remaining portion of the building. Personnel are required to perform personnel contamination monitoring when exiting the building. A hand and foot frisk is required for personnel who enter the building and do not wear protective clothing. A whole body frisk is required if personnel wore protective clothing.

The inspector reviewed radiological surveys for the building for the period June 1993-February 1994. No unusual radiological conditions were noted. Areas accessible in street clothes did not exhibit indications of contamination requiring access control. No airborne radioactivity concerns were identified. The inspector's review indicated the frisker in the facility was checked daily for operability. Background levels on the frisker were low, allowing ease of detection of low levels of contamination. The inspector checked the operability of the frisker and noted it appeared to be operating properly. In 1993, the licensee maintained two procedures regarding control and labeling of radioactive and contaminated material. Procedure HP 905/2905/3905, provided guidance on control and labeling of radioactive material. Procedure SHP 4907 provided guidance for unconditional radiological release of material. The procedures provided guidance for bagging and removal of tools from areas such as the Xenon/Krypton building.

The inspector noted that tools were permitted to be removed by workers from non-contaminated portions of the building. For example, according to discussions with licensee personnel, the licensee allowed a worker in August 1993 to remove tools from the Xenon/Krypton building. The inspector's review indicated the tools had not been in a contaminated area, the tools were bagged in a plastic bag, and the tools were subsequently removed from the building after the worker (a qualified radiation worker) surveyed the bag with a hand-held frisker. The tools were returned to the radiological controlled

access point for final checking and unconditional release by radiation protection personnel. The inspector noted that such actions were consistent with the guidance contained in the licensee's procedures. The inspector noted that workers were not permitted to bag and remove tools from the building if the tools were used in a contaminated area.

The following areas for improvement were noted.

- Personnel were observed piggy-backing at the protected area exit contamination monitor. The licensee initiated a review of this matter.
- Low levels of isolated contamination (sand on top of pavement) was found by the licensee at Unit 3 (November 1993) inside posted and controlled radiological controlled areas during clean-up from the Unit 3 refueling outage. The slightly contaminated sand was cleaned up. Storm sewers in the area where periodically sampled and analyzed for radioactivity. None was found. The licensee was attempting to identify the source of the low level of contamination to preclude recurrence.

The inspector's review indicated generally effective contamination controls were implemented. No safety concerns or violations were identified.

14.0 Plant Incident Report Associated with a Contaminated Sump

The inspector reviewed the licensee's preliminary assessment of a Plant Incident Report (PIR)(PIR # 3-94-48), issued on February 25, 1994. The text of the PIR indicated that there was a potential leakage path from the Unit 3 Engineered Safeguard Facility (ESF) sumps to under the Unit 3 containment.

The inspector's review of this matter involved review of licensee documentation, review of plant drawing, and discussions with cognizant personnel.

The inspector's review indicated the Unit 3 Containment structure was built with an under-containment drain system that was designed to collect any groundwater from under the containment and route the water to sumps (DAS 7A and 7B) located in the 34' elevation of the Unit 3 ESF Building. The drain system is imbedded in porous concrete under the containment. The sumps can also receive contaminated liquid inputs from sources within the ESF building. Analysis of the sump radioactivity indicated that radioactivity contained therein was principally cobalt-58, which has a short half-life (65 days). Effluent is pumped from the sumps to the radioactive waste processing systems.

The licensee's review indicated the potential for contaminated water in the sumps to flow back from the ESF sumps to the areas under the containment. This could present

a potential release path to the environment. However, the licensee indicated that this was unlikely, due to the motive force needed to force the water under the containment. The licensee's preliminary review indicated that the potential to release contaminated water to the environment from potential backflow of contaminated water under the containment was not significant because of the following:

- concentrations of radioactivity in the sumps were low and involved small volumes
- water in the sumps is automatically pumped to waste processing systems
- radioactivity appeared to become entrained in dirt/concrete residue in the sumps
- the geology of the area indicated the containment rested on granite, which was relatively impervious
- the drain pipes under containment rested on a rubber liner, which would preclude leakage to the granite

The inspector indicated that, pending completion of the licensee's final evaluation of the potential for release of radioactivity to the environment from backflow of contaminated ESF water to the areas under containment and a review by the NRC, this was an unresolved item. (50-423/94-14-01)

15.0 Radwaste Volume Reduction Initiatives

The inspector reviewed licensee efforts in the area of Radioactive Waste Volume Reduction. The inspector noted that the licensee developed and implemented volume reduction plans for inclusion in the company's business plans. The efforts have been successful in reducing waste volume shipped for disposal at each of the facilities. Figure 1 (attached) depicts the licensee's recent performance in reducing radioactive waste shipped for burial. The licensee indicated the condenser tube replacement at Unit 1 and the recent replacement of steam generators at Unit 2 would further reduce radioactive waste volumes shipped for burial, due to generation of less radioactive waste. This was because the licensee would significantly reduce the amount of condensate resin shipped for burial as well as the amount of dry-activated waste associated with periodic steam generator outages.

The inspector noted that the licensee recently developed procedures at each Unit covering requirements and responsibilities for radioactive liquid waste management. The following table (Table 2) depicts the licensee's recent performance on reduction of liquid radioactive waste volumes discharged.

Table 2
Liquid Waste Release Volumes

Year	Unit 1 (liters)	Unit 2 (liters) ¹	Unit 3 (liters)
1990	1.20E+07	1.49E+08	1.81E+07
1991	1.14E+07	1.41E+08	1.41E+07
1992	9.15E+06	1.32E+08	1.43E+07
1993 ²	9.70E+06	1.31E+08	1.59E+07

1. Unit 2 data includes steam generator blowdown volumes due to primary to secondary leakage.
2. Data for 1993 is preliminary; review is not complete. The licensee will report final values in the annual report which will be issued in April 1994.

No safety concerns or violations were identified.

16.0 Station Tours

The inspectors toured the station periodically during the inspection. The following observations were made and brought to the licensee's attention.

- Overall housekeeping was very good.
- Overall industrial safety matters (e.g., use of safety belts) appeared good.
- Candy wrappers and expelled gum were observed in the Unit 1 condenser bay. The licensee subsequently included reminders in an employee news bulletin sent to personnel regarding prohibition of eating in the radiological controlled area.

17.0 Exit Meeting

The inspectors met with licensee representatives (denoted in Section 1.0) on March 25, 1994. The inspectors summarized the purpose, scope and findings of the inspection. The licensee acknowledged the findings. No written material was provided to the licensee.

Figure 1

