U.S.NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-289/88-19

Docket No. 50-289

License No. DPR-50 Priority -- Category C

Licensee: GPU Nuclear Corporation
P. O. Box 480
Middletown, Pennsylvania 17057

Facility Name: Three Mile Island Nuclear Station, Unit 1

Inspection At: Middletown, Pennsylvania

Inspection Conducted: July 25 - 29, 1988

Inspector: S. S. Sherbini 8/16/88
S. Sherbini, Senior Radiation Specialist, date
Facilities Radiation Protection Section

Approved by: M. S. Shanbaky 8/17/88
M. M. Shanbaky, Chief, Facilities Radiation date
Protection Section

Inspection Summary: Inspection July 25-29, 1988 (Report No. 50-289/88-19)

Areas Inspected: Routine, unannounced safety inspection by a region-based inspector of the licensee's radiological controls program. Areas inspected included outage-related radiological controls, outage work scope and ALARA, and review of the status of previously identified items.

Results: No violations were identified during this inspection.

DETAILS

1.0 Personnel Contacted

1.1 Licensee Personnel

D. Ethridge, Radiological Engineer
E. Hauser, Training
* C. Incorvati, TMI Audit manager
* G. Kuehn, Radiological Controls Director, TMI-1
* A. Palmer, Radiological Field Operations manager, TMI-1
* R. Shaw, Radiological Engineering Manager, TMI-1

1.2 NRC Personnel

T. Moslak, Resident Inspector
A. Sidpara, Resident Inspector

2.0 Status of Previously Identified Items

2.1 Open Item (289/87-02-02): This item was opened in connection with an allegation made by a radiological controls technician (RCT) in Unit 1. The allegation was made to the NRC on August 25, 1986. The alleger stated that he had a radiological health concern and claimed that licensee management was subjecting him to harassment as a result of this concern. A review of the records during this inspection revealed that on July 18, 1986, during a routine scheduled meeting between the Unit 1 radiological controls technicians and their supervisors, the alleger pointed out that the department had been operating in a manner that violated one of their own procedures. Specifically, one of the procedures (1758.1, "Operation of Portable Air Samplers") required that all Bendix breathing zone air samplers be tested for proper air flow before being issued. This flow test was not being done, and the flow tester was not at the sampler issue point. Radiological controls supervisors at the time were not aware that the flow testing device was missing. When the alleger brought up this matter during the meeting, he was told to write a Radiological Awareness Report (RAR). The alleger wrote the report and submitted it to his management (RAR # 86-0091, July 24, 1986). As a result, radiological controls management issued a memo alerting the technicians to the problem (memo dated August 26, 1986). This memo appears to have resolved the safety concern. A review during this inspection showed that the flow tester is currently in use at the Unit-1 radiological controls access point. However, the harassment issue overlaps the safety issue. On August 19, 1986, the manager of Radiological Controls Field Operations sent a memo to the alleger in which he expressed dissatisfaction with the

alleger's performance and gave him a four day suspension without pay. Two recent failures on the part of the alleger to properly perform his duties were cited (August 9 and August 15, 1986). The memo also stated that past counseling did not appear to have been effective. The Manager, Rad Con Field Operations sent the alleger a second memo on 25 August, 1986, in which he informed him that his qualifications as a radiological controls technician had been rescinded. The memo suggested a requalification program. These qualifications were subsequently reinstated as a result of union intervention. The alleger submitted a formal complaint of harassment to the Department of Labor on September 15, 1986. The DOL conducted an investigation and informed the alleger on November 20, 1986 that the investigation could not prove discrimination. It also informed him that an appeal was possible. The alleger appealed, and a hearing was set for April 30, 1987. The DOL issued a notice on July 13, 1987, stating that the claims of discrimination had been withdrawn and that the dispute should be settled by means of the labor relations process with the licensee. The union has set a tentative date for arbitration in November 1988. The grievance stated is unjust discipline involving four days without pay. Since the safety issues in this matter have been settled and the only remaining issue is a labor relations matter, this item is considered closed.

3.0 7R Outage Work:

Plant tours conducted during this inspection showed plant housekeeping was generally adequate with the exception of some isolated locations. Access control was good and protective clothing supplies at the dressing area were adequate during the inspection period. However, some areas that needed improvement were identified. These are described in the following sections.

3.1 Posting:

Tours of the plant during the inspection showed that posting of survey results for the various radiation areas was adequate. However, discussions with the NRC Resident Inspector revealed that such postings have been a recurrent problem on site and that many out of date surveys have been observed on numerous occasions. The licensee stated that they were aware of the problem and had taken steps to correct it. The licensee stated that the problem was that all surveys were being made on schedule and were available for review but the updated surveys were not always posted. This matter will be reviewed during future inspections.

3.2 Training and Qualifications:

A review of the training and qualifications of radiological controls personnel showed that training of all personnel is being conducted according to requirements and on schedule. The qualifications of licensee personnel were also found to be at least up to minimum requirements. However, a review of the qualifications of contractor radiological controls technicians, particularly technicians classified as senior technicians, showed that some of them did not appear to be have had sufficient experience to justify the senior classification. The inspector stated that although the past experience of these technicians adds to a total of over the two years required for the senior classification, some of the experience was not directly relevant to the work of radiological controls technician and should therefore not be credited toward that classification. The licensee stated that they currently do not have written criteria or guidelines to use in deciding the type and amount of experience that may be used to classify a technician as a senior technician. The licensee stated that they will develop such criteria soon. In the meantime, the licensee stated that even though some of the technicians with apparently low experience are classified as senior technicians, their plant assignments are based on their past experience. Technicians with low experience are not assigned to critical positions. Progress in developing clear criteria for crediting past experience of technicians will be reviewed during a future inspection (289/88-19-01).

3.3 Cumulative Exposures:

The cumulative exposure estimate for the 7R outage was 134 man-rem, and the goal was 120 man-rem. The estimate is based on actual work scope, and the goal is designed to encourage improved performance. Major jobs in the estimate included: steam generator work, both primary and secondary sides; refueling; inservice inspections; and Reg. Guide 1.97 work. The actual cumulative exposure as of July 21, 1988 was about 131 man-rem, which is in excess of the goal and will likely exceed the estimate before the end of the outage. The major areas in which estimates were exceeded were the primary side steam generator work and minor maintenance and inspections. On the other hand, many jobs were completed with exposures well below the estimates. At the time of the inspection, most of the major work had been completed, including fuel shuffle, steam generator work, and reactor coolant pump seals.

The licensee stated that several factors contributed to exceeding the exposure estimates. One of the major items was erection of scaffolding. At the time of the inspection, scaffolding work had cost a little under 20 man-rem. The licensee cited the following factors

for the high scaffolding exposures: hot weather caused difficult working conditions and slowed down the work; the scaffolding crews were often inexperienced in working in radiological areas; the scaffolds were constructed to more exacting specifications than was necessary and the extra work was done at the scaffold locations, which in many cases involved radiation exposures; and more scaffolding was erected in high radiation locations than in the past outage. The licensee stated that the lessons learned from this outage will be used to improve performance in the future. Some of these improvements will include prefabricated scaffolding, more experienced crews and better planning, and the use of chillers to improve working conditions. The licensee also stated that minor maintenance and inspection work was much more than had been anticipated, and that some of the valve repacking work was done in higher than expected radiation fields. Another problem area was locating items to be inspected, such as welds, etc. that were covered by insulation. The licensee stated that an effort was made during this outage to more accurately document and mark the locations of these items for future inspection work.

4.0 Hot Particle Contamination Incident:

The contamination incident occurred on the morning July 11, 1988, and the person involved was a contractor radiological controls technician. The technician had entered containment (RWP # 33609) to perform surveys of the upper and lower steam generator tents for both steam generators. His protective clothing included single PCs, wet suit bottoms, and negative pressure respirator. The hot particle was found on the technician's back right shoulder and the licensee believes that it was probably deposited there during removal of the protective clothing. However, there is no firm data to indicate how the contamination occurred. The particle was removed with sticky tape and was kept for analysis (the particle was microscopic). A survey of the shoulder before removing the particle showed a count rate on the pancake probe that was offscale at 500,000 counts per minute.

The particle was measured on a gamma ray spectrometer and showed the following activities:

Ce-141	1.71E-2	uCi
Ce-144	2.18E-1	uCi
Ru-103	7.11E-3	uCi
Ru-106	2.10E-2	uCi
Zr-95	8.16E-2	uCi
Nb-95	1.56E-1	uCi

To the above activities were added the daughter products Pr-144 and Rh-106, known to be in secular equilibrium with their parents Ce-144 and Ru-106, respectively. The total activity of the particle based on the gamma analysis was thus found to be 0.74 uCi.

Initial dose rate estimates based on survey meter data on the hot particle gave a dose rate of 3.2 rads/hr. Since the exact time of contamination was not known it was assumed to be equal to the time interval from entry into the contamination areas until the time the particle was found. The technician turned on his air sampler (BZA) at 8:20 and it was estimated to take about 5 minutes to walk to the contamination area, giving an initial time of 8:25. The particle was found at 9:56. The contamination duration was therefore approximately 1,5 hours. Using the initial dose rate estimate of 3.2 rads/ hr, the skin dose is roughly 4.8 rads.

The hot particle was sent to Unit-2 for analysis in an attempt to estimate the content of strontium isotopes, particularly Sr-90 and its daughter product Y-90. The system used in Unit-2 is essentially a two channel analyzer connected to a scintillation detector. The energy division between the two channels is set at 1.2 MeV. The method is based on the assumption that beta activity that is detected in channel 2 will be that from Y-90 beta rays (2.2 Mev endpoint). This has been found to be the case for many of the samples taken in Unit-2. However, in the case of the hot particle, many high energy beta emitters were present (Pr-144, 3 MeV endpoint; Rh-106, 3.5 MeV endpoint). These high energy beta radiations invalidate the assumptions on which the beta measurements were made. The tentative conclusion that was reached based on these measurements, however, was that there was probably no Sr-90 activity in the particle. The licensee felt that this conclusion was confirmed by the fact that Cs-137 was not detected in the hot particle. The licensee stated that Cs-137 and Sr-90 were normally found together and that the absence of the cesium suggests the absence of the strontium.

Based on the above analyses and assumptions, the licensee performed a dose assessment in which the skin dose to the technician was estimated to be 5.624 rem. The method used for dose assessment was based on dose rate conversion data published in recent health physics literature (Kocher). This dose exceeds the GPUN administrative skin dose limit of 5 rem, and the worker's access into the radiological controls areas was restricted. The licensee has reconsidered some of the assumptions used in this dose assessment, particularly regarding the absence of Sr from the particle. It was realized that the Cs-137 could have been in soluble form and may have been dissolved out of the particle before the contamination incident. The licensee has therefore not closed this incident and is considering alternative methods to determine if the particle contains Sr and if so, how much. This item will therefore be

left unresolved pending completion of the licensee's investigations. (289/88-19-02).

5.0 Exit Meeting:

The inspector met with licensee representatives at the end of the inspection on July 29, 1988. The inspector summarized the purpose of the inspection and the inspection findings.