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June 23, 1986

TMI-2 Cleanup Project Directorate
Attn: Dr. W. D. Travers
Director
US Nuclear Regulatory Commission
c/o Three Mile Island Nuclear Station
Middletown, PA 17057

Dear Dr. Travers:

Three Mile Island Nuclear Station, Unit 2 (TMI-2)
Operating License No. DPR-73
Docket No. 50-320
Handling of Radioactive Materials

The purpose of this letter is to document the substance of conversations held with you and others members of the Staff on June 17 and June 19, 1986, regarding techniques used to survey and handle small particles of core debris found on the defueling work platform (DWP) on two recent occasions. Also included is a description of the immediate and continuing actions taken by GPU Nuclear to ensure a proper response by defueling crews, including Radiological Controls Technicians and command center personnel, in the future.

On two (2) recent occasions, small particles of debris were found on the DWP during defueling operations. The first event occurred on Sunday, June 15, 1986. A routine review of the defueling logs the following day by members of the TMI-2 Safety Review Group (SRG) raised certain questions regarding the techniques used by the Radiological Controls Technician assigned to the defueling crew. While the inquiry into this matter was ongoing, an apparently similar event occurred on Tuesday, June 17, 1986. The following is a description of each event, including an evaluation of actions taken. In both cases, the hand doses to the technicians from handling the debris were small and did not add significantly to the extremity doses normally received while performing their routine functions.

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On Sunday, June 15, 1986, a Radiological Controls Technician (Technician A) discovered a small particle of radioactive material on the plastic sheet covering the defueling platform. Two radiation measurements were taken using an air ionization chamber placed essentially in contact with the material. The first measurement was taken with the instrument set on the low (0-500 mR/h) scale; in the second case, the instrument was set on the intermediate (0-5000 mR/h) scale. Both measurements resulted in off-scale high readings. At that point, for reasons which remain unclear, Technician A opted not to take further measurements. Technician A donned a pair of heavy rubber lineman's gloves, in addition to the two pairs of rubber gloves and one pair of cotton glove liners normally worn, to provide additional extremity protection. A heavy paper multi-fold towel was held in the gloved hand and used to pick up the material. The radioactive particle was deposited in the Reactor Vessel. During the inquiry, Technician A re-enacted the actions of June 15, 1986, for the TMI-2 Manager of Radiological Engineering and Deputy Manager, Radiological Controls Field Operations. Based on the re-enactment, an exposure time (i.e., the length of time when the source was in close proximity to right hand) was determined to be approximately 1-2 seconds. The fingers of the right hand were estimated to be 3-4 centimeters from the source based on actual measurements of the gloved hand holding a simulated piece of radioactive material in a multi-fold towel. Considering the exposure time, the size of the debris particle (approximate 0.5 cm²) and radiation levels recorded on previous debris samples, a dose assessment was performed. The extremity dose assigned to Technician A from this event was approximately 0.012 rem. This was later confirmed to be a reasonable assessment based on actual TLD readings for the period of June 3, to June 16, 1986.

On Tuesday, June 17, 1986, a Radiological Controls Technician (Technician B) discovered a pea-sized particle of core debris which had fallen onto the defueling platform from a spade bucket tool while it was being repaired. Radiation measurements of the debris indicated a contact gamma radiation dose rate of 6 rem/hour and a beta radiation dose rate of 20 rem/hour at a distance of 6 inches. The Coordination Center was contacted and the situation was discussed with the Radiological Controls Supervisor on duty at the time. Using the data reported, the supervisor and technician determined that the debris could be picked up using a length of adhesive tape to lift the item off the platform and transfer it to the reactor vessel. Technician B was wearing two (2) pairs of rubber gloves and 1 pair of cotton glove liners at the time and donned an additional pair of heavy rubber lineman's gloves from which the tape was suspended. The debris adhered to the tape and was successfully lifted off the work platform and redeposited into the reactor vessel. A re-enactment indicated that the debris was within 6 cm. of the finger tips. In addition, extremity TLDs worn on the wrist (covering the exposure period of June 1, to June 17, 1986) indicated a dose of 0.187 rem; these results are considered valid and no special dosimetry evaluation was performed.

The actions taken by Technician A was improper in that the technician did not conduct a proper survey of the debris to determine radiation levels before taking any action.

In the second case, Technician B conducted a proper survey and coordinated his activities with the command center. All actions were appropriate and consistent with established procedures.

In both cases, the technicians stopped work and required the defueling crew on the DWP to maintain a distance from the debris, thus minimizing crew exposures. Additionally, as stated above, both technicians added heavy duty beta gloves which essentially eliminated the dose contribution from beta radiation. This was considered to be an effective dose reduction action.

As a result of these events and in recognition of the particular problems in handling small, highly radioactive particles, the following actions have been taken:

1. Dose assessments have been performed for the two events summarized above. Technician A was determined to have received an extremity dose of approximately 0.012 rem. In the case of Technician B, the dose to the extremities was measured by the wrist-worn thermoluminescent dosimeter (TLD). This TLD was positioned such that the distance from the source was approximately equal to that of the fingers from the source. The TLD indicated a dose of 0.187 rem for the period of June 3, through June 17, 1986.

These doses are consistent with recent experience on the defueling platform where debris was not handled directly. Thus, it has been concluded that no significant dose resulted from these activities.

2. Immediate action was taken to obtain and stage onto the DWP tools for handling (i.e, scooping up) small particles of radioactive debris. These tools will eliminate the need to pick-up radioactive debris by hand. Other remote techniques, such as the use of adhesive tape, will continue to be a viable option. A lead shielded cask (1 1/2" thick walls) was placed on the defueling platform on June 17, 1986, to receive and store small debris particles which cannot be conveniently returned to the reactor vessel.
3. On June 18, 1986, the pre-job briefings for reactor building entries were amended to include discussions of methods for handling and disposing of small particles of radioactive core debris. These briefings stressed the need for accurate dose measurements and use of techniques to minimize dose to the body and extremities. These pre-job briefings are being given to all members of the defueling work crews and will continue throughout the defueling process. Also on June 18, 1986, the Radiological Controls Field Operations Group Supervisors were briefed on the events of June 15 and June 17, 1986, the corrective and preventive actions, and their specific responsibilities for instructing and supervising field technicians in the proper techniques for handling radioactive debris particles.

4. The issues pertinent to these events will be incorporated into the Radiological Controls Technician Cyclic Training program for the cycle commencing July 15, 1986, and will be discussed in the next monthly Rad Awareness Meeting.
5. The individual involved in the handling of the radioactive debris on June 15, 1986, was restricted from work in radiological areas until a dose evaluation was completed. In addition, this technician was restricted from work in high radiations areas until retraining in issues relevant to handling radioactive material was conducted by Radiologicals Controls management.
6. The individual involved in the event on June 15, 1986, was counseled by the Radiological Controls Director. This counseling stressed the importance of performing work only when radiological conditions are well established.

In conclusion, handling of the debris by Technician A was not in strict compliance with established practices. The handling and disposition of the debris by Technician B was appropriate. Neither event resulted in significant additional dose contributions to the involved individual. As a result of these events, measures have been taken and will continue to ensure the proper response in the future.

Sincerely,



F. R. Standerfer
Vice President/Director, TMI-2

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