

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report Nos. 50-289/94-06  
50-320/94-02

Docket Nos. 50-289  
50-320

License Nos. DPR-50  
DPR-73

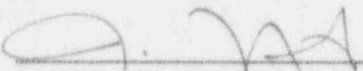
Licensee: GPU Nuclear Corporation  
Middletown, Pennsylvania 17057-0191

Facility Name: Three Mile Island Nuclear Station, Units 1 and 2

Inspection At: Middletown, Pennsylvania

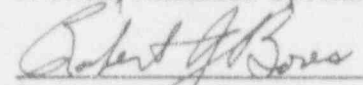
Inspection Period: March 15 - 18, 1994

Inspector:

  
\_\_\_\_\_  
J. Nick, Radiation Specialist

4/4/94  
Date

Approved by:

  
\_\_\_\_\_  
R. Bores, Chief  
Facilities Radiation Protection Section

4/6/94  
Date

Areas Inspected: Implementation of the radiological controls and external exposure control program. Program elements reviewed included planning and preparation for radiological activities, administrative controls, corrective action and self-assessment programs, personnel dosimetry, and required program documentation.

Results: The radiological controls program was generally very effective in protecting the safety of workers in radiological areas. Areas toured in the facility were well maintained and exhibited good housekeeping. The licensee provided good program assessment with continuing improvements to the radiological controls program. A minor weakness was noted in identification/labeling information of radioactive materials and containers. No violations of NRC regulations were identified.

## DETAILS

### 1.0 Individuals Contacted

#### 1.1 Licensee Personnel

- \*R. De Santis, Public Affairs Manager
- D. Etheridge, Manager, Radiological Engineering
- \*J. Harworth, Group Supervisor - Dosimetry
- G. Kuehn, Director, Radiological Controls/Occupational Safety
- \*W. Marshall, Operations Engineer
- D. Merchant, Radiological Engineer
- \*B. Mehler, PDMS Manager
- \*A. Miller, TMI Licensing Engineer
- A. Paynter, Radiological Engineer
- L. Poppenwimer, Engineering Associate
- \*W. Potts, Radiological Controls/ Occupational Safety Director
- J. Schmidt, Engineer
- P. Velez, Manager, Radiological Controls Field Operations
- D. Viola, Group Radiological Controls Supervisor
- \*S. Williams, NSCC Staff

#### 1.2 NRC Personnel

- M. Evans, Senior Resident Inspector
- L. Thonus, Project Manager, NRR

#### 1.3 Other

- \*R. Barkanic, Pennsylvania Department of Environmental Resources

\* Denotes those present during the exit meeting on March 18, 1994.

### 2.0 Facility Tours

Since the Radiological Control groups for Unit 1 and Unit 2 were combined into one organization, the inspector toured radiological controlled areas (RCAs) located throughout the site to obtain information on the manner in which the licensee controlled radiological areas and radioactive materials.

#### 2.1 Unit 2

The inspector toured many of the RCAs throughout the facility including the control building, the fuel handling building, the auxiliary building, and other areas posted as "Radioactive Materials Areas". The areas were generally well posted and most areas

exhibited good housekeeping. A few minor discrepancies in radioactive material area and radiation area postings were identified to the licensee's radiological controls staff.

High Radiation Area (HRA) and Very High Radiation Area (VHRA) postings and barriers were checked throughout the facility. All areas were appropriately posted, barricaded, and locked as required by NRC regulations and the licensee's technical specification requirements. Access to these areas was controlled by appropriate administrative controls. The inspector had expressed concern during the last inspection (NRC Combined Inspection Report Nos. 50-289/94-01; 50-320/94-01) that the guidance to workers entering VHRA's was not documented in the licensee's procedures. The licensee had previously agreed to review the minimum required controls for entry into these areas. The licensee had not finished the review of this item as of this inspection; therefore, the licensee's performance in this area will be reviewed in future inspections.

## 2.2 Unit 1

The inspector toured many of the radiologically controlled areas (RCAs) of the facility including the reactor building, the spent fuel pool building, the control building, the intermediate building, and the auxiliary building. Most areas were well posted and exhibited excellent housekeeping. Radioactive material was appropriately labeled, with the exception of a minor discrepancy in contaminated area postings around the auxiliary boiler, which was identified to the licensee's radiological controls staff. Actions were taken to resolve this discrepancy.

High Radiation Area (HRA) and Very High Radiation Area (VHRA) postings and barriers were checked throughout the facility. All areas were appropriately posted, barricaded, and locked as required by NRC regulations and the licensee's technical specification requirements. The licensee had also posted the entrance to a VHRA that was located inside the D-ring area. The area was inside the primary shield under the reactor vessel. This VHRA was discussed in an earlier inspection report (NRC Combined Inspection Report Nos. 50-289/94-01; 50-320/94-01) and access was not permitted during power operations. Because the reactor was reduced to 0% power during the period of this inspection, licensee personnel posted the entrance to the VHRA when the first entry was made into the D-ring area. The inspector found that this was an acceptable method and identified no concerns regarding these actions.

## 2.3 Common Areas

The inspector toured other areas outside the security protected area that were maintained by the licensee as RCAs. These areas included the radiological instrument shop, the respirator/laundry facility, outside storage areas, the waste packaging and handling facility, and the interim waste storage facility. Most areas were very well maintained and the licensee had provided postings and other controls. The licensee had provided radiation

detection equipment at the exits from all contaminated or potentially contaminated areas. There was adequate space for work and storage areas in these facilities.

The inspector observed some containers in the interim waste storage facility that were not labeled. Although the radiation dose rates in the area of the containers were minimal, the inspector could not determine whether or not the containers were empty. The inspector noted that some containers in the same group had stickers marked "EMPTY". However, because the container lids were bolted down, the lids were not easily removable to determine the contents. The inspector discussed with licensee management the difficulty for workers in trying to identify the contents of these containers.

The inspector noted two plastic bags in the waste packaging and handling facility, with radioactive material labels that did not have dose rate or other information, such as the radionuclides and the quantities of radioactivity contained in the bags. This information should have been present to allow workers to take precautions to minimize exposure. The inspector also noted that dose rates from the bags were very low, and the bags were in a temporary area and may not have been surveyed yet. This situation was brought to the attention of the licensee management who took immediate appropriate action.

The inspector determined that the above instances were of minimal safety consequence due to the low levels of radioactivity and the other controls provided by the licensee. The containers in both instances were within a restricted area where personnel monitoring and radiation work permits were required. However, the inspector expressed an overall concern about attention to detail by personnel handling and controlling radioactive materials and the posting/labeling information available to them. The licensee representative stated that the situation would be reviewed and possible actions would be evaluated. The inspector will review the licensee's actions in this area during future inspections.

### 3.0 Planning and Preparation for Radiological Activities

The inspector reviewed the licensee's preparation and planning for radiological activities. There was minimal radiological work planned for Unit 2 including removing the remaining water from the floor seams (cork seams) in the control building adjacent to the reactor building. Since the radiological controls organization monitors radiological work in both Unit 1 and Unit 2, and due to the minimal radiological consequence of this work in Unit 2, the inspector reviewed the preparation and planning for a planned reactor shutdown in Unit 1 for repair work on the pressurizer spray valve (RC-V-1).

The repair work was performed by maintenance personnel. Other tasks related to the valve repair included surveillance on the valve, surveillance on other equipment in the D-ring, decontamination in the area of the valve and on the lower level of the D-ring, and work oversight. Other groups had planned to enter the D-ring area including quality assurance personnel, engineering personnel, operations personnel, utility personnel (laborers), decontamination technicians and radiological controls technicians.



The inspector reviewed the planning for this work through interviews with personnel, reviewing paperwork, and attending briefing sessions between the radiological controls personnel and workers assigned to the job. Licensee personnel in the radiological engineering group had performed a pre-job review for the actual repair work on the pressurizer spray valve. The inspector reviewed the pre-job review documentation and interviewed the radiological engineer who performed the review. The inspector found that there was excellent planning for the maintenance work. The review included forethought on radiological conditions including area dose rates, highest dose rates, contamination levels, and airborne radioactivity. Radiological controls were evaluated for the work including health physics coverage, personnel monitoring, protective clothing, respirator use, engineering controls, contamination controls, air sampling, and decontamination of the work area.

Radiological engineering personnel also reviewed the Radiation Work Permits (RWPs) for the other tasks related to the repair of the valve. The inspector noted that the RWPs for these tasks were well written with appropriate information and radiological controls listed.

The inspector attended two different pre-job briefings held by radiological controls personnel with the workers assigned to perform the tasks in the D-ring. The briefings were informative and allowed the workers to ask questions. Coordination of tasks was discussed along with appropriate guidelines for different phases of the work. An example from the briefing was the coordination of the work area decontamination after the engineering evaluation, but before any "hands-on" work by the maintenance workers. The use of alarming pocket dosimeters and respirators was discussed. Heat stress and potential problems with the elevated temperatures in the reactor building were also emphasized. The licensee planned to use air-cooled (vortex tube) suits to lengthen worker's stay time.

Overall, the licensee provided very good planning and preparation for the radiological activities. Due to the extensive planning effort, the licensee experienced only one minor personnel contamination event and no other major problems associated with the work. Personnel exposure totals were lower than projected due to lower than expected dose rates in the reactor building.

#### 4.0 Personnel Dosimetry

The inspector observed workers in the RCA wearing their assigned self-reading dosimeters (SRDs) and the whole body thermoluminescent dosimeters (TLDs) with the correct body placement. The licensee's procedures required the issuance of at least one alarming SRD to a work party when individuals entered an HRA. The inspector noted that radiation work permits for work in the HRAs required at least one alarming SRD assigned to the work party. No work parties were observed by the inspector during this inspection; therefore, the inspector couldn't verify the licensee's use of alarming SRDs.

#### 4.1 TLD Program

The licensee had an onsite laboratory to process whole body TLDs and the inspector determined that the laboratory was currently accredited through the National Voluntary Laboratory Accreditation Program (NVLAP). The NVLAP accreditation was valid until October 1994. The licensee had just finished the laboratory testing portion of the reaccreditation process. The inspector reviewed the results and found that the licensee had performed very well. The results indicated a low overall performance quotient and acceptable performance in all categories. The licensee was expecting an onsite assessment during the last quarter of 1994.

The inspector reviewed the quality control program for the TLD system through a review of documents and interviews with licensee personnel. The licensee had performed a daily quality control check on the TLD processing equipment (reader). If the critical processing parameters were within specified ranges, then the equipment was used to process TLDs. If the parameters were not within specifications, the TLD processing was not performed until maintenance was performed, the reader passed another quality control check, or the reader was calibrated again. The quality control checks were reviewed and signed by the appropriate level within the licensee's supervisory staff. A monthly calibration was performed on each TLD reader to ensure that the output was reported within 5% of the expected value. This calibration was performed for a dose equivalent of 500 millirem and 3000 millirem based on TLD irradiations with a cesium-137 source. The licensee also maintained a log of maintenance performed on the TLD readers. The inspector reviewed the log and found it to be thorough and informative. No weaknesses were identified in this area.

The licensee maintained emergency procedures in the event that a TLD reader had to be relocated due to elevated dose rates in the building where the TLDs were processed. The licensee also had agreements with various other electric utilities to serve as back-up TLD processors, if necessary. Supplies of extra TLDs for emergency use were located at the Operations Support Center, the Technical Support Center, and the Emergency Operations Facility. Additional TLDs were maintained in emergency response kits located at the North Gate, the South Gate, and the Processing Center (the main access point to the restricted area).

The inspector also reviewed the training requirements for dosimetry personnel. The licensee's procedure required initial training and requalification training with appropriate documentation. The training included a very comprehensive outline of subjects and an evaluation of the individual's understanding. The evaluation included on the job (OJT) qualifications and a written examination. The inspector found that the level of training and requalification was very good for the position.

#### 4.2 Alarming Self-Reading (Pocket) Dosimeters

The licensee was currently using a Xetec alarming self-reading (pocket) dosimetry system. The dosimeter could be preset to alarm at an accumulated total dose limit. The licensee's procedure indicates that upon hearing the alarm, the individual wearing the dosimeter should stop work, place the material or equipment in a safe position, and exit the RCA.

The licensee was planning to replace the Xetec system with a new system in late 1994. The new system utilized SAIC Model PD-3 dosimeters. The PD-3 dosimeters were lighter and smaller and had more variability in alarm settings. The inspector verified that the licensee was aware of a recent NRC Health Physics Position paper on the proper operation and use of alarming dosimeters at nuclear power plants (dated November 15, 1993). The paper outlined recent occurrences and problems encountered with alarming dosimeters. The licensee representatives stated that they were aware of the position paper and would incorporate the guidance when they developed their new system. The licensee's implementation of the new alarming dosimeter system will be reviewed in future inspections.

#### 5.0 Administrative Controls

The inspector reviewed the licensee's administrative controls including the use of recent radiological survey data and the radiation work permit (RWP) program through a review of licensee paperwork and interviews with licensee personnel. The inspector noted that recent radiological survey data were posted at the main radiological control point and at the entrances to many areas including Radiation Areas and High Radiation Areas. The survey data provided very good, timely information to RCA workers.

The inspector reviewed many of the RWPs for current and planned work in the RCA. The RWPs contained necessary information for workers, including general area dose rates and contamination levels. The RWPs also contained worker requirements, including health physics coverage, personnel monitoring, protective clothing, respirator use, engineering controls, contamination controls, air sampling, and decontamination of the work area. The RWPs were posted on the walls and maintained in binders at the main radiological control point. The inspector found that the RWPs were well written and detailed.

The licensee's radiological controls program contained several components to maintain personnel radiation exposure As Low As Reasonably Achievable (ALARA). The licensee held monthly Radiation Awareness Meetings where Radiological Controls staff members presented ALARA and other radiological information to department representatives. The department representatives took this information back to their respective departments for distribution.

The supervisory staff and the Radiological Engineering staff prepared ALARA reviews of jobs and tasks performed in the RCA. ALARA reviews for major tasks and jobs were

assigned to one of the Radiological Engineering staff members. Job supervisors and job planners were also included in ALARA reviews.

The licensee distributed periodic exposure tracking reports to keep the licensee's staff aware of personnel exposure to workers on each job and overall personnel exposure totals. The reports also included performance summaries, highest individual radiation doses, numbers of Awareness Reports and Radiological Investigative Reports, numbers of positive whole body counts, numbers of skin and clothing contaminations, total square feet of contaminated and airborne radioactivity areas, and a summary of audit/action items. ALARA goals were compared to actual personnel exposures and displayed in graphs and charts. The inspector found the reports to be good quality with valuable information to the staff and radiological area workers.

The inspector also reviewed the required NRC Form-5 and Form-4 exposure reports for randomly selected individuals. The inspector did not note any discrepancies in the documentation of these reports.

#### 6.0 Records/Reports/Notifications

The inspector reviewed the licensee's records, reports and notifications that were required by NRC regulations or technical specifications. The dose summary reports for 1993 were developed during the first calendar quarter of 1994. These reports included a report on the number of individuals whose total whole body exposure was within various estimated exposure ranges, and a report of the total person-rem per job function. The inspector did not note any discrepancies or unexpected results.

The licensee did not have any reports or notifications of incidents in which an individual received an over-exposure to radiation. In fact, the inspector noted that the highest total whole body dose assigned to an individual during 1993 was less than 2000 millirem. The NRC limits for whole body dose were 3000 millirem per calendar quarter.

#### 7.0 Corrective Action and Self-Assessment Programs

The inspector reviewed the licensee's corrective action and self-assessment programs through a review of documents and interviewing personnel. There were no audits or assessments of the radiological controls program performed since the last NRC inspection of the radiological controls program (NRC Combined Inspection Report Nos. 50-289/94-01; 50-320/94-01). There were no Radiological Incident Reports (RIRs) written in 1994.

The licensee's staff had generated three Radiological Awareness reports during 1994. These reports documented a review of some portion of the program by staff members. The inspector reviewed the Awareness Reports and found some minor areas for improvement that were corrected in a timely manner. The Awareness Reports were an effective method for identifying and implementing program improvements. They were also used to identify good



work practices that were presented to the licensee's staff for additional emphasis for continued diligence and attention to detail.

#### 8.0 Exit Meeting

A meeting was held with licensee representatives at the end of the inspection period on March 18, 1994. The purpose and scope of the inspection were reviewed and the findings of the inspection were discussed. The licensee acknowledged the inspector's findings.