U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Docket/License Nos.:	50-289/DPR-50 50-320/DPR-73
Report Nos.	50-289/94-22 50-320/94-06
Licensee:	GPU Nuclear Corporation Middletown, Pennsylvania 17057-0191
Facility Name:	Three Mile Island Nuclear Station, Units 1 and 2
Inspection At:	Middletown, Pennsylvania
Inspection Conducted:	October 4 - 7, 1994

Inspector: _____ 11/3/94
J. Nick, Radiation Specialist

Approved by: _____
R. Bores, Chief
Facilities Radiation Protection Section, FRSSB

Areas Inspected: Implementation of the radiological controls for internal occupational exposure and assessment of internal exposures. Areas reviewed included audits and appraisals; changes to the program; assessment of intakes of radioactive material; engineering and administrative controls; respiratory protection program and equipment; and records, reports and notifications.

Results: No violations of regulatory requirements were observed, however, one safety concern relative to the status of inoperable high radiation monitor alarm lights was identified (Paragraph 9.2). The licensee had effective programs for control of internal radiation exposure and assessment of internal exposure.

DETAILS

1.0 INDIVIDUALS CONTACTED

1.1 PRINCIPLE LICENSEE EMPLOYEES

*G. Broughton, Director, TMI
*D. Etheridge, Manager, Radiological Engineering
J. Harworth, Group Supervisor, Dosimetry
*D. Hassler, Licensing Engineer
B. Mehler, PDMS Manager
A. Miller, Licensing Engineer
A. Paynter, Radiological Engineer
L. Poppenwimer, Engineering Associate
*W. Potts, Radiological Controls/Occupational Safety Director
M. Ross, Director, Operations and Maintenance
J. Schmidt, Radiological Engineer
D. Shriner, Radiological Engineer
*P. Velez, Manager, Radiological Controls
D. Viola, Group Radiological Controls Supervisor
S. Williams, NSCC Staff

1.2 NRC EMPLOYEES

*S. Hansell, Resident Inspector
T. Walker, Senior Resident Inspector (Acting)

* Denotes those present at the exit meeting on October 7, 1994.

The inspector also interviewed other licensee personnel.

2.0 PURPOSE OF INSPECTION

The purpose of this announced inspection was to assess the licensee's implementation of the radiological controls for internal occupational exposure and assessment of internal exposures.

3.0 AUDITS AND APPRAISALS

The inspector reviewed the audit performed by the licensee's quality assurance group during the period from June 1994 through August 1994. Among the areas included in the audit were the program to maintain personnel exposures as low as reasonably achievable (ALARA), radiation and contamination controls, implementation of the revisions to 10 CFR Part 20, the radiation protection organization, procurement, posting of radiological areas, and technical specification surveillances. The audit report documented no major findings and three minor deficiencies.

The auditors reported, and the inspector verified, that all deficiencies were corrected or resolved during the period of the audit. The inspector concluded that the audit covered an appropriate scope and contained an appropriate level of detail.

The inspector also reviewed an internal assessment performed by a radiological engineer from the licensee's staff. The assessment was performed during the period from July 1994 through September 1994 and assessed the implementation of the revisions to 10 CFR Part 20. The assessment was very detailed and documented some areas for improvement. The inspector agreed with the assessment in that the radiological controls supervision could use more generic guidance or training on the analysis of jobs to determine if using a respirator is the best control for maintaining total effective dose as low as reasonably achievable (ALARA). A licensee representative stated that a draft guidance document would be prepared before December 31, 1994. This item will be reviewed during a future inspection.

The inspector determined that the quality of audits/assessments was very good and that the licensee was identifying areas for improvement. Corrective actions or resolution of concerns was very timely and appropriate for the audits/assessments reviewed by the inspector. Since both of the latest assessments had been performed with audit members from the site, the inspector noted that a qualified individual from outside the organization could provide other perspectives and insights. Licensee representatives agreed and responded that a future audit was planned to include an expert from outside the site organization. No violations of regulatory requirements or safety concerns were identified in this area.

4.0 CHANGES TO PROGRAM

The inspector reviewed changes to the facilities, equipment, personnel, training, and procedures related to the program for internal exposure controls through a review of documents and interviews with licensee personnel. The inspector noted that the software for the whole body counting system had been upgraded prior to the implementation of the revisions to 10 CFR Part 20 in January 1994. Also noted, was the relocation of the whole body count equipment to the Administration Building at the end of 1992. The relocation moved the equipment from a temporary location in an office trailer to a permanent facility. Aside from the efficiency from being closer to other personnel processing functions, the move provided the benefits of a permanent facility including a stable foundation, dedicated electrical systems, improved work space, and large area ventilation. Although the licensee was experiencing minor difficulty with the electrical system, the inspector agreed that the relocation was a program improvement.

The licensee was preparing for implementation of an automated access control system. The system will use electronic dosimeters interfaced to the computer system. The licensee planned to implement the system before the end of 1994. Training for personnel who will use the system had begun, but was not completed at the time of this inspection. The inspector reviewed the training material and did not have any concerns, but also noted some good practices. Several recent problems with

electronic dosimeters at other facilities had been reviewed by the licensee's staff. Since the system is not yet ready for implementation, this area will be reviewed in future inspections.

5.0 ASSESSING INDIVIDUAL INTAKES OF RADIOACTIVE MATERIALS

The inspector reviewed the process for assessing individual intakes of radioactive materials through interviews with personnel and a review of documentation. Areas in Unit 1 and Unit 2 toured by the inspector indicated appropriate sampling equipment to adequately measure airborne radioactivity in areas where personnel were working. The inspector also reviewed the health physics count room practices where air sample filter media and removable contamination samples were counted to determine total radioactivity and isotopic content. Based on the count room results, the licensee determined the need to calculate and assign Derived Air Concentrations (DACs) and DAC-hours based on stay time. When a DAC-hour assignment was required, the licensee converted the DAC-hours to committed effective dose equivalent (CEDE) and assigned the dose to individuals in millirem. The inspector noted good count room practices for identifying, analyzing, and measuring air sample results with sufficient technical expertise available to review questionable results.

The licensee maintained a computer system to automate internal dose assignment tracking. The inspector reviewed the results of the count room analysis that resulted in personnel internal dose assignments. There were not many internal dose assignments due to the type and amount of work in radiological areas during 1994. The random sample of results showed that the dose assignments were correctly entered in the computerized tracking system. No concerns were noted.

Internal dose assessments via bioassay were performed when individuals exceeded 10 millirem CEDE per day or 50 millirem CEDE in any consecutive 7 days. Most bioassay measurements were performed with the whole body count equipment. The whole body count equipment included one unit with two stationary sodium iodide detectors that were used while an individual stood in front of the detectors (Fastscan); and a scanning unit with a bed that moved the prone individual below a stationary germanium detector (Accuscan). Bioassay through excreta sample analyses was also used by the licensee in rare situations.

A review of the procedures and quality assurance for the whole body count equipment was performed by the inspector. The inspector found appropriate operation, calibration and quality assurance/control for the whole body count system.

Overall, the inspector noted very good, detailed procedures for air sampling, dose assignments from air sample results, and dose assessments from bioassay. The radiological controls staff members were very skilled and knowledgeable in the performance of these duties. Although the number of dose assignments and the actual doses were small, the

inspector concluded that the licensee was effective in assessing individual intakes of radioactive materials. No violations of regulatory requirements or safety concerns were identified.

6.0 ENGINEERING AND ADMINISTRATIVE CONTROLS

The inspector examined the licensee's engineering and administrative controls used to protect workers from internal exposures in lieu of respiratory protection. This examination was performed through interviews with personnel and review of documentation, and included unplanned intakes and subsequent investigations, use of contamination detection equipment, and tracking of personnel facial and nasal contaminations.

The licensee had documented only one unplanned intake of radioactive material during 1994. This unplanned intake resulted in a committed effective dose equivalent to the individual of less than 10 millirem. The inspector reviewed the investigation of this event and had no concerns.

The inspector reviewed the use of contamination detection equipment with licensee representatives. Since the licensee's workers may have intakes from intentional decisions against respirator use, the inspector questioned the licensee's staff for protocol to use to distinguish between internal and external radioactive material. Radiological intakes could mask external contamination, or create difficulty in determining the levels/amounts of external contamination. During the last refueling outage at Unit 1, the licensee's staff had some limited experience with internal intakes and potentially contaminated individuals. The staff did not have any clear guidance for these circumstances; however, a licensee representative stated that they would develop guidance before the next refueling outage. The inspector had no further concerns in this area.

The inspector also reviewed the licensee's tracking and trending of facial and nasal contaminations to determine if there was an increase due to the decreasing use of respiratory protection equipment. The licensee had recorded less than 40 cases of skin contamination during 1994. The inspector determined that the number of skin contaminations was relatively low, and no conclusions could be drawn from the data due to limited radiological area work during 1994. This item will be further reviewed in future inspections.

7.0 RESPIRATORY PROTECTION PROGRAM AND EQUIPMENT

The inspector assessed the licensee's respiratory protection program through interviews with licensee personnel and review of documentation. Areas of assessment included the guidance provided by the licensee for the use, issuance, and maintenance of respiratory protection equipment including fit testing of respirators, protection factors, and self-assessment of the program.

The inspector had reviewed the guidance for the issuance of respiratory protection equipment during a previous inspection (NRC Region I Combined Inspection Report Nos. 50-289/94-01; 50-320/94-01). The inspector noted during the previous inspection that the licensee had procedural guidance for the issuance of respiratory protection when a job required an ALARA review. The procedure outlined the various items that should be considered including the use of respirators to maintain total personnel dose ALARA. This guidance was sufficient for the professional staff when they performed the ALARA reviews of major jobs. However, the inspector could not find any procedural guidance concerning maintaining total personnel exposure ALARA for the technicians or supervisors when issuing respirators on a day-to-day basis. The inspector concluded that this was a detail of the radiological controls program that provided an opportunity for improvement (see Section 3.0 of this report).

The inspector observed the licensee's process of performing a respirator fit test. The test was performed with a unit that sampled the ambient air and compared it to the air inside the test respirator. The testing subject donned the mask and performed a variety of exercises while the technician monitored the test and determined a fit factor. The technician performing the test followed appropriate licensee and regulatory guidance. At the conclusion of the test, the test subject was asked to provide a comfort rating for the respirator. Although the comfort rating was only recorded in the paper file, it was used to determine further action if the wearer reported a very low comfort rating. The inspector did not identify any safety concerns or violations of regulatory requirements.

The inspector also reviewed the protection factors assigned to each type of respirator. The licensee used the protection factors to calculate intakes of radioactive materials when a respirator was worn. The licensee assigned a protection factor of 50 for a full facepiece, negative pressure, air purifying respirator for particulates; 1000 for a full facepiece, positive pressure, air purifying respirator for particulates; 2000 for a full facepiece, continuous flow, air line supplied respirator; 10,000 for a full facepiece, pressure demand, self-contained breathing apparatus; 2,000 for a hood/helmet with continuous airline flow; 1,000 for a hood/helmet with positive pressure and air purifier for particulates; and 5 for a half-face, negative pressure, air purifying respirator for particulates. The inspector determined that the licensee's use of protection factors was consistent with regulatory guidance.

The licensee's staff had performed an annual self-assessment review of the respiratory protection program. The inspector reviewed the report for 1993 that was dated March 30, 1994. The report summarized the bioassay program, the air sampling program, respirator usage, training, fit testing, use of engineering/process controls, respirator selection, equipment maintenance and inspection, equipment inventory and storage, breathing air supplies, program administration, emergency equipment, and incident/deficiency reports. Although there were not many details on trends or specific indicators, the report contained several very good

suggestions for program improvement. These suggestions included a professional development program on the use of ventilation or other process controls, the need for a larger drying oven for clean respirators, and a refresher course for the Analyst, Respiratory Protection for continuing training. The inspector noted that none of the suggestions had been fully implemented as of the period of this inspection.

The inspector also reviewed the results from the random bioassay program. The licensee had committed to a random audit of 15 personnel per quarter. This was intended to check the effectiveness of the licensee's respiratory protection and internal dose tracking system. The licensee had selected at least 15 people for the each of the first two calendar quarters of 1994. Two individuals had been identified with positive whole body count results as a result of the random sampling program. Although the total intakes were relatively minor (less than 10 millirem committed effective dose equivalent), only the latest occurrence was documented and retained with the sampling results. No other intakes of radioactive materials were detected from the random selections. The random check had not yet been completed for the third or fourth quarter of 1994. The inspector found the random audit was a very good program element, but questioned the timeliness of the audits during a previous inspection (NRC Region I Combined Inspection Report Nos. 50-289/94-01; 50-320/94-01). Since the previous inspection, the licensee had improved on the timeliness of the audits. The licensee had revised their procedure (6610-ADM-4025.01, "Bioassay Procedure") to allow sampling before the end of the calendar quarter. The inspector identified this procedure change as a program improvement that could enhance the timeliness of the audits.

Respiratory protection equipment was maintained and cleaned by the Radwaste Group. The inspector interviewed the supervisor of this area to determine the adequacy of the staff's size to perform these functions. The supervisor stated that normally two technicians were routinely assigned to this area. One technician was assigned full time, while three other technicians were assigned one at a time on a rotating schedule. The technicians had attended vendor training for respirator maintenance and were initially qualified for maintenance, testing, and inspection of respirators. The licensee did not maintain a formal requalification process for the technicians, but held periodic refresher training sessions. The inspector expressed concern that these training sessions were not documented. However, the inspector also noted a decreasing trend in the number of respirator failure/incident reports during the last few years. This trend could be attributed to less respirator use and/or continued technician proficiency with respirator maintenance.

Overall, the inspector determined that the licensee had an effective respiratory protection program with some areas for potential improvement. The self-assessments were continuing to identify areas for improvement, and some improvements had been noted. No violations of regulations or further concerns were identified.

8.0 RECORDS, REPORTS, NOTIFICATIONS

The licensee's records, reports, and notifications were inspected through a review of documentation. There had been no required notifications to the NRC during the current year that were related to internal exposures. The inspector reviewed a random selection of NRC Form 5 equivalent reports and had no concerns with the licensee's documentation. Records were appropriately maintained and proper reporting practices were used.

9.0 OTHER ITEMS

9.1 PERSONNEL FRISKING

Several occurrences of incomplete or inadequate frisking for external contamination by licensee personnel had been previously observed by various NRC inspectors. The inspector reviewed this item to determine if the radiation protection program was inadequate for personnel monitoring or monitoring of personal items when individuals exited radiological controlled areas. One problem the licensee has is the location of the frisking equipment in relation to the radiological control point. The frisking equipment is not visible to the technicians assigned to the control point. Licensee personnel had performed various self-audits in this area in the past and had not found an indication of a problem. However, the licensee's self-audits did not document the scope of the audits or the number of personnel that were observed. The inspector did not observe any instances of improper or inadequate frisking during the period of this inspection based on the observation of approximately 20 workers exiting the controlled area. In addition, the licensee maintained portal monitors at the exit from the site that would detect any gross contamination. The inspector will continue to review this item in future inspections.

9.2 COORDINATION WITH OTHER DEPARTMENTS FOR OUT OF SERVICE ALARMS

A recent observation from an NRC inspector noted that several high radiation monitor alarm lights were out of service in the reactor building. The alarm lights are necessary in high noise areas where audible alarms and page announcements are not easily heard by workers. The inspector interviewed members of the licensee's radiological controls organization, who were planning and executing a reactor building entry, to determine if they were aware of the problems with the alarm lights. After several attempts to obtain the status of the alarm lights from the licensee's operations and maintenance departments, the licensee's radiological controls staff were made aware of the problems. The inspector expressed that this lack of coordination between departments could be a safety concern for the individuals who entered this noisy area without knowledge of the alarm light status. The worst case scenario could involve an unplanned exposure to an individual in the reactor building. The NRC resident inspectors will perform a followup review of this coordination issue with the various departments that were involved.

9.3 CLOTHING CONTAMINATIONS

The inspector had noted an increase in the number of personnel contaminations on personal clothing (i.e. shoes, shirts, pants, etc.) for 1994. The licensee had records for approximately 100 incidents during the period from January 1, 1994 through October 1, 1994. The licensee had previously identified this trend in an internal assessment. Through conversations with licensee personnel, the inspector determined that the contaminations were mostly shoe contaminations and the study of this trend had not yet been completed. Based on this incomplete analysis, the inspector will review this item during a future inspection.

10.0 EXIT MEETING

The inspector met with the licensee representatives denoted in Section 1.0 of this report at the conclusion of the inspection on October 7, 1994. The inspector summarized the purpose, scope, and findings of the inspection. The licensee acknowledged the inspection findings.