Niagara Mohawk

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August 29, 2001
NMP1L 1607

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

RE: Nine Mile Point Unit 1
Docket No. 50-220
DPR-63

***Subject:*** ***January - June 2001 Semi-Annual Radioactive Effluent Release Report***

Gentlemen:

In conformance with the Nine Mile Point Unit 1 (NMP1) Technical Specifications, we are enclosing the Semi-Annual Radioactive Effluent Release Report for the reporting period January - June 2001. Included in this report is a summary of gaseous, liquid, and solid effluents released from the station during the reporting period (Attachments 1 - 6), a summary of revisions to the Offsite Dose Calculation Manual and the Process Control Program during the reporting period (Attachments 7 and 8), and an explanation as to the cause and corrective actions regarding the inoperability of any station liquid and/or gaseous effluent monitoring instrumentation (Attachment 9).

The format used for the effluent data is outlined in Appendix B of Regulatory Guide 1.21, Revision 1. Dose assessments were made in accordance with the NMP1 Offsite Dose Calculation Manual. Distribution is in accordance with 10CFR50.4(b)(1) and the Technical Specifications.

Attachment 10 to this report is an update of actual data for the fourth quarter 2000 used in the July – December 2000 Semi-Annual Radioactive Effluent Release Report.

During the reporting period from January - June 2001, NMP1 did not exceed any 10CFR20, 10CFR50, or Technical Specification limits for gaseous or liquid effluents.

IE48

If you have any questions concerning the attached report, please contact Mr. Anthony M. Salvagno, (315) 349-1456, Engineering Services, Nine Mile Point.

Very truly yours,

Richard B. Abbott
Vice President Nuclear Engineering

RBA/CLW/cld
Attachments

cc: Mr. H. J. Miller, NRC Regional Administrator, Region I
Mr. G. K. Hunegs, NRC Senior Resident Inspector, Region I
Mr. P. S. Tam, Senior Project Manager, NRR (2 copies)
Records Management

# NINE MILE POINT NUCLEAR STATION - UNIT 1

# SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

**January – June 2001**

*NIAGARA MOHAWK POWER CORPORATION*

# NINE MILE POINT NUCLEAR STATION - UNIT 1

# SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

# JANUARY - JUNE 2001

# SUPPLEMENTAL INFORMATION

**Facility:** Nine Mile Point Unit #1 **Licensee:** Niagara Mohawk Power Corporation

1. TECHNICAL SPECIFICATION LIMITS

A) FISSION AND ACTIVATION GASES

1. The dose rate limit of noble gases released in gaseous effluents from the site to areas at and beyond the site boundary shall be less than or equal to 500 mrem/year to the total body and less than or equal to 3000 mrem/year to the skin.

2. The air dose due to noble gases released in gaseous effluents from Nine Mile Point Unit 1 to areas at and beyond the site boundary shall be limited during any calendar quarter to less than or equal to 5 milliroentgen for gamma radiation and less than or equal to 10 mrad for beta radiation, and during any calendar year to less than or equal to 10 milliroentgen for gamma radiation and less than or equal to 20 mrad for beta radiation.

B&C) TRITIUM, IODINES AND PARTICULATES, HALF LIVES > 8 DAYS

1. The dose rate limit of Iodine-131, Iodine-133, Tritium and all radionuclides in particulate form with half-lives greater than eight days, released in gaseous effluents from the site to areas at and beyond the site boundary shall be less than or equal to 1500 mrem/year to any organ.

2. The dose to a member of the public from Iodine-131, Iodine-133, Tritium and all radionuclides in particulate form with half-lives greater than eight days in gaseous effluents released from Nine Mile Point Unit 1 to areas at and beyond the site boundary shall be limited during any calendar quarter to less than or equal to 7.5 mrem to any organ and, during any calendar year to less than or equal to 15 mrem to any organ.

D) LIQUID EFFLUENTS

1. The concentration of radioactive material released in liquid effluents to unrestricted areas shall be limited to the concentrations specified in 10 CFR Part 20, Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2E-04 microcuries/ml total activity.

2. The dose or dose commitment to a member of the public from radioactive materials in liquid effluents released from Nine Mile Point Unit 1 to unrestricted areas shall be limited during any calendar quarter to less than or equal to 1.5 mrem to the total body and to less than or equal to 5 mrem to any organ, and during any calendar year to less than or equal to 3 mrem to the total body and to less than or equal to 10 mrem to any organ.

## 2. MEASUREMENTS AND APPROXIMATIONS OF TOTAL RADIOACTIVITY

Described below are the methods used to measure or approximate the total radioactivity and radionuclide composition in effluents.

### A) FISSION AND ACTIVATION GASES

Noble gas effluent activity is determined by on-line gamma spectroscopic monitoring (intrinsic germanium crystal) or gross activity monitoring (calibrated against gamma isotopic analysis of a 4.0L Marinelli grab sample) of an isokinetic stack sample stream.

### B) IODINES

Iodine effluent activity is determined by gamma spectroscopic analysis (at least weekly) of charcoal cartridges sampled from an isokinetic stack sample stream.

### C) PARTICULATES

Activity released from the main stack is determined by gamma spectroscopic analysis (at least weekly) of particulate filters sampled from an isokinetic sample stream and composite analysis of the filters for non-gamma emitters.

### D) TRITIUM

Tritium effluent activity is measured by liquid scintillation or gas proportional counting of monthly samples taken with an air sparging/water trap apparatus. Tritium effluent activity is measured during purge and weekly when fuel is offloaded until stable tritium release rates are demonstrated.

### E) EMERGENCY CONDENSER VENT EFFLUENTS

The effluent curie quantities are estimated based on the isotopic distribution in the Condensate Storage Tank water and the Emergency Condenser shell water. Actual isotopic concentrations are found via gamma spectroscopy. Initial release rates of Sr-89, Sr-90 and Fe-55 are estimated by applying scaling factors to release rates of gamma emitters and actual release rates are determined from post offsite analysis results. The activity of fission and activation gases released due to tube leaks is based on reactor steam leak rates using offgas isotopic analyses.

### F) LIQUID EFFLUENTS

Isotopic contents of liquid effluents are determined by isotopic analysis of a representative sample of each batch and composite analysis of non-gamma emitters. Tritium activity is estimated on the most recent analysis of the Condensate Storage Tank water. Initial release rates of Sr-89, Sr-90, and Fe-55 are estimated by applying scaling factors to release rates of gamma emitters and actual release rates are determined from post offsite analysis results.

### G) SOLID EFFLUENTS

Isotopic contents of waste shipments are determined by gamma spectroscopy analysis of a representative sample of each batch. Scaling factors established from primary composite sample analyses conducted off-site are applied, where appropriate, to find estimated concentration of non-gamma emitters. For low activity trash shipments, curie content is estimated by dose rate measurement and application of appropriate scaling factors.

# ATTACHMENT 1

Summary Data



Unit 1 X Unit 2 __ Reporting Period January – June 2001

**Liquid Effluents:**

10CFR20, Appendix B, Table II, Column 2

Average MPC - uCi/ml (Qtr. 1) = **N/A**
Average MPC - uCi/ml (Qtr. 2) = **N/A**

**Average Energy (Fission and Activation gases – Mev):**

| | | | | |
|---|---|---|---|---|
| Qtr. 1 : | $\bar{E}\gamma$ | = **0.247** | $\bar{E}\beta$ | = **0.317** |
| Qtr. 2 : | $\bar{E}\gamma$ | = **0.159** | $\bar{E}\beta$ | = **0.253** |

**Liquid:**

| | | | |
|---|---|---|---|
| Number of batch releases | : | **0** | |
| Total time period for batch releases (hrs) | : | **N/A** | |
| Maximum time period for a batch release (hrs) | : | **N/A** | |
| Average time period for a batch release (hrs) | : | **N/A** | |
| Minimum time period for a batch release (hrs) | : | **N/A** | |
| Total volume of water used to dilute the liquid effluent during release period (L) | : | 1st **N/A** | 2nd **N/A** |
| Total volume of water used to dilute the liquid effluent during reporting period (L) | : | 1st **1.12E+11** | 2nd **9.70E+10** |

**Gaseous – (There were no releases from the operation of the Emergency Condenser Vent):**

| | | |
|---|---|---|
| Number of batch releases | : | **0** |
| Total time period for batch releases (hrs) | : | **N/A** |
| Maximum time period for a batch release (hrs) | : | **N/A** |
| Average time period for a batch release (hrs) | : | **N/A** |
| Minimum time period for a batch release (hrs) | : | **N/A** |

**Gaseous (Primary Containment Purge):**

| | | |
|---|---|---|
| Number of batch releases | : | **1** |
| Total time period for batch releases (hrs) | : | **1.35E+01** |
| Maximum time period for a batch release (hrs) | : | **1.35E+01** |
| Average time period for a batch release (hrs) | : | **1.35E+01** |
| Minimum time period for a batch release (hrs) | : | **1.35E+01** |

**ATTACHMENT 1**

Summary Data



Unit 1 X Unit 2 __ Reporting Period **January – June 2001**

**Abnormal Releases:**

**A. Liquids:**[1]

Number of releases **0**

Total activity released **N/A** Ci

**B. Gaseous:**

Number of releases **0**

Total activity released **N/A** Ci

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1 During preparation of this report, August 2001, incidental leakage from a closed cooling system to the service water was identified. Details will be reported in the July – December 2001 Semi-Annual Report. Should the evaluation of that event impact effluent data from this report period, i.e., January – June 2001, an update will be provided in the July – December 2001 Semi-Annual Report.

# ATTACHMENT 2

Unit 1 **X** Unit 2 __ Reporting Period **January – June 2001**

**GASEOUS EFFLUENTS – SUMMATION OF ALL RELEASES, ELEVATED AND GROUND LEVEL**

| | | | 1st QUARTER | 2nd QUARTER | EST. TOTAL ERROR, % |
|---|---|---|---|---|---|
| A. | Fission & Activation gases | | | | |
| | 1. Total release | Ci | **1.71E-03** | **1.38E-02** | 5.00E+01 |
| | 2. Average release rate | μCi/sec | **2.20E-04** | **1.76E-03** | |
| B. | Iodines | | | | |
| | 1. Total Iodine-131 | Ci | **1.31E-03** | **2.77E-04** | 3.00E+01 |
| | 2. Average release rate for period | μCi/sec | **1.67E-04** | **3.56E-05** | |
| C. | Particulates[1] | | | | |
| | 1. Particulates with half-lives >8 days | Ci | **5.82E-03** | **2.63E-03** | 3.00E+01 |
| | 2. Average release rate for period | μCi/sec | **7.41E-04** | **3.38E-04** | |
| | 3. Gross alpha radioactivity | Ci | **3.38E-05** | **5.46E-05** | 2.50E+01 |
| D. | Tritium[1] | | | | |
| | 1. Total release | Ci | **4.60E+01** | **3.26E+01** | 5.00E+01 |
| | 2. Average release rate for period | μCi/sec | **5.91E+00** | **4.19E+00** | |
| E. | Percent of Tech. Spec. Limits | | | | |
| | Fission and Activation Gases | | | | |
| | Percent of Quarterly Gamma Air Dose Limit (5 mR) | % | **1.38E-05** | **4.12E-05** | |
| | Percent of Quarterly Beta Air Dose Limit (10 mrad) | % | **8.86E-06** | **2.07E-05** | |
| | Percent of Annual Gamma Air Dose Limit to Date (10 mR) | % | **6.90E-06** | **2.75E-05** | |
| | Percent of Annual Beta Air Dose Limit to Date (20 mrad) | % | **4.43E-06** | **1.48E-05** | |
| | Percent of Whole Body Dose Rate Limit (500 mrem/yr) | % | **3.69E-07** | **1.10E-06** | |
| | Percent of Skin Dose Rate Limit (3000 mrem/yr) | % | **1.62E-07** | **4.19E-07** | |
| | Tritium, Iodines, and Particulates[1] (with half-lives greater than 8 days) | | | | |
| | Percent of Quarterly Dose Limit (7.5 mrem) | % | **2.00E+00** | **5.16E-01** | |
| | Percent of Annual Dose Limit (15 mrem) | % | **1.01E+00** | **1.27E+00** | |
| | Percent of Organ Dose Rate Limit (1500 mrem/yr) | % | **4.01E-02** | **1.05E-02** | |

[1] Tritium, Iron-55, and Strontium results for the second quarter were not received from the off-site vendor at the time of this report. These values include estimates, and actual numbers will be provided in the next Semi-Annual Report.

# ATTACHMENT 3

Unit 1 X Unit 2 __ Reporting Period **January – June 2001**

**GASEOUS EFFLUENTS – ELEVATED RELEASE**

| Nuclides Released | | CONTINUOUS MODE[3] 1st QUARTER | CONTINUOUS MODE[3] 2nd QUARTER | BATCH MODE 1st QUARTER | BATCH MODE 2nd QUARTER |
|---|---|---|---|---|---|
| | | | | **There were no batch releases during the reporting period.** | |
| 1. Fission Gases[1] | | | | | |
| Argon-41 | Ci | ** | ** | | |
| Krypton-85 | Ci | ** | ** | | |
| Krypton-85m | Ci | ** | 1.38E-02 | | |
| Krypton-87 | Ci | ** | ** | | |
| Krypton-88 | Ci | ** | ** | | |
| Xenon-127 | Ci | ** | ** | | |
| Xenon-131m | Ci | ** | ** | | |
| Xenon-133 | Ci | ** | ** | | |
| Xenon-133m | Ci | ** | ** | | |
| Xenon-135 | Ci | ** | ** | | |
| Xenon-135m | Ci | ** | ** | | |
| Xenon-137 | Ci | ** | ** | | |
| Xenon-138 | Ci | ** | ** | | |
| 2. Iodines[1] | | | | | |
| Iodine-131 | Ci | 1.31E-03 | 2.77E-04 | | |
| Iodine-133 | Ci | 1.00E-02 | 7.80E-04 | | |
| Iodine-135 | Ci | ** | ** | | |
| 3. Particulates[1,2] | | | | | |
| Strontium-89 | Ci | 4.06E-05 | 5.34E-04 | | |
| Strontium-90 | Ci | ** | 6.68E-05 | | |
| Cesium-134 | Ci | ** | ** | | |
| Cesium-137 | Ci | 5.24E-06 | ** | | |
| Cobalt-60 | Ci | 3.17E-03 | 8.52E-04 | | |
| Cobalt-58 | Ci | 2.71E-04 | 1.75E-05 | | |
| Manganese-54 | Ci | 1.41E-03 | 2.60E-04 | | |
| Barium-Lanthanum-140 | Ci | ** | ** | | |
| Antimony-125 | Ci | ** | ** | | |
| Niobium-95 | Ci | ** | ** | | |
| Cerium-141 | Ci | ** | ** | | |
| Cerium-144 | Ci | ** | ** | | |
| Iron-59 | Ci | 1.18E-04 | ** | | |
| Cesium-136 | Ci | ** | ** | | |
| Chromium-51 | Ci | 3.30E-04 | ** | | |
| Zinc-65 | Ci | ** | ** | | |
| Iron-55 | Ci | 4.75E-04 | 8.96E-04 | | |
| Molybdenum-99 | Ci | ** | ** | | |
| Neodymium-147 | Ci | ** | 5.30E-06 | | |
| 4. Tritium[2] | Ci | 1.14E+01 | 3.11E+01 | | |

1 Concentrations less than the lower limit of detection of the counting system used are indicated with a double asterisk. A lower limit of detection of 1.00E-04 μCi/ml for required noble gases, 1.00E-11 μCi/ml for required particulates, 1.00E-12 μCi/ml for required Iodines, and 1.00E-06 μCi/ml for Tritium, as required by Technical Specifications, has been verified.

2 Tritium, Iron-55, and Strontium results for the second quarter were not received from the off-site vendor at the time of this report. These values include estimates, and actual numbers will be included in the next Semi-Annual Report.

3 Contributions from purges are included.

# ATTACHMENT 4

Unit 1 X Unit 2 __ Reporting Period **January – June 2001**

## GASEOUS EFFLUENTS – GROUND LEVEL RELEASES

Ground level releases are determined in accordance with the Off-Site Dose Calculation Manual and Chemistry procedures.

| | | | CONTINUOUS MODE | | BATCH MODE **There were no batch releases during the reporting period.** | |
|---|---|---|---|---|---|---|
| | | | **1st QUARTER** | **2nd QUARTER** | **1st QUARTER** | **2nd QUARTER** |
| 1. | Fission Gases[1] | | | | | |
| | Argon-41 | Ci | ** | ** | | |
| | Krypton-85 | Ci | ** | ** | | |
| | Krypton-85m | Ci | ** | ** | | |
| | Krypton-87 | Ci | ** | ** | | |
| | Krypton-88 | Ci | ** | ** | | |
| | Xenon-127 | Ci | ** | ** | | |
| | Xenon-131m | Ci | ** | ** | | |
| | Xenon-133 | Ci | ** | ** | | |
| | Xenon-133m | Ci | ** | ** | | |
| | Xenon-135 | Ci | **1.71E-03** | ** | | |
| | Xenon-135m | Ci | ** | ** | | |
| | Xenon-137 | Ci | ** | ** | | |
| | Xenon-138 | Ci | ** | ** | | |
| 2. | Iodines[1] | | | | | |
| | Iodine-131 | Ci | ** | ** | | |
| | Iodine-133 | Ci | **1.02E-08** | ** | | |
| | Iodine-135 | Ci | ** | ** | | |
| 3. | Particulates[1,2] | | | | | |
| | Strontium-89 | Ci | ** | **2.16E-08** | | |
| | Strontium-90 | Ci | ** | **2.70E-09** | | |
| | Cesium-134 | Ci | ** | ** | | |
| | Cesium-137 | Ci | ** | ** | | |
| | Cobalt-60 | Ci | **2.68E-07** | **5.36E-08** | | |
| | Cobalt-58 | Ci | ** | **1.07E-08** | | |
| | Manganese-54 | Ci | **2.32E-08** | **1.42E-08** | | |
| | Barium-Lanthanum-140 | Ci | ** | ** | | |
| | Antimony-125 | Ci | ** | ** | | |
| | Niobium-95 | Ci | ** | ** | | |
| | Cerium-141 | Ci | ** | ** | | |
| | Cerium-144 | Ci | ** | ** | | |
| | Iron-59 | Ci | ** | **1.79E-08** | | |
| | Cesium-136 | Ci | ** | ** | | |
| | Chromium-51 | Ci | ** | **3.32E-09** | | |
| | Zinc-65 | Ci | ** | ** | | |
| | Iron-55 | Ci | ** | **5.36E-08** | | |
| | Molybdenum-99 | Ci | ** | ** | | |
| | Neodymium-147 | Ci | ** | ** | | |
| 4. | Tritium[2] | Ci | **3.46E+01** | **1.46E+00** | | |

1 Concentrations less than the lower limit of detection of the counting system used are indicated with a double asterisk.

2 Tritium, Iron-55, and Strontium results for the second quarter were not received from the off-site vendor at the time of this report. These numbers include estimates and actual numbers will be included in the next Semi-Annual Report.

Unit 1 X Unit 2 __ Reporting Period **January – June 2001**

**LIQUID EFFLUENTS – SUMMATION OF ALL RELEASES**

| | | | 1st QUARTER | 2nd QUARTER | EST. TOTAL ERROR, % |
|---|---|---|---|---|---|
| A. | Fission & Activation Products | | | | |
| | 1. Total release (not including Tritium, gases, alpha) | Ci | No Releases | No Releases | 5.00E+01 |
| | 2. Average diluted concentration during reporting period | μCi/ml | No Releases | No Releases | |
| B. | Tritium | | | | |
| | 1. Total release | Ci | No Releases | No Releases | 5.00E+01 |
| | 2. Average diluted concentration during reporting period | μCi/ml | No Releases | No Releases | |
| C. | Dissolved and Entrained Gases | | | | |
| | 1. Total release | Ci | No Releases | No Releases | 5.00E+01 |
| | 2. Average diluted concentration during reporting period | μCi/ml | No Releases | No Releases | |
| D. | Gross Alpha Radioactivity | | | | |
| | 1. Total release | Ci | No Releases | No Releases | 5.00E+01 |
| E. | Volumes | | | | |
| | 1. Prior to dilution | Liters | No Releases | No Releases | 5.00E+01 |
| | 2. Volume of dilution water used during release period | Liters | No Releases | No Releases | 5.00E+01 |
| | 3. Volume of dilution water available during reporting period: | Liters | 1.12E+11 | 9.70E+10 | 5.00E+01 |
| F. | Percent of Technical Specification Limits | | | | |
| | Percent of Quarterly Whole Body Dose Limit (1.5 mrem) | % | No Releases | No Releases | |
| | Percent of Quarterly Organ Dose Limit (5 mrem) | % | No Releases | No Releases | |
| | Percent of Annual Whole Body Dose Limit to Date (3 mrem) | % | No Releases | No Releases | |
| | Percent of Annual Organ Dose Limit to Date (10 mrem) | % | No Releases | No Releases | |
| | Percent of 10CFR20 Concentration Limit | % | No Releases | No Releases | |
| | Percent of Dissolved or Entrained Noble Gas Limit (2.00E-04 μCi/ml) | % | No Releases | No Releases | |

Unit 1 X Unit 2 __ Reporting Period **January – June 2001**

**LIQUID EFFLUENTS RELEASED**

| | | BATCH MODE[1] | |
|---|---|---|---|
| **Nuclides Released** | | 1st QUARTER | 2nd QUARTER |
| Strontium-89 | Ci | No Releases | No Releases |
| Strontium-90 | Ci | No Releases | No Releases |
| Cesium-134 | Ci | No Releases | No Releases |
| Cesium-137 | Ci | No Releases | No Releases |
| Iodine-131 | Ci | No Releases | No Releases |
| Cobalt-58 | Ci | No Releases | No Releases |
| Cobalt-60 | Ci | No Releases | No Releases |
| Iron-59 | Ci | No Releases | No Releases |
| Zinc-65 | Ci | No Releases | No Releases |
| Manganese-54 | Ci | No Releases | No Releases |
| Chromium-51 | Ci | No Releases | No Releases |
| Zirconium-Niobium-95 | Ci | No Releases | No Releases |
| Molybdenum-99 | Ci | No Releases | No Releases |
| Technetium-99m | Ci | No Releases | No Releases |
| Barium-Lanthanum-140 | Ci | No Releases | No Releases |
| Cerium-141 | Ci | No Releases | No Releases |
| Tungsten-187 | Ci | No Releases | No Releases |
| Iodine-133 | Ci | No Releases | No Releases |
| Iron-55 | Ci | No Releases | No Releases |
| Neptunium-239 | Ci | No Releases | No Releases |
| Iodine-135 | Ci | No Releases | No Releases |
| Dissolved or Entrained Gases | Ci | No Releases | No Releases |
| Tritium | Ci | No Releases | No Releases |

[1] No continuous mode release occurred during the report period.

Unit 1 X Unit 2 __ Reporting Period **January – June 2001**

**SOLID WASTE AND IRRADIATED FUEL SHIPMENTS**

| A.1 TYPE | Volume ($m^3$) Class | | | Activity[1] (Ci) Class | | |
|---|---|---|---|---|---|---|
| 1. Spent Resins (Class A), Mechanical Filters (Class C) (Dewatered) | A | B | C | A | B | C |
| | **8.45E+01** | **0** | **0** | **3.37E+02** | **0** | **0** |
| 2. Dry Active Waste (Contaminated Equipment) | **5.55E+00** | **0** | **0** | **1.06E+00** | **0** | **0** |
| 3. Other: (to vendor for processing or consolidation) | | | | | | |
| a. Dry Active Waste | **4.71E+02** | **0** | **0** | **5.19E-01** | **0** | **0** |
| b. Misc. Filters and Equipment | **1.53E+01** | **0** | **0** | **7.18E+00** | **0** | **0** |

[1] The estimated total error is 5.00E+01%.

Unit 1 X Unit 2 __ Reporting Period **January – June 2001**

**SOLID WASTE AND IRRADIATED FUEL SHIPMENTS**

| A.1 TYPE | Container | Package | Solidification Agent |
|---|---|---|---|
| 1. Spent Resins, Mechanical Filters (Dewatered) | **Poly HIC w/ steel shell**<br>**Poly HIC**<br>**Poly HIC w/ steel shell** | **STP**<br>**Type B**<br>**Type A** | **None** |
| | | | |
| 2. Dry Active Waste (Contaminated Equipment) | **Poly HIC** | **STP** | **None** |
| | | | |
| 3. Other: (To Vendor for Processing or Consolidation)<br>a. Dry Active Waste | **Metal Box (sealand)** | **STP** | **None** |
| b. Misc. Filters and Equipment | **Poly HIC**<br>**Poly HIC w/ steel shell**<br>**Metal Drum**<br>**Metal Box** | **STP** | **None** |

Unit 1 X Unit 2 ___ Reporting Period **January – June 2001**

**SOLID WASTE AND IRRADIATED FUEL SHIPMENTS**

A.2 ESTIMATE OF MAJOR NUCLIDE COMPOSITION (BY TYPE OF WASTE)

a. Spent Resins, Mechanical Filters (Dewatered)

| Nuclide (Resins) | Percent (Resins) |
|---|---|
| (1) Co-60 | 4.75E+01 |
| (2) Mn-54 | 4.44E+01 |
| (3) Co-58 | 2.74E+00 |
| (4) Cs-137 | 1.04E+00 |
| (5) Other | 4.32E+00 |

b. Dry Active Waste (Contaminated Equipment)

| Nuclide | Percent |
|---|---|
| (1) Co-60 | 5.91E+01 |
| (2) Mn-54 | 1.26E+01 |
| (3) Cr-51 | 1.17E+01 |
| (4) Cs-137 | 8.56E+00 |
| (5) Fe-59 | 2.84E+00 |
| (6) Fe-55 | 1.56E+00 |
| (7) Co-58 | 1.43E+00 |
| (8) Other | 2.21E+00 |

c. Other: (to Vendor for Processing or Consolidation)

1. Dry Active Waste

| Nuclide | Percent |
|---|---|
| (1) Fe-55 | 4.30E+01 |
| (2) Co-60 | 3.61E+01 |
| (3) Cs-137 | 8.22E+00 |
| (4) Mn-54 | 5.90E+00 |
| (5) Cr-51 | 4.01E+00 |
| (6) Ni-63 | 1.03E+00 |
| (7) Other | 1.74E+00 |

2. Misc. Filters and Equipment

| Nuclide | Percent |
|---|---|
| (1) Co-60 | 8.05E+01 |
| (2) Mn-54 | 8.82E+00 |
| (3) Cs-137 | 5.50E+00 |
| (4) Ni-63 | 1.01E+00 |
| (5) Other | 4.17E+00 |

Unit 1 X Unit 2 ___ Reporting Period **January – June 2001**

**SOLID WASTE AND IRRADIATED FUEL SHIPMENTS**

A.3. SOLID WASTE DISPOSITION:

| Number of Shipments | Mode of Transportation | Destination |
|---|---|---|
| **15** | **Truck** | **Chem Nuclear Systems, Inc. Barnwell, SC** |
| **9** | **Truck** | **GTS Duratek Oak Ridge, TN** |
| **3** | **Truck** | **Barnwell Waste Management Facility Barnwell, SC** |
| **1** | **Truck** | **GTS Duratek- Memphis Service Oak Ridge, TN** |

B. IRRADIATED FUEL SHIPMENTS (DISPOSITION): There were no shipments.

| Number of Shipments | Mode of Transportation | Destination |
|---|---|---|
| **0** | **0** | **0** |

Unit 1 X Unit 2 __ Reporting Period **January – June 2001**

**SOLID WASTE AND IRRADIATED FUEL SHIPMENTS**

C. SOLID WASTE SHIPPED OFF-SITE TO VENDORS FOR PROCESSING AND SUBSEQUENT BURIAL

Below is a summary of NMP-1 radwaste buried by vendor facilities during **January – June 2001** These totals were reported separately from "10CFR61 Solid Waste Shipped for Burial" since (a) waste classification and burial was performed by the vendors, and (b) Technical Specification 6.9.1 requires reporting of "information for each class of solid waste (as defined by 10CFR61) shipped off-site during the reporting period." The following data represents the actual shipments made from the off-site vendors of our radwaste (e.g., compacted and non-compacted trash, dry non-compressible waste, asbestos, scrap metal, and resins) that was processed and commingled prior to burial.

C.1. TYPE OF WASTE – Compacted and noncompacted trash, dry non-compressible waste, asbestos, scrap metal, and resins processed by vendor facilities prior to burial.

| Burial Volume ($m^3$) | Activity (Ci) | Est. Total Error, % |
|---|---|---|
| **1.71E+01** | **1.72E-01** | **5.00E+01** |

C.2. ESTIMATE OF MAJOR NUCLIDE COMPOSITION

| Nuclide | Percent |
|---|---|
| (1) Fe-55 | 6.776E+01 |
| (2) Co-60 | 2.436E+01 |
| (3) Cs-137 | 3.75E+01 |
| (4) Mn-54 | 2.58E+00 |
| (5) Ni-63 | 1.48E+00 |
| (6) Other | 7.00E-02 |

C.3. SOLID WASTE DISPOSITION

| Number of Shipments | Mode of Transportation | Destination |
|---|---|---|
| **17** | **Truck** | **Clive, UT** |

Unit 1 X Unit 2 ___ Reporting Period **January - June 2001**

**SOLID WASTE AND IRRADIATED FUEL SHIPMENTS**

D. SEWAGE WASTES SHIPPED TO A TREATMENT FACILITY FOR PROCESSING AND BURIAL

There were no shipments of sewage sludge with detectable quantities of plant-related nuclides from NMP to the treatment facility during the reporting period.

# ATTACHMENT 7

Unit 1 X Unit 2 ___ Reporting Period **January – June 2001**

**SUMMARY OF CHANGES TO THE OFF-SITE DOSE CALCULATION MANUAL (ODCM)**

There were no changes to the Unit 1 ODCM during the reporting period.

## ATTACHMENT 8

Unit 1 X Unit 2 __ Reporting Period **January – June 2001**

**SUMMARY OF CHANGES TO THE PROCESS CONTROL PROGRAM (PCP)**

The Unit 1 Radwaste Process Control Program (RPCP) Revision 5 was implemented in February 2001. Administrative changes were made to reflect the procedures used for Non-Waste Radioactive Shipments, and editorial changes for clarification. The RPCP changes do not reduce the overall conformance of the solidified waste product to existing criteria for solid waste in accordance with Technical Specifications. A copy of the RPCP, Revision 5 is attached and below is a summary of the changes accepted by the Station Operations Review Committee on February 27, 2001.

| Old Page # | New Page # | New/Amended Section # | Change | Reason for Change |
|---|---|---|---|---|
| Entire Document | Entire Document | N/A | The General Supervisor Radwaste is now referred to as the Supervisor Radwaste | Editorial Correction |
| 3 | 3 | 4.1.4 | Referral to procedures N1-LWPP-4 and N1-WHP-4 is replaced with the phrase "with approved procedures" | Editorial change made to reduce the frequency of editorial revisions to the RPCP |
| 4 | 4 | 4.3.3 | The phrase "applicable Radiation Protection procedures for packaging and transportation of radioactive material" is replaced with "approved procedures" | Editorial change made to reduce the frequency of editorial revisions to the RPCP |
| 5 | 5 | 4.4.1.c | The phrase "designated area" is now "designated storage area" and the phrase "radioactive material storage area" is replaced with "radioactive material storage procedures" | Clarification and editorial correction |
| 8 | 8 | 6.3.13 | Reference GAP-RMP-01 added to the policies, programs, and procedures references | Adds the procedure for Interim Storage of Low-Level Radioactive Waste to the RPCP |
| 8 | 8 | 6.4.1 | Chem Nuclear Systems, Inc. is replaced with "vendor" | Editorial change made to reduce the frequency of revisions to the RPCP |
| 10 & 11 | 9 | Attachment 1 | The listing of all individual procedures has been replaced with general listing, e.g., N1-WHP-01 is referred to N1-WHPs. Generation Administrative Procedures (GAPs) is added to the list. | Editorial change made to reduce the frequency of revisions to the RPCP |
| 12 | 10 | Attachment 2, Section 4.1 | The phrase "concentrated waste" is replaced with "concentrate" | Clarification |
| Entire Document | Entire Document | N/A | The phrase "sluiced" is replaced with "transferred" | Clarification |

ORIGINAL

NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT NUCLEAR STATION UNIT 1

RPCP

REVISION 05

# UNIT 1 RADWASTE PROCESS CONTROL PROGRAM

TECHNICAL SPECIFICATION REQUIRED

Approved by:
L. A. Hopkins

L A Hopkins
Plant Manager - Unit 1

2/27/01
Date

THIS IS A FULL REVISION

Effective Date: 2/27/01

TABLE OF CONTENTS

1.0 PURPOSE

To describe the methods for processing, packaging, transporting, and storing low-level radioactive waste and provide assurance of complete stabilization of various radioactive wastes in accordance with applicable NRC & DOT regulations and guidelines.

2.0 RESPONSIBILITIES

2.1 The Plant Manager is responsible for:

2.1.1 Ensuring the Unit 1 Radwaste Process Control Program provides for the health and safety of the general public as it applies to Radwaste Management.

2.1.2 Reviewing and approving changes to the Unit 1 Radwaste Process Control Program in accordance with the applicable Technical Specification.

2.2 The Radiation Protection Manager is responsible for the content and maintenance of this program.

2.3 The Supervisor Radwaste is responsible for overall implementation of the Radwaste Process Control Program.

3.0 PROGRAM

3.1 System Description

3.1.1 General

a. The Solid Waste Management System (SWMS) implemented by the procedures identified in the Unit 1 Radwaste Process Control Program Implementing Procedures (Attachment 1) collects, reduces the volume, dewaters and packages wet and dry types of radioactive waste in preparation for shipment off-site for further processing or disposal at a licensed burial site. The processing and storage methods used for interim storage are consistent with the present waste form stability requirements.

b. Types of solid waste sources are identified in Solid Waste Sources (Attachment 2).

3.1.1 (Cont)

c. Bead resins, powdered resins and charcoal are dewatered using approved vendor equipment in:

1. Vendor certified polyethylene containers, or

2. Carbon steel liners, or a

3. High Integrity Container (HIC)

d. Concentrated wastes are processed off-site to dryness by an approved vendor.

e. Evaporator bottoms are transferred to a liner in the Radwaste Truck Bay for off-site processing by an approved vendor.

f. Dry solid trash is collected in the Radwaste Facility, sorted, and sent off-site for further separation and processing.

3.1.2 Ventilation Systems

a. The Radwaste Building Ventilation System provides filtered, conditioned outside air to various areas of the Radwaste Building and exhausts the air to the atmosphere through the Turbine Building stack. (The system maintains the building at a pressure below atmospheric to help prevent any unmonitored air leakage to the environment.)

b. The Radwaste Solidification and Storage Building (RSSB) Ventilation System provides filtered, conditioned outside air to selected areas in the RSSB. Recirculation fans continuously filter and condition the air, and exhaust fans, taking a suction on the truck bays, exhaust the air to the Turbine Building stack. (The system maintains the building at a pressure below atmospheric to help prevent any unmonitored air leakage to the environment.)

3.1.3 Crane

a. All liner movements are completed using a remote controlled/operated crane. The movements are facilitated by the use of remote controlled cameras and monitors.

3.1.3 (Cont)

b. Liners are moved when required using a ceiling grid coordinated system for placement of the liner.

c. When liners stored in the RSSB storage area are to be shipped, the liners scheduled for shipment are moved to the East-West Truck Bay and then loaded for transportation.

## 4.0 RADIOACTIVE WASTES

### 4.1 Waste Processing System

The Supervisor Radwaste shall ensure:

4.1.1 Radioactive waste is processed using approved equipment with approved procedures.

4.1.2 Radioactive waste may be processed using approved vendor equipment and procedures.

4.1.3 Radioactive wastes are disposed of in the applicable approved containers.

4.1.4 Radioactive waste is transferred into shipping casks in accordance with approved procedures.

4.1.5 Waste is transferred between units and placed in interim storage in accordance with approved procedures.

### 4.2 Solid Dry Radioactive Wastes (SDRW)

The Supervisor Radwaste shall ensure:

4.2.1 Low Specific Activity (LSA) Solid Dry Radioactive Waste (SDRW) is collected and prepared in accordance with the applicable procedure, meeting 10CFR61, Sub Part D, Technical Requirements for Land Disposal Facilities and Final Waste Classification and Waste Form Technical Position Papers requirements.

4.2.2 SDRW is examined for liquids or items that could compromise the integrity of the package or violate the burial site license and/or criteria. These items are removed or separated.

4.2.3 SDRW is shipped in containers meeting the transport requirements of 49CFR173.427, Transport Requirements for Low Specific Activity (LSA) Radioactive Materials.

4.2.4 Waste precluded from disposal in LSA boxes or drums, due to radiation limits, is disposed of in the applicable containers.

4.2.5 Waste segregation and volume reduction processing techniques are used for waste generated during operation, maintenance, and modifications.

4.2.6 Scrap metal is separated from waste, when possible, for on-site or off-site decontamination.

**NOTE:** Vendor services may be used for waste segregation and further volume reduction processes.

4.2.7 Waste is placed in interim storage in accordance with approved procedures.

4.3 Waste Classification/Characterization

4.3.1 The Supervisor Radwaste shall ensure:

a. The minimum waste classification/characteristic requirements identified in 10CFR61.56, Waste Characteristics, are satisfied.

b. The radionuclide concentration determination methods and frequency are conducted in accordance with approved procedures.

4.3.2 The Manager Chemistry shall ensure the chemical and radionuclide content of waste is determined in accordance with the applicable Chemistry procedures.

4.3.3 The Manager Radiation Protection shall ensure classification of waste is performed in accordance with approved procedures.

4.4. Administrative Controls

4.4.1 The Supervisor Radwaste is responsible for overall administrative control of the Radwaste Process Control Program, ensuring:

4.4.1 (Cont)

a. Changes to the Unit 1 Radwaste Process Control Program are submitted to the NRC in the Semiannual Radioactive Effluent Release Report for the period in which the change(s) was made, and contain the information required by the applicable Technical Specification.

b. Shipping manifests are completed and tracked to satisfy the requirements of 10CFR20.2006, Transfer for Disposal and Manifests, in accordance with Waste Handling Procedures.

c. Temporary storage of solid radioactive material awaiting shipment in an area other than a designated storage area is done in accordance with the applicable radioactive material storage procedures.

d. Interim storage of low level waste is performed in accordance with approved procedures.

4.4.2 The Nuclear Division Quality Assurance Program assures effective implementation of the Process Control Program, as follows:

**NOTE: The Manager, Nuclear QA, Operations has the authority to stop work when significant conditions adverse to quality exist and require corrective action.**

a. Under the cognizance of the Safety Review and Audit Board (SRAB), the Process Control Program and implementing procedures for processing and packaging of radioactive waste are audited at least once every 24 months as required by the applicable Unit 1 Technical Specification.

b. QA audits waste classification records to ensure compliance with 10CFR20.2006, Transfer for Disposal and Manifests.

c. QA Inspectors performing Radwaste inspections receive training in Department of Transportation and NRC Radwaste Regulatory requirements.

d. Management reviews results of QA audits.

4.4.3 The Nuclear Division Training Program assures personnel responsible for implementation of the Process Control Program are effectively trained in accordance with the applicable training procedures as follows:

a. Qualification as a Radwaste Operator requires satisfactory completion of the Radwaste Operations Unit 1 Initial Training Program and participation in continued training. This includes:

1. Demonstrating an acceptable level of skill and familiarity associated with Radwaste operations by achieving an average grade of 80 percent or above on written examinations.

2. Receiving on-the-job training in accordance with applicable training procedures.

3. Continued training conducted on a cyclical basis and includes a fundamental review of system modifications, revisions or changes to procedures, and changes or experiences in the nuclear industry.

4. Individuals that demonstrate a significant deficiency in a given area of knowledge and/or proficiency (as identified during continued training) are placed in a remedial training program as directed by approved training procedures.

4.4.4 Training records and Waste Management records are maintained in accordance with applicable Quality Assurance procedures.

## 5.0 DEFINITIONS

5.1 The applicable Radwaste packaging, processing, and transportation definitions will be used in accordance with 49CFR171 and 49CFR Sub Part I.

## 6.0 REFERENCES

### 6.1 Licensee Documentation

6.1.1 Unit 1 Technical Specifications

a. System 3.6.16.c, Radioactive Effluent Treatment Systems

b. Section 4.6.16.c, Radioactive Effluent Treatment Systems

c. Section 6.5.2.11, Technical Review and Control

d. Section 6.5.3.8.k, Audits of Facility Activities

e. Section 6.9.1.e, Semiannual Radioactive Effluent Release Report

6.1.2 Unit 1 Radiological Effluent Technical Specifications, Amendment No. 66

6.1.3 Nine Mile Point Unit 1 Operating License No. DPR-63 (Docket No. 50-220)

6.1.4 QATR-1, Quality Assurance Program Topical Report for Nine Mile Point Nuclear Station Operations, Section 17.0, Quality Assurance Records

6.1.5 UFSAR, Section XII.A, Radioactive Wastes

6.1.6 UFSAR, Section III.I, RSSB

6.1.7 Safety Evaluation 92-049, Rev. 04, Interim Storage

### 6.2 Standards, Regulations, and Codes

6.2.1 10CFR20, Standards for Protection Against Radiation

6.2.2 10CFR61, Sub Part D, Technical Requirements for Land Disposal Facilities and Final Waste Classification and Waste Form Technical Position Papers

6.2.3 10CFR61.55, Waste Classification

6.2.4 10CFR61.56, Waste Characteristics

6.2.5 10CFR71, Packaging and Transportation of Radioactive Material, (Refer to applicable S-RPIPs for the packaging and transportation of radioactive material)

6.2.6 49CFR173, Shippers - General Requirements for Shipment and Packagings, (Refer to applicable S-RPIPs for the packaging and transportation of radioactive material)

6.2.7 49CFR173.427, Transport Requirements for Low Specific Activity (LSA) Radioactive Materials

6.2.8 NUREG-0133, Section 3.5, Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants

6.2.9 NUREG-0473, Sections 3.11.3 and 6.14, Draft Radiological Effluent Technical Specifications for Boiling Water Reactors

6.2.10 NUREG-0800, Section 11.4, Standard Review Plan for Solid Waste Management Systems

6.3 Policies, Programs, and Procedures

6.3.1 NDD-LPP, Licenses, Plans, and Programs

6.3.2 NDD-OPS, Operations

6.3.3 NDD-RMP, Radioactive Material Processing, Transport, and Disposal

6.3.4 NIP-ECA-01, Deviation/Event Report

6.3.5 NIP-PRO-03, Preparation and Review of Technical Procedures

6.3.6 NIP-RMG-01, Records Management

6.3.7 NIP-TQS-01, Qualification and Certification

6.3.8 GAP-ALA-01, Site ALARA Program

6.3.9 GAP-INV-02, Control of Material Storage Areas

6.3.10 GAP-OPS-01, Administration of Operations

6.3.11 GAP-RPP-01, Radiation Protection Program

6.3.12 GAP-RPP-02, Radiation Work Permit

6.3.13 GAP-RMP-01, Interim Storage of Low-Level Radioactive Waste

6.4 Supplemental References

6.4.1 Vendor Training and Requalification Procedure

6.4.2 Nuclear Regulatory Commission's Branch Technical Position of Waste Classification and Waste Form, May 1983

6.4.3 DER 1-94-0549

6.4.4 Structural Calculation S.2.3-R5252-Tank 01

6.4.5 Modification N1-91-033

6.4.6 Procedure N1-MFT-30

ATTACHMENT 1: UNIT 1 RADWASTE PROCESS CONTROL PROGRAM IMPLEMENTING PROCEDURES

Waste Handling Procedures (N1-WHPs and S-WHPs)

Liquid Waste Processing Procedures (N1-LWPPs)

Radiation Protection Procedures (S-RPIPs)

Chemistry Technical Procedures (N1-CTPs)

Quality Assurance Audit and Surveillance Procedures (QAPs)

Nuclear Training Procedures (NTPs)

Generation Administrative Procedures (GAPs)

ATTACHMENT 2: SOLID WASTE SOURCES



1.0 RADWASTE FILTERS

1.1 Mechanical Radwaste filters filter resin and crud (backwash material) from the Waste Collector Sub-System.

1.2 When a filter reaches a pre-determined differential pressure, the filter is backwashed into the filter sludge tank, which is then processed via the clarifier to the thickener tanks.

2.0 RADWASTE DEMINERALIZER

2.1 The Radwaste Demineralizer is used as anionic exchange media for processing high quality water from the Waste Collector Tanks.

2.2 When determined the resin can NO longer be used, the depleted resin is transferred to the Spent Resin Tank.

3.0 CONDENSATE DEMINERALIZERS

3.1 The Condensate Demineralizers remove soluble and insoluble impurities from the condensate water to maintain reactor feedwater purity.

3.2 After it is determined these resins can NO longer be used, the depleted resin are transferred to the Radwaste Demineralizer or Spent Resin Tank.

4.0 THERMEX SYSTEM

4.1 Concentrate will be pumped to the Spent Resin Tank and dewatered or stored in a liner and eventually pumped to a transport liner in the Radwaste Truck Bay for off-site processing.

4.2 Exhausted resin and charcoal are transferred to the Spent Resin Tank, mixed to a homogenous mixture and then transferred to a liner in the truck bay for dewatering.

4.3 Exhausted Reverse Osmosis membranes will be processed as DAW.

5.0 FUEL POOL FILTER SLUDGE TANK

This tank receives the exhausted powdered filter media (resins) from the Fuel Pool Cleanup System, which is subsequently pumped to the Filter Sludge Tank for processing.

6.0 CLEANUP FILTER SLUDGE TANK

This tank receives the exhausted powdered filter media (resins) from the Reactor Cleanup System, which is subsequently pumped to the Filter Sludge Tank, Clarifier, or directly to a liner in the Radwaste Truck Bay for processing.

7.0 FILTER SLUDGE STORAGE TANK

This tank receives waste from the Radwaste filters, Fuel Pool and Cleanup Sludge Tanks, Clarifier and Thickener Tank overflows, and Radwaste Floor Drain Sump #11. Tank discharge is to the Clarifier (Filter Sludge Thickener System) or directly to a liner in the Radwaste Truck Bay for processing.

8.0 FILTER SLUDGE THICKENER TANKS (CLARIFIER)

Waste from the Filter Sludge Storage Tank or the Cleanup Filter Sludge Tank is pumped to the Clarifier, mixed with a flocculent and drained in the Thickener Tanks. The Thickener Tanks are pumped to a liner in the Radwaste Truck Bay for processing.

9.0 SPENT RESIN STORAGE TANK

Exhausted resin from the Condensate Demineralizers, Radwaste Demineralizer, and THERMEX System are transferred to the Spent Resin Tank. The tank is subsequently pumped to a liner in the Radwaste Truck Bay for dewatering and further processing.

10.0 CONTAMINATED OIL

Oil from sources within Unit 1 that becomes contaminated is stored in containers to be shipped off-site for incineration.

11.0 COMPACTIBLE SOLIDS

11.1 Compactible low level trash is shipped off-site for vendor separation and processing.

11.2 Shoe covers, trash, contaminated paper from the Chemistry Lab, and similar materials are included in this category.

12.0 FILTERS AND MISCELLANEOUS ITEMS

Solid items with high dose rates are handled on a case-by-case basis, being disposed of by methods acceptable to the burial site or shipped off-site for vendor recovery or disposal.

13.0 WASTE EVAPORATOR

13.1 The Waste Evaporator processes low quality waste from the Floor Drain Collector System.

13.2 The Waste Evaporator is designed to concentrate waste to a 25% solid concentration, which may then be discharged to the Evaporator Bottoms Tank for transfer to the Radwaste Truck Bay for vendor processing.

# ATTACHMENT 9

Unit 1 X Unit 2 __ Reporting Period **January - June 2001**

**SUMMARY OF INOPERABLE MONITORS**

One stack effluent radiation monitor was inoperable for the entire reporting period. However, the minimum number of channels required be Technical Specification 3.6.14.B was always maintained. The inoperable monitor was returned to operable status in July 2001.

# ATTACHMENT 10

## Update of Actual Data for the Fourth Quarter 2000

Unit 1 **X** Unit 2 __ Reporting Period **July - December 2000**

**UPDATE OF RELEASE AND DOSE DATA FOR GASEOUS (ELEVATED AND GROUND LEVEL) AND LIQUID EFFLUENTS**

Update of data using actual results from the offsite vendors for Strontium, Tritium, and Iron-55 for the fourth quarter of 2000.

| Nuclide | GASEOUS 4th QUARTER 2000 Activity (Ci) | LIQUID 4th QUARTER 2000 Activity (Ci) |
|---|---|---|
| Sr-89 | **3.59E-05** | **No Releases** |
| Sr-90 | **4.59E-09** | **No Releases** |
| H-3 | **8.57E+01** | **No Releases** |
| Fe-55 | **2.18E-03** | **No Releases** |

| | | | GASEOUS | LIQUID |
|---|---|---|---|---|
| Particulates | 1. Particulates with half-lives >8 days | Ci | **9.96E-03** | **No Releases** |
| | 2. Average release rate for period | µCi/sec (gaseous) µCi/ml (liquid) | **1.27E-03** | **No Releases** |
| Tritium | 1. Total release | Ci | **8.57E+01** | **No Releases** |
| | 2. Average release rate for period | µCi/sec (gaseous) µCi/ml (liquid) | **1.09E+01** | **No Releases** |

| Tritium, Iodines, and Particulates (with half-lives greater than 8 days) | | GASEOUS | LIQUID |
|---|---|---|---|
| 1. | Percent of Quarterly Dose Limit[2] | % | **2.19E+00** (Quarterly) | **No Releases** (Quarterly) |
| 2. | Percent of Annual Dose Limit to Date[1] | % | **3.93E+00** (Annual) | **No Releases** (Annual) |
| 3. | Percent of Organ Dose Rate Limit (Gaseous)(Quarterly) -Dose Limit (Liquid) (Quarterly & Annual) | % | **4.41E-02** (Quarterly) | **No Releases** (Quarterly) **No Releases** (Annual) |
| 4. | Percent of 10CFR20 Concentration Limit[2] (Liquid) | % | | **No Releases** |
| 5. | Percent of Dissolved or Entrained Noble Gas (Liquid) | % | | **No Releases** |

[1] The dose is to the whole body for liquid effluents and to the maximally exposed organ for gaseous effluents.

[2] The percent of the 10CFR20 concentration limit is based on the average concentration during the quarter.