

U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-320/89-13

Docket No. 50-320

License No. DPR-73

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

Facility Name: Three Mile Island Unit 2

Inspection At: Middletown, Pennsylvania

Inspection Conducted: November 30, 1989 and December 15, 1989

Inspectors: S. Sherbini 12/29/89
S. Sherbini, Senior Radiation Specialist
Facilities Radiation Protection Section
date

W. Pasciak 12/29/89
W. Pasciak, Chief, Facilities Radiation
Protection Section, Facilities Radiological
Safety and Safeguards Branch
date

Approved by: Ronald R. Bellamy December 29, 1989
R. Bellamy, Chief, Facilities Radiological
Safety & Safeguards Branch, Division of
Radiation Safety and safeguards
date

Inspection Summary: Inspection on November 30, 1989 and December 15, 1989
(Report No. 50-320/89-13)

Areas Inspected: A reactive inspection to review the circumstances connected with an unplanned exposure of a Radiological Controls Technician associated with the removal of fuel fines from the reactor vessel.

Results: One apparent violation was identified (Section 5.0). The violation was a failure to adequately survey an end-plug being removed from the reactor vessel which resulted in improper removal of material from the vessel and in an unplanned exposure of an individual to radiation.

DETAILS

1.0 Personnel Contacted

- * M. Roche, Director, Unit-2
- * J. Kuehn, Site Operations Director
- * T. Murphy, Radiological Controls Director, TMI-2
- * S. Levin, Defueling Director, Unit-2
- C. Whitaker, Group Radiological Controls Supervisor
- D. Hollman, Defueling Senior Operator
- M. Kovach, Utility Worker "A"
- B. Novac, Auxiliary Operator "A"
- J. Barry, Auxiliary Operator "A"
- K. Barth, Radiological Controls Technician
- T. Dupes, Radiological Controls Technician
- E. Smith, Radiological Controls Technician
- S. Laskoski, Boilermaker
- G. Strachan, Boilermaker

1.1 NRC Personnel

- * M. Knapp, Director, Division of Radiation Safety and Safeguards
- * F. Young, Senior Resident Inspector
- * C. Cowgill, Chief, Reactor Projects Section - 4B
- L. Thonus, Project Manager, NRR

1.2 Pennsylvania Department of Environmental Resources (PDER)

- * R. Cook, PDER Inspector

* Denotes attendance at the exit meeting

2.0 Background

On November 28, 1989 two auxiliary operators were removing an end-plug device from the reactor vessel by means of a long tool (Peters tool). The Peters tool that was used was a long aluminum rod about three-quarters of an inch in diameter with a vise-grip type device on one end that could be controlled from the other end. The end-plug was about two and one-half inches in diameter and two inches in height and was of a cup-like configuration open on one end. The plug was removed from the vessel apparently full of fuel fines. The presence of these fuel fines led to an unplanned exposure of a Radiation Controls Technician (RCT).

3.0 Description of the Facility

The work area in which the incident occurred was the Reactor Defueling Platform located about seven feet above the water surface in the reactor vessel. The platform is shielded and covers the entire reactor vessel. In its center is an arrangement of slots in the shape of a "T" that

allows operators standing on the platform access to the reactor vessel. Figure 1 depicts the arrangement of the "T" slot and the approximate positions of the individuals involved during the incident. There is a rail that borders the "T" slot of approximately three feet in height. The rail's sides are covered with a shield for radiation protection purposes. Off to one side of the "T" slot is an area designated as the "local service panel", essentially a table, which is used by the radiation controls technicians in handling materials removed from the vessel.

4.0 Description of the Incident

The sequence of events described here was determined through discussions with the individuals involved in the incident. There are some discrepancies in the accounts of the events as related to the inspectors. In Section 4.1 below the discrepancies are presented in further detail.

The incident occurred early during the third shift (2:15 a.m. on November 28, 1989). During the end of the second shift the end-plug was removed from the hose it was in by means of the Peters tool described in Section 2.0, and the plug was left in the tool at the bottom of the vessel by the boilermakers on second shift. According to the second shift boilermaker who removed the end-plug, the position of the plug in the Peters tool was such that the open bowl of the plug was oriented upward. This orientation supports the statement by the RCT that the amount of fuel fines that were removed was about that of a full cup. The second shift boilermakers exited the containment building at about 1:50 a.m.

Figure 1 depicts the approximate location of the two auxiliary operators, the crane operator and the radiological controls technician when the incident occurred. The auxiliary operators' job was to pull up the Peters tool from the vessel in order to retrieve the reusable end-plug. As they pulled it up out of the water in the "T" slot through the area of the rails they wiped it down with a clean cloth, while at the same time the RCT surveyed the pole. When the object at the end of the tool got to the height of the rails where it could be grabbed, the RCT surveyed it to determine if the dose rates on it were low enough to remove it from the vessel. The RCT did not give the auxiliary operators an indication that there were any unusual dose rates associated with the end-plug.

The RCT stated that there was no change in the meter reading when the object initially broke water nor was there any marked increase in the meter reading when the object was up to the point where it was removed from the end of the Peters tool. When it was removed from the tool it was dropped into a semitransparent plastic bag along with the wiping cloth.

The auxiliary operator who performed the actual bagging stated that because he did not want to drop the plug back into the vessel he was leaning way over the rail and down between the rails, and bagged the end-plug more quickly than usual. The RCT also stated that the end-plug was bagged much more quickly than normal. The auxiliary operator stated that the RCT seemed surprised that the operation went so quickly and

hastily snatched the bag out of the his hand. The auxiliary operator said that while he was working the Peters tool and bagging the end-plug he thought that the RCT's survey meter was somewhere up over or near his head. The RCT stated that his survey meter was below the operator's hands during the entire operation.

Once the RCT had the bag with the end-plug in it in his hands, he took it over to the local service panel and put it down. He then noticed some water in the bag. He put his hand in the bag and grabbed the towel that was already in there and used it to wipe up the water. He did not perform a survey before putting his hand in the bag. He then took the towel out and did a contact survey of it. He measured 35 R/hr closed window and offscale open window (>50 R/hr). He then put the towel in a second plastic bag. He also noticed that some fuel fines were in the bag with the end-plug. He put a beta glove on, put his hand in the bag, grabbed the end-plug, knocked it on the table inside the bag to shake out any fuel fines in it, removed it from the bag and placed it on the end of the table. He said that there was about a full cup of fuel fines in the bag. During this time the RCT was in communication with the Command Center. The Command Center's direction was that he shake the bag over the slot to return the fuel fines to the vessel, which he did. He was also directed to have the auxiliary operators put the end-plug in a submerged fuel canister located in the vessel. He held the end-plug over the slot for the operator to clamp it with the Peters tool and then it was placed in the fuel canister. The RCT then took the second plastic bag which contained the wipe cloth and placed it at the North end of the defueling platform. During this time the RCT made several surveys of the end-plug and the fuel fines in the bag. The end-plug on contact with its open side measured 5 R/hr gamma and 80 R/hr beta. The fuel fines in the bag exhibited dose rates that were offscale open and closed window at contact, and at fourteen inches were 15 R/hr gamma and 80 R/hr beta. The survey results along with the RCT's comments appear in the attached survey sheet (Enclosure 1).

4.1 Discrepancies

There were several discrepancies in the accounts of the various individuals that were interviewed by the inspectors. They are as follows:

- ** The auxiliary operator who bagged the end-plug stated that he thought the RCT's meter was up around his head. The RCT stated that his meter was below the operator's hands. No one else on the platform could comment on this aspect of the operation.
- ** The RCT stated that the Peters tool and end-plug were flushed on the second shift and put back in the vessel, and that it was not flushed a second time by the operators when they removed it on third shift. One operator said that it was flushed during removal on third shift and the other said he thought it was but could not remember who did it.

- ** The RCT stated that the beta dose rates deep into the slot were 5-8 R/hr when the operation was going on. Measurements made by another RCT afterward did not support the 5-8 R/hr measurement, but were in the area of a few hundred mR/hr. It is not known whether the second survey covered the exact areas as the initial survey.

5.0 Apparent Violation

10 CFR 20.201(b) requires, in part, that each licensee shall make or cause to be made such surveys as may be necessary and reasonable to ensure compliance with the requirements of 10 CFR Part 20. 10 CFR 20.201(a) defines a survey, in part, as an evaluation of the radiation hazards incident to the presence of radioactive materials under a specific set of conditions. When appropriate, such an evaluation includes a physical survey of material and equipment and measurements of levels of radiation present. Contrary to the above, at approximately 2:15 a.m. on November 28, 1989, inadequate surveys were made to assure compliance with that part of 20.101 which limits radiation dose to individuals in restricted areas. Specifically, a hose end-plug fitting was removed from the reactor vessel and handled by two technicians without properly measuring the radiation dose from the end-plug. This resulted in an unplanned radiation exposure to one of the technicians and in the inappropriate removal of contaminated material from the reactor vessel.

Corrective actions for this apparent violation will be reviewed during a future inspection. (50-320/89-13-01)

5.1 Program Weaknesses

The following program weaknesses were identified as part of the inspection and discussed during the Enforcement Conference on December 4, 1989.

- ** The RCT stated that the background dose rate in the vicinity of where surveys were being made of the Peters tool and the end-plug were 5 to 8 R/hr beta. It was not clear to the technician what an acceptable background dose rate is for making such surveys. In discussions the inspectors had regarding this with other RCTs, it appeared that there was a confusion among the RCTs what acceptable background levels are. One RCT said that an acceptable background would be about 2-3 R/hr, open window, and another said 1 R/hr open window would be acceptable. The licensee should modify procedures to provide clear directions to RCTs as to what background levels are acceptable for survey work and what should be done when the specified levels are exceeded. Direction should be clarified for all types of future work where there is a potential for high background dose rates.
- ** The end-plug was removed from the vessel without having received an adequate survey. Survey procedures for all types of future work

should be upgraded to ensure that adequate surveys are performed. The procedures need to take into consideration the possibility of objects with very high beta to gamma ratios and the particular problems of surveying objects with this type of contamination. Procedures should clarify how surveys are to be made, for example open or closed window and survey distance. Where appropriate, special equipment should be specified.

- ** The end-plug was bagged for removal from the work slot much more quickly than usual without receiving oral approval from the RCT. The rapidity in which the end-plug was bagged may have contributed to the inadequacy of the survey. The practice has been that the operators may remove objects from the vessel unless the RCT tells them not to. Licensee procedures should be revised to require approval by the RCT at critical points in the progress of each job. These critical points should be designated for each type of future job and clearly communicated to workers and to the RCTs.
- ** The RCT handled the end-plug prior to performing an adequate survey on it. While in this case the RCT may have thought he performed an adequate survey, in actuality he did not. The licensee should emphasize to the RCTs the importance of performing radiological surveys on objects before handling them.

These weaknesses will be reviewed during a future inspection.
(50-320/89-13-02)

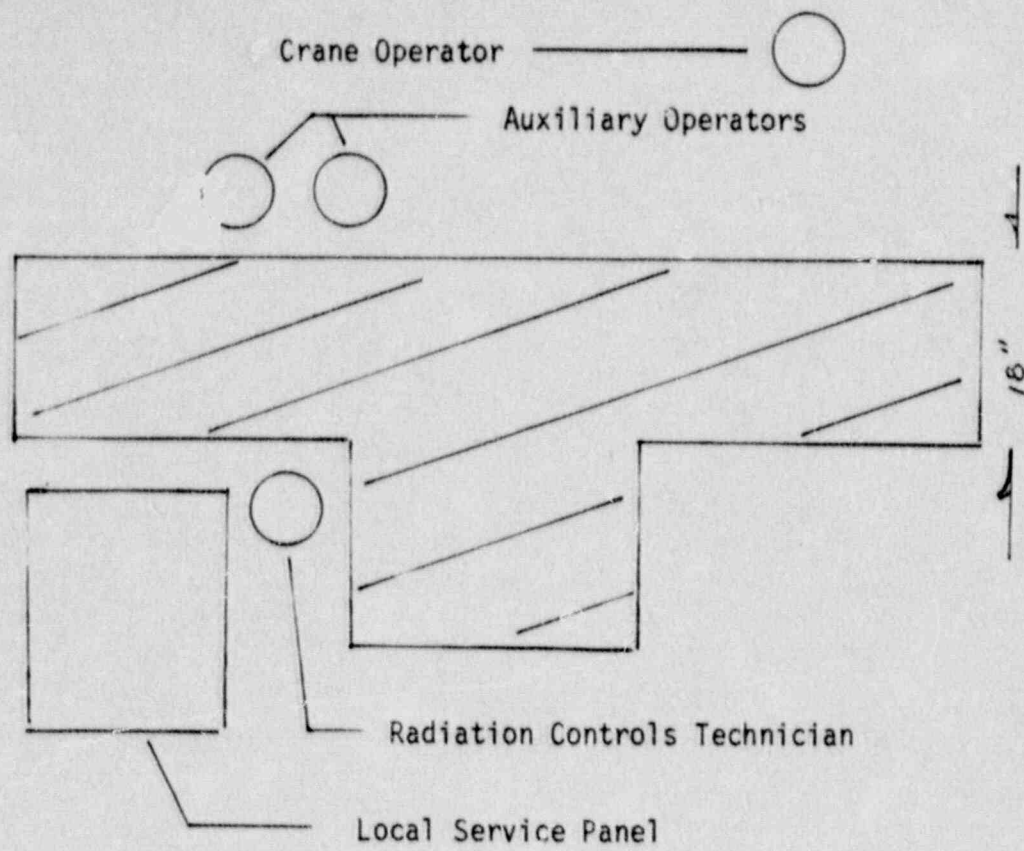
6.0 Follow-up Inspection on December 15, 1989

On December 15, 1989, a follow-up inspection to review the licensee's retraining of radiation control technicians and workers was conducted. Several RCTs and workers were interviewed by the inspector. Both workers and RCTs had received additional training since the November 28, 1989 incident. The training focused on the importance of following licensee procedures when removing objects from the vessel. A new form was developed to ensure more thorough surveying of objects. Also hold points have been established for critical stages of job evolutions to provide for RCT approval.

The licensee was briefed on the results of this follow-up inspection on December 15, 1989. Mr. Thomas Murphy attended the briefing.

7.0 Exit Interview

The inspector met with the licensee personnel denoted in Section 1.0 at the conclusion of this inspection on November 30, 1989. The scope and findings were presented at that time.



"T" Slot Plan View

Figure 1

Survey Information	Instrument Data		Air Sample	
	Contamination Survey		Radiation Survey	
Location <u>3'2" RA W</u> <u>Platform</u>	Inst _____	Inst _____	Inst <u>R02A</u>	Inst _____
Reason <u>JOB COVERAGE</u>	S/N _____	S/N _____	S/N <u>698</u>	S/N _____
Date <u>11-28-89</u> Time <u>0810</u>	Cal. Due _____	Cal. Due _____	Cal. Due <u>2-2-90</u>	Cal. Due _____
Tech. <u>E. Smith</u>	Eff. _____	Eff. _____	B.C.F. <u>2</u>	B.C.F. _____
Reviewed by <u>C. K. Whitaker</u>	Bkg _____	Bkg _____	Tech _____	
	Tech _____		Note: Contact Readings Circled <input type="checkbox"/> = Smear Location	

Date _____ Time _____
 Activity _____
 Sample # _____
 Note: Radiation dose rates in mr/hr are general area, contamination results are dpm/100cm² unless otherwise noted

I HAD THE PLUG FLUSHED WHEN FIRST REMOVED FROM FITTING, THEN PARTLY PUT BACK IN FITTING SO THE BOILERMAKERS COULD LEAVE, TEAM OF OPERATORS ENTERED WE PULLED THE PLUG AND REMOVED IT. AT 2' BELOW HAND RAIL PLUG WAS BAGGED AND I TOOK THE BAG WITH PLUG TO THE TOP OF THE LOCAL SERVICE PANEL, I COULD NOT GET WHAT I FELT WAS A GOOD READING 2' BELOW THE HAND RAIL BECAUSE THE CAN BELOW WAS GIVING A HI READING 8RA. I QUICKLY DRIED THE OUTSIDE OF THE PLUG - ABOUT 10 SECONDS, WITH JUST NORMAL GLOVES. THEN I CHECKED THE TERA TOWEL 1 SEC READING BELOW. THEN I PUT ON A BETA GLOVE AND CHECKED THE PLUG THRU THE BAG. READINGS BELOW, AS I TURNED THE PLUG OVER I NOTICED IT HAD EMPTIED OUT FUEL INTO THE BAG. THEN I TOOK READINGS ON THE FUEL THEN I EMPTIED THE FUEL BACK INTO THE RX VESSEL, HANDLED THE FUEL FOR ABOUT 5-10 SECONDS AT ARMS LENGTH WITH A BETA GLOVE. THEN WITH A LONG PETERS TOOL I PUT THE PLUG IN IT'S JAWS. HANDLED THE PLUG FOR ABOUT 15-20 SECONDS WITH BETA GLOVE TO GET IT TO HOLD THEN PUT IN BAGGED 3 BAGS THE DE FUELING CANS,



ORIGINAL

Enclosure 1