

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report Nos. 50-289/92-19 and 50-320/92-13  
Docket Nos. 50-289 and 50-320  
License Nos. DPR-50 and DPR-73  
Licensee: GPU Nuclear Corporation  
P.O. Box 480  
Middletown, Pennsylvania, 17057-0191  
Facility Name: Three Mile Island Nuclear Station, Units 1 and 2  
Inspection At: Middletown, Pennsylvania  
Inspection Conducted: November 2-6, 1992

Inspector:

Jason C. Jang  
Jason C. Jang, Senior Radiation Specialist  
Effluents Radiation Protection Section (ERPS)  
Facilities Radiological Safety and  
Safeguards Branch (FRSSB)

11-25-92  
Date

for Laurie Peluso  
Laurie Peluso, Radiation Specialist  
ERPS, FRSSB, Division of Radiation Safety and  
Safeguards (DRSS)

11-25-92  
Date

Approved by:

Marie T. Miller  
Marie T. Miller, Chief, ERPS, FRSSB, DRSS

11-25-92  
Date

Areas Inspected: Announced safety inspection of the Unit 1 Radioactive Liquid and Gaseous Effluent Control Programs, projected dose calculations, management controls, air cleaning systems, and implementation of the Offsite Dose Calculation Manual (ODCM), and the projected dose calculation for Unit 2.

Results: Within the areas inspected, the licensee effectively implemented the above programs. No safety concerns or violations of regulatory requirements were identified.

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## DETAILS

### 1.0 Individuals Contacted

#### 1.1 Licensee Personnel

- \* W. County, Quality Assurance Audit Manager
- \* D. Ethridge, Manager, Radiological Engineering
- \* B. Good, Manager, Environmental Controls
- \* D. Jenkins, Plant Engineer
- B. Parfitt, Radiological Engineering
- \* R. Rogan, Licensing Director
- \* J. Schork, Licensing
- \* R. Shaw, Radiological Controls Director
- S. Williams, Radiological Engineer

#### 1.2 Commonwealth of Pennsylvania

- \* R. Janati, Dept. of Environmental Resources/Bureau of Radiation Protection

#### 1.3 Nuclear Regulatory Commission (NRC) Personnel

- S. Young, Senior Resident Inspector
- \* D. Beaulieu, Resident Inspector
- \* M. Miller, Chief, Effluents Radiation Protection Section, Region I
- \* Denotes those individuals present at exit interview on September 4, 1992.

Other licensee personnel were also contacted or interviewed during this inspection.

### 2.0 Purpose

The purpose of this inspection was to verify the licensee's capability to implement the following areas:

- o The licensee's ability to control and quantify effluent radioactive liquids, gases, and particulates.
- o The licensee's ability to calculate projected doses to the public from radioactive liquid and gaseous (airborne) effluent releases during normal operation.

### 3.0 Management Controls

#### 3.1 Organization

The inspector reviewed the licensee's Unit 1 organization and administration of the radioactive liquid and gaseous effluent control programs and discussed with the licensee any changes made since the last inspection conducted in June 1991. There have been no changes in the organization of the effluent control programs since the previous inspection.

#### 3.2 Quality Assurance Audit

The licensee had not yet performed the annual QA Audit in this area as of the date of this inspection. The inspector stated that the 1992 QA Audit results will be reviewed during a subsequent inspection.

#### 3.3 Review of the Semiannual Radioactive Release Reports

The inspector reviewed the Semiannual Radioactive Effluent Release Reports for 1991 and the first half of 1992. The inspector determined that the licensee met the Technical Specification reporting requirements. These reports provided total released radioactivity for liquid and gaseous effluents including projected radiation exposures to the public. No obvious omissions, trends or anomalous measurements were identified.

### 4.0 Implementation of the Effluent Control Programs

The inspector reviewed the licensee's implementation of the Radioactive Liquid and Gaseous Effluent Control Programs through discussions with licensee personnel, review of selected radioactive liquid and gaseous discharge permits and the following associated procedures as part of the examination of the implementation of the Unit 1 Technical Specification requirements.

- 6610-ADM-4250.01, Releasing Radioactive Liquid Waste
- 6610-ADM-4250.03, Releasing Radioactive Release Records
- 6610-ADM-4250.04, Gaseous Radioactive Release Records
- 6610-ADM-4250.05, Dose Calculation for Liquid and Gaseous Effluents
- 6610-ADM-4250.09, Tracking Continuous Releases from the Turbine Building Sump
- 6610-ADM-4250.11, Releasing Radioactive Gaseous Effluents - Waste Gas Decay Tank
- 6610-ADM-4250.12, Releasing Radioactive Gaseous Effluents - Reactor Building Purges

The inspector noted that the effluent control procedures were sufficiently detailed and well written to control all routine effluent releases effectively. The inspector also noted that the licensee met the requirements for sampling and analysis at the frequencies and lower limits of detection established in the Unit 1 Technical Specifications.

Based on the above reviews and discussions with licensee personnel, the inspector determined that the licensee had implemented the radioactive liquid and gaseous effluent control programs effectively.

## 5.0 Air Cleaning Systems

The inspector reviewed the licensee's most recent test results as part of the examination of the implementation of the Unit 1 Technical Specification requirements for the (1) Emergency Control Room, (2) Reactor Building Purge, (3) Auxiliary and Fuel Handling Building, and (4) Fuel Handling Engineered Safety Features. The inspector reviewed the following inspection and test results.

- o Visual Inspection
- o In-Place HEPA Leak Tests
- o In-Place Charcoal Leak Tests
- o Air Capacity Tests
- o Pressure Drop Tests
- o Laboratory tests for the Iodine Collection Efficiencies

The Plant Engineering Department had responsibility for the above tests and surveillances. Some tests were performed by the Operations Department and these test results will be reviewed during a subsequent inspection. All reviewed test results were found to be within the licensee's Technical Specification limits.

Based on the above reviews, the inspector determined that the licensee met the Technical Specification requirements for the above air cleaning systems.

## 6.0 Comparison of the Projected Dose Calculation Program

During this inspection, the inspector performed an independent verification of the licensee's capability for calculating projected doses to the public using radioactive liquid and gaseous discharge permits. The licensee calculated the projected dose to the public based on the data incorporated into the discharge permits. The inspector also used the same parameters contained in the discharge permits (e.g., dilution factor, total amount of radioactivity released, meteorological data, etc.) to calculate the maximum projected dose to the public for the purpose of intercomparison. The licensee used its computer code and the NRC used the "PCDOSE code". The intercomparison results are listed in Tables 1 through 5.

The "PCDOSE code" was developed by Idaho National Engineering Laboratory (EG&G Idaho, Inc.) for the U.S. Nuclear Regulatory Commission. The code was designed to calculate the maximum projected radiation dose to an individual and the average dose to the population due to radionuclides released in routine radioactive liquid and airborne operations rather than for emergency situations. The code was developed from the methodology found in both NUREG-0133 and Regulatory Guide 1.109 (Revision 1). The "PCDOSE code" is to serve as a basis of comparison with similar programs conducted by individual utilities which operate nuclear power plants.

The licensee uses two dose calculational codes: (1) the Liquid and Gaseous Effluent Release (LAGER) to perform projected dose calculations prior to release and (2) the Simplified Environmental Effluent Dosimetry System (SEEDS) to perform final dose calculations based on the actual radioactive release data and environmental data, such as river flow and meteorological information. The "LAGER" is being implemented by members of the Radiological Engineering Department at the site and the "SEEDS" is being implemented offsite by members of the Environmental Controls Group.

The comparison results of the total body dose to an adult from radioactive liquid releases are listed in Table 1. The calculation results of "LAGER" were higher than "PCDOSE" because the licensee used conservative site specific parameters. The licensee performed hand calculations without the site specific parameters using the appropriate equation documented in the ODCM. The comparison results were in good agreement as shown in Table 1. However, the licensee will re-evaluate the site specific parameters and will upgrade the computer code, as necessary.

The dose comparison results of the noble gases were in good agreement, as shown in Table 2.

The thyroid dose comparison results for the inhalation pathway using both the "SEEDS" and "LAGER" codes were good, as illustrated in Tables 3 and 4. The comparison results between the "SEEDS" and "PCDOSE" codes shown in Table 3 were not exact as compared to the results of the "LAGER" code shown in Table 4. The reason for the differences was because "SEEDS" uses only real time meteorological parameters (dispersion and deposition) at assigned locations. The inspector reviewed the meteorological parameters and used locations close to the licensee's assigned locations for the "PCDOSE" code. Despite the need to make the above parameter assumptions, the comparisons were in good agreement.

The Unit 2 dose comparisons were performed only on the tritium release pathway because tritium was the predominate radionuclide released as the result of evaporation of accident-generated water. The dose comparison results for Unit 2 were in good agreement, as shown in Table 5.

Based on the above comparisons, the inspector determined that the licensee has good capability of performing dose assessments during normal operations.

#### 7.0 Exit Interview

The inspector met with the licensee representatives denoted in Section 1.1 of this inspection report at the conclusion of the inspection on November 6, 1992. The inspector summarized the purpose, scope, and findings of the inspection.

**Table 1** Total Body Dose for Adult (mrem)  
Liquid Release: Unit 1

Nuclides	NRC	TMI-1
Cobalt-60	7.15E-10	8.83E-8 *
Cobalt-60	7.15E-10	7.13E-10**
Cesium-137	3.28E-7	6.73E-5 *
Cesium-137	3.28E-7	3.22E-7 **

\* With Site Specific Parameters (by LAGER Calculations)

\*\* Without Site Specific Parameters (by Hand Calculations)

**Table 2** Beta and Gamma Air Dose (mrad)  
Noble Gas Release: Unit 1

	NRC	TMI-1
Beta Air Dose	1.94E-6	1.94E-6
Gamma Air Dose	1.90E-7	1.90E-7



**Table 3** Thyroid Dose due to Inhalation (mrem)  
Iodine Release: Unit 1

AGE GROUP	NRC	TMI-1 *
INFANT	4.51E-6	4.26E-6
CHILD	4.93E-6	4.66E-6
TEEN	4.35E-6	4.12E-6
ADULT	3.51E-6	3.32E-6

\* TMI-1 Computer Code: SEEDS (Simplified Environmental Effluents Dosimetry Systems)

**Table 4** Thyroid Dose due to Inhalation (mrem)  
Iodine Release: Unit 1

	NRC	TMI-1 **
INFANT	1.99E-6	1.99E-6

\*\* TMI-1 Computer Code: LAGER (Liquid and Gaseous Effluent Releases)

**Table 5** Maximum Doses (mrem) due to Tritium Releases  
Tritium Release: Unit 2 Evaporator

PATHWAY / AGE	NRC	TMI-2
INHALATION / TEEN	3.69E-3	3.68E-3
MEAT / ADULT	9.41E-4	9.38E-4
MILK / INFANT	6.90E-3	6.89E-3
VEGETATION/ALL AGES	1.16E-2	1.16E-2



**Table 1**      **Total Body Dose for Adult (mrem)**  
**Liquid Release: Unit 1**

Nuclides	NRC	TMI-1
Cobalt-60	7.15E-10	8.83E-8 *
Cobalt-60	7.15E-10	7.13E-10**
Cesium-137	3.28E-7	6.73E-5 *
Cesium-137	3.28E-7	3.22E-7 **

\* With Site Specific Parameters (by LAGER Calculations)

\*\* Without Site Specific Parameters (by Hand Calculations)

**Table 2**      **Beta and Gamma Air Dose (mrad)**  
**Noble Gas Release: Unit 1**

	NRC	TMI-1
Beta Air Dose	1.94E-6	1.94E-6
Gamma Air Dose	1.90E-7	1.90E-7

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Docket No. 50-289

Mr. T. Gary Broughton  
Vice President and Director, TMI-1  
GPU Nuclear Corporation  
Three Mile Island Nuclear Station  
P. O. Box 480  
Middletown, Pennsylvania 17057-0191

Docket No. 50-320

Dr. R. L. Long  
Vice President and Director, TMI-2  
GPU Nuclear Corporation  
Three Mile Island Nuclear Station  
P. O. Box 480  
Middletown, Pennsylvania 17057-0191

Dear Mr. Broughton and Dr. Long:

Subject: Combined Inspection Nos. 50-289/92-19 and 50-320/92-13

This letter refers to the safety inspection conducted by Dr. Jason Jang and Ms. Laurie Peluso of this office on November 2-6, 1992, of activities authorized by NRC License Nos. DPR-50 and DPR-73 at the Three Mile Island Nuclear Station, Units 1 and 2, Middletown, Pennsylvania, and to the discussions of our findings held by Dr. Jang and Ms. Peluso with Mr. Rogan and other members of your staff at the conclusion of the inspection.

Areas examined during this inspection, involving your radioactive effluents control programs, are important to public health and safety and are described in the NRC Region I Inspection Report which is enclosed with this letter. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the inspector.

Within the scope of this inspection, we noted that you maintained effective implementation of the Radioactive Liquid and Gaseous Effluent Control Programs. No safety concerns or violations of regulatory requirements were identified.

No response to this letter is required. Your cooperation with us in this matter is appreciated.

Sincerely,  
Original Signed By:  
James H. Joyner

James H. Joyner, Chief  
Facilities Radiological Safety  
and Safeguards Branch  
Division of Radiation Safety  
and Safeguards

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Enclosure: NRC Region I Combined Inspection Report Nos. 50-289/92-19 and 50-320/92-13

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Table 3 Thyroid Dose due to Inhalation (mrem)  
Iodine Release: Unit 1

AGE GROUP	NRC	TMI-1 *
INFANT	4.51E-6	4.26E-6
CHILD	4.93E-6	4.66E-6
TEEN	4.35E-6	4.12E-6
ADULT	3.51E-6	3.32E-6

\* TMI-1 Computer Code: SEEDS (Simplified Environmental Effluents Dosimetry Systems)

Table 4 Thyroid Dose due to Inhalation (mrem)  
Iodine Release: Unit 1

	NRC	TMI-1 **
INFANT	1.99E-6	1.99E-6

\*\* TMI-1 Computer Code: LAGER (Liquid and Gaseous Effluent Releases)

Table 5 Maximum Doses (mrem) due to Tritium Releases  
Tritium Release: Unit 2 Evaporator

PATHWAY / AGE	NRC	TMI-2
INHALATION / TEEN	3.69E-3	3.68E-3
MEAT / ADULT	9.41E-4	9.38E-4
MILK / INFANT	6.90E-3	6.89E-3
VEGETATION/ALL AGES	1.16E-2	1.16E-2

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GPU Nuclear Corporation

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cc w/encl:

R. E. Rogan, TMI Licensing Director  
M. J. Ross, Operations and Maintenance Director, TMI-1  
J. Fornicola, Licensing and Regulatory Affairs Director  
TMI-1 Licensing Department  
E. J. Scheyder, TMI-2 Site Operations Director  
TMI-2 Licensing Department  
E. L. Blake, Jr., Esquire  
TMI-Alert (TMIA)  
K. Abraham, PAO (2)  
Public Document Room (PDR)  
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NRC Resident Inspector  
Commonwealth of Pennsylvania

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bcc w/encl:

Region I Docket Room (with concurrences)

R. Blouin, DRP

J. Joyner, DRSS

J. Rogge, DRP

L. Rossbach, SRI, Beaver Valley

D. Vito, SRI, Oyster Creek

V. McCree, OEDO

R. Hernan, PD I-4, NRR

M. Masnik, NRR/PDNP

L. Thonus, NRR/PDNP

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11/11/92

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11/11/92

RI:DRSS

Joyner

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