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NRC/TMI-85-080

Docket No. 50-320

GPU Nuclear Corporation
ATTN: Mr. F. R. Standerfer
Vice President/Director, TMI-2
P.O. Box 480
Middletown, Pennsylvania 17057

Gentlemen:

Subject: Inspection 50-320/85-18

Between September 7, 1985 and October 7, 1985, Mr. R. Cook and other NRC representatives conducted a routine safety inspection of activities authorized by NRC License No. DPR-73 at your facility. The attached NRC Region I Inspection Report describes the areas examined. The inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the inspector. At the conclusion of the inspection, Mr. Cook summarized the inspection findings with you and other members of your staff.

Based on the results of the inspection, no violations were identified.

We have received your letter of September 27, 1985 concerning Inspection Report 50-320/84-04. We will examine the implementation of revisions to the GPU Nuclear Radiation Protection Plan, 1000-PLN-4010.01 in a future inspection.

Your cooperation is appreciated.

Sincerely,
Original Signed By

William D. Travers
Acting Director
TMI Program Office

Enclosure: NRC Region I Inspection Report 50-320/85-18

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cc w/encl:
T. F. Demmitt, Deputy Director, TMI-2
S. Levin, Site Operations Director
R. C. Rogan, Director, Licensing and Nuclear Safety
J. J. Byrne, Manager, TMI-2 Licensing
W. H. Linton, Manager, Recovery Programs
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J. B. Lieberman, Esquire
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Public Document Room (PDR)
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bcc w/encl:
Region I Docket Room (w/concurrence)
W. Travers, Deputy Program Director, TMI Program Office
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DATE ▶	10/29/85	10/31/85	10/31/85					

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U. S. NUCLEAR REGULATORY COMMISSION

Report No. 50-320/85-18

Docket No. 50-320

License No. DPR-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: September 7, 1985 - October 7, 1985

Inspectors:

R. Cook, Senior Resident Inspector (TMI-2) — date signed 10/29/85

T. Moslak, Resident Inspector (TMI-2) — date signed 10/29/85

J. Bell, Senior Radiation Specialist — date signed 10/29/85

D. Collins, Radiation Specialist — date signed 10/29/85

L. Myers, Radiation Specialist — date signed 10/29/85

L. Thonus, Nuclear Engineer — date signed 10/29/85

Approved By:

C. Cowgill, Chief, TMI-2 Project Section — date signed 10/31/85

Inspection Summary:
Areas Inspected: Routine safety inspection by site inspectors of plant operations (long term shutdown) including examination of welding on Canister Storage Modules; defueling operator training; reactor building entry to observe monthly surveillances; evaluations of a radiochemistry analysis error for strontium-90; routine health physics and environmental reviews; radiological waste management and review of periodic reports. The inspection involved 350 inspector hours.

Results: No violations were identified.

DETAILS

1.0 Ongoing Recovery Operations

Routine Plant Operations

Inspections of the facility were conducted to assess compliance with the requirements of the Proposed Technical Specifications and Recovery Operations Plan in the following areas: licensee review of selected plant parameters for abnormal trends; plant status from a maintenance/modification viewpoint, including plant cleanliness, control of switching and tagging, and fire protection; licensee control of routine and special evolutions, including control room personnel awareness of these evolutions; control of documents, including log keeping practices; radiological controls; and security plan implementation.

Random inspections of the control room during regular and backshift hours were routinely conducted. The Shift Foreman's Log and selected portions of the Control Room Operator's Log were reviewed for the period September 7 through October 7, 1985. Other logs reviewed during the inspection period included the Submerged Demineralizer System (SDS) Operations Log, Radiological Controls Foreman's Log, and Auxiliary Operator's Daily Log Sheets.

Operability of components in systems required to be available for response to emergencies was reviewed to verify that they could perform their intended functions. The inspectors attended selected licensee planning meetings. Shift staffing for licensed operators, non-licensed personnel, and fire brigade members was observed.

No violations were identified.

2.0 Licensee Action on Previous Inspection Findings

(Closed) Inspector Follow Item (320/85-16-01): Weld defects were noted on the fuel canister storage racks when they were received onsite.

During the reporting period, two additional fuel canister storage racks, designated racks numbers 3 and 4, were received on site from the Nuclear Engineering Services Company (NES). These racks were shipped on an air ride trailer and had a 1/8 inch thick metal backing and 1/8 inch thick rubber strip covering the weld area which came in contact with the shipping dunnage. No indications of faulty welds were observed in rack number 3 when the welds which engaged the shipping dunnage were examined using visual and penetrant testing (PT) techniques. When rack number 4 was upended and unwrapped, eight indications were detected using PT. Several of these eight indications could have been detected using visual examination. The licensee performed a visual inspection on all welds of rack number 4 and identified 47 linear indications. Five of these linear indications were examined using PT and were found to be nonrelevant.

The licensee performed PT examination of all the critical welds (for all racks) which are defined as the first five vertical welds from the bottom

and all the outside horizontal welds attaching the 1/2 inch thick top and bottom plates to the rest of the structure. All welds which came in contact with the shipping dunnage were also examined by PT.

During the visual and/or PT examination of the external welds (on all four racks) 45 repairable indications were identified. The licensee's method of weld repair consisted of adding a 3/32 inch by 2 inch long fillet weld on each side of a weld with an identified defect. The inspector witnessed some of these repair welds being installed on rack numbers 1 and 2.

Internal welds which attach the individual fuel canister cells were visually inspected by the licensee on rack number 1. Six visual indications were identified and two missing welds. Four of the visual indications were examined by PT. Three of these indications were evaluated as nonrelevant. Eighteen cells located in proximity to the rack supports were examined for missing welds on rack number 3 and no missing welds were detected.

The licensee presented a design evaluation of the racks. This evaluation indicated that to meet applicable requirements, nominally 13 1/2 linear inches of weld are required, and that nominally 46 1/2 inches of linear weld were applied directly over the support feet. Similar degrees of conservatism between the fabricated rack and the applicable requirements and the methodology for stress calculations exist throughout the rack. NES also identified that the five vertical welds from the bottom are considered critical welds for those racks where the fuel actually impacts the cell wall during a seismic event. The design of the fuel canister modules for TMI preclude the canister from touching the cell wall during a seismic event. However, for consistency reasons, NES retained the five vertical welds from the bottom as critical welds.

The inspector witnessed angle shaped "bumpers" being installed on racks 3, 2 and 1 prior to transporting the racks into the fuel pool. All four racks are placed in fuel pool "A" and the licensee is performing the final leveling and alignment of the racks and subsequent indexing of the fuel transfer bridge.

There are no further questions on this item at this time.

3.0 Operator Training

On September 23, 24, and 25, 1985, the inspector evaluated training provided to defueling crews (i.e. licensed and non-licensed personnel) during the backshift (3:00 PM - 11:00 PM). The training involved hands-on manipulation of long handled tools and operations of systems to be used in defueling operations. These tools and systems are installed in the Defueling Test Assembly (DTA) located in the Turbine Building and are replicas of those to be used on the work platform over the Reactor Vessel.

The inspector attended presentations that addressed operating the Canister Positioning System, Reactor Vessel Lighting System, Camera Viewing System, Hydraulic System, Weight Monitoring System, and

manipulating assorted tools. The inspector determined that the presentations met the lesson objectives by providing the students hands-on experience using step-by-step procedures for the various systems, under the guidance of engineers who were formerly responsible for system installation and testing.

The inspector reviewed the seventeen (17) operating procedures that comprise the Defueling Training Manual. The procedures are complete in that they provide sufficient detail for performing specific tasks, identifying limits and precautions, and have been reviewed and approved by the appropriate licensee departments (e.g. Quality Assurance, Safety Review Group, Plant Operations, etc.). However, the licensee has deferred submitting the procedures to NRC for final review/approval until changes have been incorporated in them based on feedback from students on such items as sequence of steps, industrial safety considerations, and tool modifications.

Though the training was largely effective, the inspector had two items of concern. The first was that for the three or four man crew actually manipulating equipment, a leader was not designated to coordinate tool/camera movements. This lack of coordination resulted in confusion on the part of the tool-handlers as to where to position tools/camera and not interfere with an ongoing task. Licensee representatives stated that team coordination should improve as more experience is gained by personnel. Additionally, prior to beginning core alterations a specific job title (e.g. tool-handler), in addition to the SRO or FHSRO, will be designated to coordinate in-vessel movements.

The inspector's second concern was that personnel were not attired in protective clothing as they would be in the Reactor Building. Failure to don such clothing (double P.C.'s, double rubber gloves, booties, and possibly a respirator) does not accurately simulate the work conditions under which tool manipulations will occur. This could result in unanticipated human factor problems. Through discussions with licensee representatives, the inspector determined that the training presented was to qualify personnel in the use of defueling systems and tools and that subsequent training will be provided for personnel to improve their technique under more realistic conditions.

No violations were identified.

4.0 Core Stratifications Sample Training

The licensee plans to obtain a stratified sample of the reactor core using a core drilling device. A member of the TMIPO staff observed mockup training at the Idaho National Engineering Laboratory on September 16-18, 1985. The actual drilling rig to be used on the core and simulated severe to worst case core materials were used in the training.

The training included both classroom and hands-on equipment operation. System alignment, equipment capabilities, safety limits, operations and maintenance were covered. The instructors were knowledgeable, developed a good rapport with the class and transmitted knowledge using an

effective and interactive method. Some of the feedback from the training is being used to refine operating procedures.

The possibility exists that the scope and/or mode of drilling may change from currently planned evolutions. Any required additional training will be conducted after the drilling rig is reassembled onsite in the Turbine Building.

The training as conducted was effective and met the goal of preparing the operators for obtaining a stratified core sample.

5.0 Monthly Surveillance

On Saturday, September 28, 1985, the inspector entered the Reactor Building to observe performance of functional checks of the reactor coolant system level indicator (RC-LI-102), fuel transfer canal (FTC) level indicator (FCC-LI-102), and inspection of the seals for the FTC dam. The inspector independently verified flow rates, pressure settings, compressor oil level, and general operating condition of the respective equipment. The inspector observed the "A" Auxiliary Operator verify valve line-ups by valve manipulation.

The inspector determined that the operating parameters met the acceptance criteria of an approved operations surveillance procedure, OPS-S-215, and that the activity was performed by qualified personnel, within the required time period. The inspector also determined that the equipment met the operability requirements of Technical Specification 3.4.2 (Limiting Conditions for Operation) and the Recovery Operation Plan 4.4.2 (Surveillance Requirements).

No violations were identified.

6.0 Radiochemistry Analysis Error with Strontium-90

During this inspection period, the licensee identified an error in the analysis for strontium-90 (Sr-90) performed on solid samples. This error has existed since July 1981. The error resulted in understating the activity of Sr-90 by one-half when using a Beta Spectrometer for Sr-90/Y-90 determinations. The solid samples analyzed by this method included general area air particulate filters, individual breathing zone air particulate filters, surface contamination wipes, paint chips, scabbling dust and metal flakes.

A special inspection, 50-320/85-20, was conducted from September 30 through October 2, 1985 to evaluate the licensee's corrective actions concerning the accuracy of Sr-90 analyses. Report 50-320/85-20 was issued on October 7, 1985.

At the close of the inspection on October 2, 1985, NRC Region I issued Confirmatory Action Letter Number 85-16 detailing the following steps to be taken by the licensee:

-- Assure by October 11, 1985 that all procedures used for strontium analyses are clear and accurate. (50-320/85-20-01)

-- Provide the Director, TMIPO, with the documented results of the GPU Nuclear assessment of the impact of the inaccurate Sr-90 analyses by November 22, 1985. (50-320/85-20-02)

-- Have performed and provide to the Director, TMIPO, by November 22, 1985 an independent assessment of the Chemistry Quality Assurance/Quality Control program and procedures. (50-320/85-20-03)

-- Implement a formalized Quality Assurance/Quality Control program for laboratory analyses that includes the provisions of Regulatory Guide 4.15, Revision 1, February 1979, Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment by November 22, 1985. (50-320/85-20-04)

-- Document all computer software used in laboratory analyses and verify that the results generated are accurate by November 22, 1985. (50-320/85-20-05)

7.0 Routine Health Physics and Environmental Review

a. Plant Tours

The NRC site radiation specialists performed plant inspection tours including all radiological control points and selected radiologically controlled areas. Items inspected included:

-- Access control to radiologically controlled areas

-- Adherence to Radiation Work Permit (RWP) requirements

-- Proper use and storage of respiratory protection equipment

-- Adherence to radiation protection procedures

-- Use of survey meters and radiological instruments

-- Cleanliness and housekeeping

-- Fire protection.

The inspector reviewed the application of radiological controls within the plant, the laundry facility and the Interim Solid Waste Staging Facility. The inspector reviewed the Radiological Controls Department logbooks for the period September 7 - October 7, 1985. Notations in the logbooks were appropriate to the conditions, showed attention to detail, and were properly made. The logbooks were initialed to indicate frequent review by departmental management.

No violations were identified.

b. Measurement Verification

Measurements were independently made by the inspector using NRC radiological equipment. These measurements were made to verify the quality of licensee performance in the areas of radioactive material shipping, radiation and contamination surveys, and onsite environmental air and water analyses.

No violations were identified.

c. Reactor Building Entries

The site staff monitored Reactor Building (RB) entries conducted during the inspection period, and verified the following on a sampling basis:

-- The RB entry was properly planned and coordinated to assure that task implementation included adequate ALARA review, personnel training, and equipment testing.

-- Radiological Controls precautions were planned and implemented including the use of an RWP and specific work instructions.

-- Specific procedures were developed for unique tasks and were properly implemented.

Entries 689 (September 11, 1985) through 705 (October 7, 1985) were conducted. Saturday entries are being scheduled by the Operations Department to conduct surveillances at times when few other personnel are in the building.

The inspector observed the initial attempt to remove lower head debris samples from the Reactor Vessel (RV) on September 18, 1985. Unit Work Instruction (UWI) 4370-3221-85-R251 RV Lower Head Debris Sample Transfer was implemented. A Senior Reactor Operator (SRO) was required and present in the Coordination Center. Radiation Work Permit (RWP) 12616 and Radiological Review 51075 were the controlling Radiological Controls documents for this evolution. Radiological Engineering placed a 5 rem/hr (contact) limit on any sample being removed from the RV. Observations of radiation levels include:

-- Bucket #7, approx. 19 R/hr inside the bucket
3 R/hr 1 inch outside the bucket
200 mR/hr 1 foot outside the bucket

-- Bucket #11, over 20 R/hr inside the bucket
15 R/hr 1 inch outside the bucket
5 R/hr 1 foot outside the bucket

These readings were confirmed with a second instrument. The sample buckets were then hung below the RV flange so as to ensure water shielding. The job was halted pending evaluation of the

higher-than-expected dose rates. The samples were successfully removed from the RV on October 8, 1985 and transported to the Spent Fuel Cooler Room authorized storage area. The inspector observed preparations for storage of the lower head core debris samples in the Spent Fuel Cooler Room. When the samples were placed in the storage safe, the safe was properly labeled as a high radiation area.

No violations were identified within the scope of this review.

d. Additional Reviews

During the inspection period reviews were conducted of licensee periodic reports concerning job specific manrem figures; the radiological controls program, including current data and trends in such areas as manrem per RWP hour, decontamination status, skin contaminations, environmental monitoring, radiological events, whole body counting, training, dosimetry, shipments, goals and objectives, storage tank radioactivity content, airborne radioactivity, and manrem by work category; effluent releases, including sump releases and sources of sump contamination; groundwater monitoring; and overall plant exposures.

No violations were identified.

8.0 Radiological Waste Management

a. Organization

The inspector examined the program organization with regard to organizational structure, management oversight, assignment of responsibility, and assignment of authority. The inspector's assessment of this area was based on interviews with licensee personnel, examinations of ongoing operations, review of procedures and review of selected records.

The Waste Disposal group is responsible for packaging, storage, shipment and disposal of solid radwaste. The unit is made up of three radioactive material coordinators and one packaging coordinator supervised by the Waste Disposal Supervisor. The Waste Disposal Supervisor reports to the Radwaste Support Manager who reports to the Plant Operations Manager.

The Waste Disposal group authorities, responsibilities, and interfaces with other site groups are detailed in procedures 4000-ADM-1000.1, Revision 6-00, dated August 8, 1985, "TMI Unit 2 Organization, Responsibility and Authority," and 4210-ADM-1000.01, Revision 2-01 dated June 4, 1985, "TMI Unit 2 Plant Operations Organization, Responsibility and Authority."

The Waste Disposal group is supported by personnel from Chemistry, Radiological Engineering, and Radiological Controls Field Operations and operational groups.

b. Management Oversight

Through examination of procedures, records and interviews of licensee personnel, the inspector determined that the Waste Disposal group's activities are adequately supervised. During the absence of the Waste Disposal Supervisor, the Radwaste Support Manager provides supervision and guidance to the Waste Disposal group. Shipment portfolios are given final review and approval by only the Waste Disposal Manager, Radwaste Support Manager, Operations Manager or Site Operations Director.

c. Training and Qualifications

The licensee's performance in training and qualification of personnel assigned to the Waste Disposal group was determined by review of the lesson plans and training records. Personnel are initially required to take both contractor-given training and in-house training. Retraining is required every two years. On-the-job training, procedure review and reading requirements are implemented appropriately.

The Radiological Controls Field Operations group surveys radioactive material packages and the package transportation vehicles. The results of the package surveys are used to determine the curie content of the packages. The lesson plan and training records of Radiological Controls Field Operations personnel, group supervisors and technicians for cyclic training, "Shipment and Receipt of Radioactive Material," were also reviewed. The licensee is developing a computer tracking system to help ensure that cyclic retraining is current.

Within the scope of this review, no violations were noted.

d. Radiological Waste Handling

The inspector reviewed the methods used by the licensee to determine radioactivity content of radioactive material being shipped from TMI.

The following documents were reviewed:

-- 9200-ADM-4420.02 - TMI-2 Radwaste Isotopic Distribution and Conversion Factors

-- 9200-ADM-4450.01 - Curie Estimates for Radioactive Material Shipments

-- 9200-ENG-4100.01 - Calculations

-- ISOSHLD User's Manual - Three Mile Island Unit 2

-- Radiological Analysis File (RAF) 84-23, dated May 15, 1984, TMI-2 Radwaste Conversion Factors for Period 05/01/84 through 05/01/85

-- 4214-ADM-4450.01 - TMI-2 Radioactive Material Shipment Portfolio Preparation

-- 4214-ADM-445.02 - Packaging of Non-Waste Radioactive Material.

e. Findings

The inspector determined that the data flow between Waste Management and Radiological Controls was appropriate. Appropriate records were maintained and were traceable from author through implementor. The Waste Disposal group agreed to document, all changes made to the computer program used for determining package classification.

The inspector compared the production run of a computer printout for a specific radwaste drum and verified that the computer program method and manual method gave the same results. Both produced acceptable results with respect to 10 CFR Part 20.311 and 10 CFR Part 71.

The methodology used to generate isotopic distribution factors for the plant was acceptable and meets the criteria established by 10 CFR Part 61. The methodology for preparing and reviewing shipping calculations was acceptable. The methodology used for determination of individual package curie content was acceptable.

No violations were identified.

f. Radioactive Material Shipments

The NRC site radiation specialists inspected selected TMI-2 radioactive material shipments during the inspection period to verify the items listed below.

-- The licensee had compiled with approved packaging and shipping procedures.

-- The licensee had prepared shipping papers, which certified that the radioactive materials were properly classified, described, packaged, and marked for transport.

-- The licensee had applied warning labels to all packages and had placarded vehicles.

-- The licensee had controlled the radioactive contamination and dose rates below the regulatory limits.

Inspector review of this area consisted of (1) examination of shipping papers, procedures, packages, and vehicles, and (2) performance of radiation and contamination surveys of shipments on September 10, 16, and 27, 1985.

No violations were identified.

9.0 Review of Periodic Reports

On August 29, 1985, the licensee submitted to NRC, Region I the required Quarterly Dose Assessment Report and Semi-Annual Radioactive Effluent Release Report. The periods covered are the second quarter and the first six months of 1985.

The inspector noted that 4.314% of the 2.133 Ci ± 5% dry compressible radioactive waste shipped from the site during the first six months of 1985 was strontium-90 (Sr-90). As stated in paragraph 6.0 of this report, a recently discovered error has resulted in the need to double some of the Sr-90 values. Doubling and adding the Sr-90, a total of 2.225 Ci was shipped offsite for disposition. This 2.225 Ci falls within the 5% error range (2.026 - 2.240 Ci), thus no change to the report is required.

The inspector had no further questions.

10.0 Inspector Follow Items

Inspector follow items are inspector concerns or perceived weaknesses in the licensee's conduct of operation (hardware or programmatic) that could lead to violations if left uncorrected. Inspector follow items are addressed in paragraphs 2.0 and 6.0.

11.0 Exit Interview

The inspectors met periodically with licensee representatives to discuss inspection findings. On October 8, 1985, the inspector summarized the inspection findings to the following personnel at the exit meeting:

J. Byrne, Manager, Licensing, TMI-2
D. Cowser, Safety Engineer
C. Dell, Licensing Technical Analyst
E. Gee, Deputy Manager, Radiation Control Field Operations
W. Heysek, TMI-2 Audit Supervisor

At no time during the inspection was written material provided to the licensee by the TMIPO staff except for procedure reviews pursuant to Technical Specification 6.8.2.