

U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-320/88-05
Docket No. 50-320
License No. DPK-73 Priority -- Category C
Licensee: GPU Nuclear Corporation
P. O. Box 480
Middletown, Pennsylvania 17057
Facility Name: Three Mile Island Nuclear Station, Unit 2
Inspection At: Middletown, Pennsylvania
Inspection Conducted: February 27 - April 1, 1988
Inspectors: R. Conte, Senior Resident Inspector
*T. Moslak, Resident Inspector
A. Sidpara, Resident Inspector
*Reporting Inspector
Approved by: C. Cowgill, Chief, Reactor Projects Section 1A 5/2/88
Date

Inspection Summary:

Areas Inspected: Routine safety inspection by site inspectors of routine plant operations, defueling-related operations, abnormal plant events, implementation of radiological controls, and general plant housekeeping.

Results: One violation was identified for failure to perform the procedural prerequisites for controlling hotwork activities in the Decontamination Facility in the reactor building. Failure to do these prerequisites resulted in fires in the facility. Overall, housekeeping in the reactor building and in the balance of the plant areas has significantly deteriorated. Inspectors will monitor licensee's progress in improving this aspect of the fire protection and industrial safety program.

DETAILS

1. Plant Operations

1.1 Defueling Operations

During this reporting period, defueling crews continued to use the drilling machinery to separate the in-core instrument guide tubes (IJGT) and support posts from the Lower Core Support Assembly (LCSA). Problems that initially slowed this process have been resolved and significant progress has been made.

Thirty-four of forty-eight support posts have been drilled out of the uppermost plate, the Lower Grid Rib Section (LGRS). Present plans call for continuing to use the drilling machine to drill out selected support posts then using this machinery, to make severance cuts of the grid intersections of the LGRS. Performing these cuts will result in the LGRS being cut into one large square section and twelve smaller sections. Upon removal from the reactor vessel, the larger sections will be stored in a Core Flood Tank that has been reconfigured to accept sections of the LCSA. In series with the drilling operations, visual examinations, using underwater cameras, and radiation surveys of internal components are being conducted to assess the strategy for their eventual removal from the reactor vessel.

On March 29, 1988, a small specifically outfitted robotic submarine began removing debris from the pressurizer. The debris is picked up by slave manipulators on the device and deposited into a waste receptacle. Some material was placed in the receptacle, but a loss in visibility, caused by the device's propellers stirring up fine material, has slowed progress.

1.2 Decontamination/Dose Reduction Activities

Removing thin layers of concrete (scarification) from reactor building basement walls has been completed. Robots performed this task. Transfers of the concrete dust/water slurry will be made from the basement to a sludge receiving tank in the auxiliary building for eventual processing and shipment of the solidified waste to a commercial burial site.

Preparations are being made to fill the concrete block wall with water, located in the reactor building basement, in an effort to leach out the imbedded contamination. Subsequent to performing this task, the contaminated water will be processed through the Submerged Demineralizer System to remove the radioactive contaminants.

Scabbling, steam vacuuming, and hands-on decontamination continue in the auxiliary and fuel handling buildings. To date, 116 of 143 cubicles have been decontaminated to end point criteria. On March 29, 1988, approximately seven cubic yards of concrete were poured into the floor of the seal injection valve room to reduce the dose rate in that cubicle. This

additional shielding, ranging in depth from seven inches to eleven inches, appears to have reduced the general area dose rate in the cubicle from about 60 R/hour to about 1 R/hour.

2. Fires in Reactor Building Decontamination Facility

2.1 Background

On February 22 and 27, 1988, fires occurred in the Decontamination (Decon) Facility a temporary structure located on the 347-foot elevation of the reactor building. The fires resulted when sparks from a plasma arc cutting job ignited various materials installed and staged in the facility. In both occurrences, the portable fire extinguishers issued to the firewatch failed to operate. However, both fires were quickly extinguished using other methods. In the first incident, February 22, when a dry chemical extinguisher was found to be spent, the torch operator extinguished the flames by "patting-out" the flames with a leather glove he was wearing; and, in the second incident, February 27, when the CO2 extinguisher failed to discharge, personnel obtained a dry chemical portable extinguisher from another work area and used it to extinguish the fire. Subsequent to extinguishing the first fire, the torch operator and his firewatch left the reactor building because they felt nauseated from smoke inhalation and reported to the first aid department for examination. No injuries or illnesses resulted from the second fire. Critiques were conducted and Incident Reports were prepared for both fires; however, following the second fire, site management stopped all cutting work in the facility until an evaluation of the facility was performed by the fire protection engineer and corrective actions resulting from that review were completed.

On February 29, 1988, the licensee's fire protection engineer inspected the facility and identified deficiencies in the construction, conduct of operations, and housekeeping conditions in and near the facility; and, provided recommendations for upgrading the facility and re-training personnel in controlling hotwork operations. The appropriate departments took actions to modify the facility, improve the housekeeping, and provide job briefings. The fire protection engineer presented the job briefings to about 144 personnel on the requirements specified in the control of hotwork procedure (4000-ADM-1100.05) for performing cutting operations. The job briefings provided specific information to plasma arc firewatch personnel, torch operators, task supervisors, and personnel monitoring the work from the coordination center on pre-work requirements, work area maintenance requirements, post-work inspection requirements, and outlined the actions required to be taken if a fire is discovered.

To verify implementation of the recommendations, inspections of the facility were performed by a fire protection engineer and a safety specialist. The facility was determined to be safe for conducting hotwork on March 7, 1988.

During the critique of the first fire, the licensee learned that personnel were not complying with the notification and reporting requirements of the fire protection plan. Personnel standing fire watches in the facility had not notified the control room of this fire in a timely manner, apparently because the firewatch assumed that there was no reason to notify the control room of such occurrences. As a result, the Incident Event Report (No. 88-014) for this fire that occurred on February 22, 1988, was not prepared until February 24, 1988, with the critique being held on February 25, 1988. This finding was assigned to management to take actions to assure that task supervisors and crafts personnel advise the control room of all fires and provide input to generate Incident/Event Reports in a timely manner. When the second fire occurred, the notifications and reports were expeditiously made within the licensee's organization and the NRC Resident Office was contacted.

2.2 Inspector Findings

The inspector evaluated the conditions that resulted in the fires in the Decontamination Facility and licensee actions taken to prevent a recurrence through discussions with licensee representatives, reviews of relevant documentation, and examination of conditions in the reactor building. From this evaluation, the inspector determined the following.

- Fire protection engineers had not been in the reactor building to assess fire hazard conditions to the Decon Facility from October 1987, until after the second fire, February 29, 1988. This lack of involvement is considered to be a contributing factor to the deteriorated housekeeping conditions in and around the facility.
- The initial engineering review on the Unit Work Instruction (UWI No. 4730-3100-86-C1415) did not adequately assess the combustibility of the materials used in the construction of the facility or the materials used in support systems; i.e., the fabric tool window and the ductwork of the ventilation system, respectively.
- The quality of the corrective actions taken after the first fire were not adequate to prevent another fire.
- A sense of complacency regarding poor housekeeping conditions in and around the Decon Facility was developed by task supervisors, torch operators, and firewatch standers that resulted in cutting and welding permits being issued without the prerequisite fire protection measures being implemented.

With respect to the last item, the inspector established that licensee personnel failed to implement the specific requirements of procedure 4000-ADM-1100.05, "Control of Hotwork," which states, in part, in Section 4.3.

"The supervisor in charge of a welding, cutting, or grinding job shall ensure the Job Site has been physically inspected prior to starting the job. The person assigned by the Supervisor to inspect the area initials and signs the rear of the permit. The Supervisor's signature on the front of the permit documents the inspection verified the items on the rear of the job in addition to the following prior to starting the job.

- a. The job area shall be clear of transient combustibles such as trash and rags within a 40 foot distance to protect against ignition by slag or sparks.
- b. All fixed combustibles, machinery, equipment, and cable in trays subject to possible ignition or damage by sparks or slag shall be protected by appropriate noncombustible guards or covers.
- c. Fire protection and suppression equipment installed in the job area shall be verified to be in service.
- d. Appropriate portable fire extinguishers shall be provided at the immediate job site. Size, type, and number of extinguishers should be obtained to suit the hazard in any individual job area, but shall include a minimum of one ABC dry chemical unit, and shall be in addition to the normal complement of extinguishers installed in the area."

Failure to implement this procedure is contrary to the requirements of Technical Specification (TS) 6.8.1, which references Appendix A of Regulatory Guide 1.33, Revision 2, February 1978." Administrative procedures that implement the plant's fire protection program are referenced in the subject Regulatory Guide (320/88-05-01).

The inspector noted that a more in-depth review in the front end processes, i.e., design review and procurement of materials and support equipment used in the construction and operation, could have reduced the probability of such fires occurring. The inspector determined that the licensee failed to address the quality of the initial engineering review for the construction of the Decon Facility as part of their post-fire evaluations. The failure to make this determination to improve the quality of future fire protection engineering reviews is considered a weakness in the licensee's post-fire critique process.

On April 1, 1988, the inspector entered the reactor building to assess radiological, fire protection, and industry safety conditions. The results of this assessment are addressed in paragraph 3.0 of this report. However, with respect to housekeeping and fire protection conditions, the inspector concluded that housekeeping is very poor.

Specifically, the inspector observed that transient combustible materials; i.e., paper towels, card board tags, plastic bags, and plastic sheeting were carelessly scattered around work areas, and low usage spaces on the 305-foot elevation, 347-foot elevation, and on top of the "A" D-ring.

Through discussions with the lead fire protection engineer concerning the controlling of transient combustibles into the reactor building, the inspector determined that the licensee document the transient combustible materials taken into the building to verify that the maximum permissible combustible loading of the reactor building is not exceeded but does not have lower administrative action levels to assure that unused combustible material is removed from containment in a timely manner.

The fire protection engineer stated that this item will be given consideration in the upgrading of the implementation of the fire protection program at TMI Unit 2.

3.0 Reactor Building Conditions

-- (Closed) Unresolved (320/87-14-02): Reactor Building Housekeeping

On Friday, April 1, 1988, inspectors toured the reactor building to evaluate fire prevention, industrial safety, and radiological conditions. The inspectors determined that housekeeping on all elevations had deteriorated in that paper towels, cardboard tags, plastic bags, and other transient combustible materials were scattered in work areas and low usage areas. The inspectors observed that the high rad waste storage area was congested and that the waste drum used for disposing of plastic/tape materials from protective clothing was filled to overflowing. There were kick boards missing from the open hatch on the 347-foot elevation and a loose locking device on a temporary stairwell. Appropriate licensee managers were briefed on these findings. Subsequent to their discussions, licensee personnel took quick action to correct the deficiencies identified by the inspectors. The corrective actions to improve the conditions in the reactor building will be evaluated during the inspector's next entry into the reactor building.

The inspector verified that the licensee took action to address specific inspection findings identified in Inspection Report No. 50-320/87-14 and, accordingly, this item is closed. However, the inspector determined that the licensee should upgrade the overall implementation of the housekeeping program in the reactor building and in the balance of plant areas (see Section 4). To improve and to correct the deficiencies identified during the current inspection period, these actions will be evaluated on a regular basis as part of the routine inspection effort (320/88-05-02).

4.0 General Balance of Plant Conditions

The inspector, on March 9, 11, and 25, 1988, toured various areas in the auxiliary/fuel handling building and turbine building. The licensee was advised of the findings identified in these tours. As a result of the tours and followup discussions with the licensee, the following findings/conclusions were made.

4.1 Radiological Areas

Behind door AX-105 (Motor Control Center Area), several pieces of contaminated equipment were found in the corner without any radiation zone barrier. Licensee advised that due to low level contamination and the fact that the equipment was bagged and had proper radiation survey data, no additional barrier was necessary. The inspector verified that adequate measures were in place.

In the change room, near Locker No. 38, a barrel designed for clean trash contained some anti-C's. Also behind the same locker area, more anti-C's were noticed. The inspector was advised that, as a normal practice, the barrels, even those marked with "clean trash," are sorted as a precautionary measure and the anti-C's, if found, are removed. The inspector had no further questions.

Several bags containing contaminated articles were found all over the area. They were properly surveyed and had proper radiation tags. The situation, however, created a housekeeping problem. The licensee has initiated stricter administrative controls. A few days later, the inspector toured the same area and noted significant improvement.

Several radiation tags were found loose on the floor. Loose tags could mean either the contaminated equipment has been disposed of but not the tag or the contaminated equipment is still in the area without the tags and, therefore, could cause further contamination problems. Licensee has counseled the supervisory staff to be aware of such situations and to take appropriate actions.

The inspector also witnessed the tool decontamination operation inside a Plexiglas glove box fabricated by the licensee in the past. The glove box system includes a solvent for decontaminating the tools, High Efficiency Particulate Absolute (HEPA) filter on top of the glove box, as well as a vacuum unit to remove any airborne contamination. The glove box has four gloves, two on opposite sides, as well as an access door on one side. The following observations were made.

- The decontamination operation was in progress and the vacuum pump was not running. The inspector noted that licensee stated that the pump should be on anytime the glove box is in use.

- The operator was not aware of any operating procedure, inspection, or testing requirements for the glove box. He had received on-the-job verbal instructions only.
- The operator, when questioned on the pump operation requirement turned the unit on, which created a very unpleasant odor. The pump was turned off immediately.
- There was some solvent in the tray inside the glove box. The operator was not aware of the type of solvent being used.
- The inspector also found two cracks on two sides of the glove box. These cracks represented a potential leak path.
- The inspector asked the group radiological control supervisor about the decontamination procedure, solvent, inspection or testing procedure, etc. None was available.

Further review by the inspector identified that there is no operating procedure for the glove box. Also the glove box has never been inspected or tested. There is no requirement regarding solvents. There is no formal training on operating or maintaining the glove box. The inspector was also informed by the licensee that one of the cracks was through the Plexiglas wall and the glove box has been put out of service until it is repaired and required operating and testing procedures are developed. The inspector also learned that the solvent being used is known as "simple green," which is non-toxic, non-flammable but very effective for decontaminating the tools.

Since there are other means of protection in place, such as continuous air monitors, area radiation monitors, routine radiological surveys, as well as controls on work activities, no immediate radiation hazard existed. The licensee, however, took the appropriate actions to correct the problem.

4.2 Temporary Shielding

The inspector reviewed the licensee's procedure on the control of temporary shielding (TS). At the present time, the TS's, once installed, are tracked on the quarterly audit program. The audit addresses the TS's on a random basis and basically verifies the location, date installed, and date audited. The audit does not include an engineering assessment of the TS, its adequacy, effectiveness, or any planned actions to eliminate them. Since the quarterly audit does not cover all the TS's and since there is not any criteria to cover all of them in a certain time frame, it is possible that some of the TS's may be left unaudited. The other radiological controls that are in place, however, are adequate to detect any significant change in the radiological conditions (reference paragraph 4.1) and, therefore, does not cause any significant radiological hazard. The licensee, however, has planned to reassess

their TS program and then implement the necessary corrective actions to strengthen the current program. The inspector had no further questions on this matter.

4.3 Defueling Test Assembly

The inspector toured the defueling test assembly (DTA). No work was in progress at that time and the access door was open and the DTA was unmanned. According to the licensee, the access to the DTA is controlled and the door should have been closed when it is unmanned. The licensee has reinforced this administrative control.

The floor opening on the top of the vessel at the DTA was found to be inadequately guarded. One of the protective sides was removed and the safety barrier (rope) was at the top. Therefore, the potential for anyone falling into the opening existed. The licensee corrected the problem immediately by installing another barrier (chain) at the bottom.

At the DTA, the floor on the reactor vessel loop is made out of removable wooden pieces. One of the pieces was found to be unsafe. The licensee corrected this problem right away and also inspected and strengthened the rest of the floor area as appropriate. The inspector had no further questions on this matter.

4.4 Liquid Radwaste Instrumentation

- At the waste control panel area on the annunciator panel, a high level WDS-T-1A alarm was blinking. The actual level indication was 9.3 feet, which is lower than the set point, as shown in procedure 4215-RPR-3233.01. Following investigation by the licensee, it was found to be only a spurious alarm. The observed condition could not be repeated.
- The auxiliary building sump level is indicated by a temporary gauge installed under mechanical modification No. 138. The calibration requirement was not clear and the actual sump level is determined by subtracting ten from the indicated readout and then dividing by eight. This gauge makes it harder to readily determine the auxiliary building sump level. The temporary installation was made approximately four years ago. The inspector was informed that the gauge is periodically inspected and calibrated. An engineering evaluation is also performed periodically to assure its reliability. The licensee, however, is looking for a different kind of level indicating gauge as the permanent installation.
- Miscellaneous waste hold-up tank WDL-T-2 has a temporary level gauge. The original gauge has been out of service for about four years. The calibration sticker on the temporary gauge was found to be blank.

The inspector was informed that the gauge will be recalibrated. The ink on the calibration sticker was faded even though it was calibrated per established frequency.

The inspector had no further questions regarding this matter.

4.5 Posting of Radiation Surveys

The inspector reviewed radiation surveys in the auxiliary building control point book and found a total of nine out-of-date surveys. The maximum elapsed time was about two weeks. The inspector also noted the daily check sheet for this time were signed off indicating all the radiation surveys at the control point were verified to be current.

At the end of the tour, the inspector was advised by the GRCS that the current surveys were conducted, but they were locked in a file cabinet and not distributed at the control point.

The inspector was informed by the licensee that there was no new Radiation Work Permit (RWP) was to be issued, since there was not any significant change in the radiological conditions as indicated on the current radiation surveys.

Licensee's procedure 9200-ADM-4110-.04, "Radiation Work Permit," paragraphs 4.3.5.1 and 4.3.5.2 require distribution of radiation surveys once they are reviewed and approved by the GRCS. Also, per procedure 9200-ADM-4200.01, "Radiation Surveys," paragraph 4.4.6, the GRCS is to ensure that surveys are performed as scheduled and that, at the end of each shift, the schedule (for radiation surveys) should be checked for completeness and status system updated upon completion of the radiation surveys. The licensee has corrected this problem by providing additional instructions to GRCS regarding items to be checked when signing off the check sheets.

4.6 Miscellaneous Findings

In addition to the findings identified in the above paragraphs, the inspector made the following observations during his plant spaces review.

- In the fuel handling building, one blower with No. U4713-100, which is used to maintain negative pressure in the annular space between the auxiliary building and the fuel handling building was operating with excessive vibration and potentially could cause a safety hazard for the personnel working in the area. The inspector was informed by the shift supervisor that the blower has been operating in that condition for a long time; however, the maintenance department will be requested to evaluate the blower.

- Radiation tag, dated October 13, 1987, was found on the floor near pump DC-P-1A.
- One radiation caution tag marked "Hand Tool," dated March 15, 1988, was found on the floor near SF-C-1B, but no hand tool was in that area.
- The lube oil site glass on nuclear service pump NS-P-1B does not have the protection cage. The glass, if broken, potentially could cause loss of lube oil.
- Near door No. AX-112, an oil leak was found through an oil lubricating device mounted approximately five feet above the ground level. A followup tour indicated that this problem was corrected.
- A pair of anti-C's was found on the floor near the demineralizer filter system unit on the 305-foot elevation.

Following the above-mentioned plant walkdowns, the inspector briefed several licensee staff members. The licensee was responsive and took immediate corrective actions or planned future actions emphasizing safety significance.

The inspector had no further questions regarding these items.

5.0 Exit Interview

The inspectors met periodically with licensee representatives to discuss inspection. On April 8, 1988, the site inspectors summarized the inspection findings in a meeting with the following personnel:

P. Barth, Fire Protection Engineer
 J. Byrne, Manager, TMI-2 Licensing
 E. Gee, Industrial Safety and Health Manager
 S. Levin, Defueling Director
 T. O'Connor, Lead Fire Protection Engineer
 W. Potts, Site Operations Director
 R. Rogan, Director, Licensing and Nuclear Safety
 F. Standerfer, Director, TMI-2
 D. Turner, Director, Radiological Controls, TMI-2
 D. Tuttle, Manager, Radiological Controls Field Operations, TMI-2

At no time during the inspection was written material provided to the licensee by the inspectors.

Unresolved Items are matters about which information is required in order to ascertain whether they are acceptable, violations, or deviations. Unresolved items discussed during the exit meeting are addressed in Section 3.