

**ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION**

**ANNUAL RADIOACTIVE
EFFLUENT RELEASE REPORT**

January 1, 1995 - December 31, 1995

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LIST OF ATTACHMENTS

- ☐ Attachment I - Offsite Dose Calculation Manual, Revision 17
- ☐ Attachment II - Corrected Pages

I. INTRODUCTION

This Annual Radioactive Effluent Release Report (ARERR) for the period of January 1 through December 31, 1995 is submitted in accordance with Offsite Dose Calculation Manual (ODCM), Section 5.6.3 of Grand Gulf Nuclear Station (GGNS) License No. NPF-29.

The monitoring of radioactive effluents is referenced in ODCM Appendix A, Sections 6.11 and 6.12.

Airborne discharges at GGNS are considered ground-level releases. All liquid and airborne discharges to the environment were analyzed in accordance with ODCM requirements. All effluent releases were within the concentration and total release limits specified by the ODCM.

Projected offsite doses were within the dose limits specified by the ODCM.

The summation of all gaseous releases during the reporting period is given in Table 1A, while elevated releases and ground-level releases are given in Tables 1B and 1C, respectively. Table 1D describes the radioactive gaseous sampling and analysis program implemented at GGNS.

The summation of all liquid releases during the reporting period is given in Table 2A, while continuous and batch mode releases are given in Table 2B. Table 2C describes the radioactive liquid waste sampling and analysis program implemented at GGNS.

Solid radioactive waste and irradiated fuel shipments during the reporting period are summarized in Table 3.

I. INTRODUCTION (CONT'D)

The annual summary of meteorological data (joint frequency distribution) will be maintained on site in a file that shall be provided to the NRC upon request. The option to maintain meteorological data on site is in accordance with ODCM Administrative Controls Section 5.6.3.

This report contains a copy of Revision 17 to the GGNS ODCM, issued during the reporting period. Revision 17 implemented the Improved Technical Specifications adopted by GGNS in March 1995 and incorporated updated meteorological parameters.

This report also contains corrected pages from the previous ARERR. The corrections had no effect on the accuracy of reported data.

II. DETAILED INFORMATION

A. Regulatory Limits

1. 10CFR 20 Limits

- a. Fission and Activation Gases - The release rate limit at any time for noble gases to areas at or beyond the site boundary shall be such that:

D_{tb} = average total body dose rate in the current year (mrem/yr)

$$= X/Q \sum K_i Q_i \leq 500 \text{ mrem/yr}$$

D_s = average skin dose rate in the current year (mrem/yr)

$$= X/Q \sum (L_i + 1.1 M_i) Q_i \leq 3000 \text{ mrem/yr}$$

where the terms are defined in the GGNS ODCM.

- b. Radioiodines and Particulates - The release rate limit for the sampling period for all radioiodines, tritium and radioactive materials in particulate form with half-lives greater than 8 days shall be such that:

D_o = average organ dose rate in current year (mrem/yr)

$$= \sum_i W P_i \bar{Q}_i \leq 1500 \text{ mrem/yr}$$

where the terms are defined in the GGNS ODCM.

- c. Liquid Effluents - The concentration of radioactive materials released in liquid effluents to unrestricted areas from the site shall not exceed at any time ten times the values specified in 10CFR20, Appendix B, Table 2, Column 2. The concentration of dissolved or entrained noble gases, released in liquid effluents to unrestricted areas from all reactors at the site, shall be limited to 2×10^{-4} microcuries/ml total activity.

II. DETAILED INFORMATION (CONT'D)

2. 10CFR50, Appendix I Limits

- a. Fission and Activation Gases - The dose from noble gases in gaseous effluents to areas at or beyond the site boundary shall be such that:

D_{γ} = air dose due to gamma emissions from noble gases

$$= 3.17 \times 10^{-8} \sum_i M_i X/Q' Q_i \leq 5 \text{ mrad/qtr}$$

$$\leq 10 \text{ mrad/yr}$$

D_{β} = air dose due to beta emissions from noble gas

$$= 3.17 \times 10^{-8} \sum_i N_i X/Q' Q_i \leq 10 \text{ mrad/qtr}$$

$$\leq 20 \text{ mrad/yr}$$

where the terms are defined in the GGNS ODCM.

- b. Radioiodines and Particulates - The dose to an individual from tritium, I-131, I-133 and radioactive material in particulate form with half-lives greater than 8 days in gaseous effluents shall be such that:

D_P = dose to an individual from tritium, I-131, I-133 and radionuclides in particulate form with half-lives greater than 8 days (mrem)

$$= 3.17 \times 10^{-8} \sum_i R_i W' Q_i \leq 7.5 \text{ mrem/qtr Any Organ}$$

$$\leq 15 \text{ mrem/yr Any Organ}$$

where the terms are defined in the GGNS ODCM.

- c. Liquid Effluents - The dose from radioactive materials in liquid effluents shall be such that:

$$D_{\text{Tau}} = \sum_i [A_{i\text{Tau}} \sum_{l=1}^m \Delta t_l C_{il} F_l] \leq 1.5 \text{ mrem/qtr Total Body}$$

$$\leq 5 \text{ mrem/qtr Any Organ}$$

$$\leq 3 \text{ mrem/yr Total Body}$$

$$\leq 10 \text{ mrem/yr Any Organ}$$

where the terms are defined in the GGNS ODCM.

II. DETAILED INFORMATION (CONT'D)

3. 40CFR190 Limits

Doses are calculated for Fission and Activation Gases; Radioiodines and Particulates; and Liquid Effluents according to equations contained in Sections 2.(a), (b), and (c) respectively, with the exception that the limits applied are:

≤ 25 mrem/yr, Total Body or any Organ except Thyroid

≤ 75 mrem/yr, Thyroid

≤ 10 mrad γ /qtr or ≤ 20 mrad γ /yr, Fission and Activation Gases

≤ 20 mrad β /qtr or ≤ 40 mrad β /yr, Fission and Activation Gases

≤ 15 mrem/qtr or ≤ 30 mrem/yr, any Organ, Iodine and Particulates

≤ 3 mrem/qtr or ≤ 6 mrem/yr, Total Body, Liquid Effluents

≤ 10 mrem/qtr or ≤ 20 mrem/yr, any Organ, Liquid Effluents

B. Effluent Concentrations

1. Airborne

The Effluent Concentration Limit (ECL) of radioactive materials in gaseous effluents is limited by the dose rate restrictions given in Section II.A.1.a. In this case, the ECLs are actually determined by the dose factors in Table 2.1-1 of the GGNS ODCM.

2. Liquid

The Effluent Concentration Limit (ECL) of radioactive materials in liquid effluents is limited by ten times the values in 10CFR20, Appendix B, Table 2, Column 2. The ECL chosen is the most conservative value of either the soluble or insoluble ECL for each radioisotope.

C. Average Energy

Not applicable for GGNS ODCM Appendix A.

II. DETAILED INFORMATION (CONT'D)

D. Measurements and Approximations of Total Activity

The following discussion details the methods used to measure and approximate total activity for the following:

| | |
|---------------------------------|---------------------|
| 1. Fission and Activation Gases | 3. Particulates |
| 2. Radioiodines | 4. Liquid Effluents |

Tables 1D and 2C give sampling frequencies and minimum detectable sensitivity requirements for the analysis of gaseous and liquid effluent streams, respectively.

Values in the attached tables given as zero do not necessarily imply that the radionuclides were not present. A zero indicates that the radionuclide was not present at levels greater than the sensitivity requirements shown in Tables 1D and 2C. For some radionuclides, lower detection limits than required may be readily achievable; when a radionuclide is measured below its stated detection limits, it is reported.

1. For Fission and Activation Gases

The following noble gases are considered in evaluating gaseous airborne discharges:

| | |
|--------|---------|
| Ar-41 | Xe-131m |
| Kr-85m | Xe-133 |
| Kr-85 | Xe-133m |
| Kr-87 | Xe-135m |
| Kr-88 | Xe-135 |
| Kr-89 | Xe-138 |

Periodic grab samples from Station effluent streams are analyzed by a computerized pulse height analyzer system utilizing high-resolution germanium detectors. (See Table 1D for sampling and analytical requirements.) Isotopic values thus obtained are used for dose release rate calculations due to effluent releases as given in Section II.A.1. of this report. Only those radionuclides that are detected are used in this computation. During the period between grab samples, the amount of radioactivity released is based on the effluent monitor readings. Monitors are assigned a calibration factor based upon the last isotopic analysis, using the following relationship:

II. DETAILED INFORMATION (CONT'D)

$$C_i = U_i + m$$

where

C_i = isotopic calibration factor for isotope i

U_i = concentration of isotope i in the grab sample in $\mu\text{Ci/ml}$.

m = net monitor reading associated with the effluent stream
(determined at the time of grab sampling).

These calibration factors, along with the hourly effluent monitor values and flow rates, are entered into the laboratory computer where the release rates for individual radionuclides are calculated and stored. If no activity is detected in the grab sample, the calibration factor defaults to a historical mixture of Kr-88, Xe-133, Xe-135m, Xe-135, and Xe-138.

2. For Particulates and Radioiodines

The radioiodines and radioactive materials in particulate form to be considered are:

| | |
|---|--------|
| Zn-65 | I-133 |
| Cr-51 | Cs-134 |
| Mn-54 | Cs-136 |
| Fe-59 | Cs-137 |
| Co-58 | Ba-140 |
| Co-60 | Ce-141 |
| Sr-89 | Ce-144 |
| Sr-90 | Zr-95 |
| Sb-124 | I-131 |
| Other radionuclides with half lives greater than 8 days. | |

3. For Continuous Releases

Continuous sampling is performed on the continuous release points (i.e., Offgas/Radwaste Building Vent, Containment Purge, Fuel Handling Area Vent, Turbine Building Vent). Particulate material is collected by filtration. Radioiodines are collected by adsorption onto a charcoal filter. Periodically these filters are removed and analyzed on the pulse height analyzer to identify and quantify radioactive materials collected on the filters. Particulate filters are then analyzed for gross alpha and Strontium-89 and -90 as required. Gross alpha determinations are made using 2 pi gas flow proportional counter. Strontium-89 and -90 values are obtained by chemical separation and subsequent analysis using liquid scintillation techniques. Tritium

II. DETAILED INFORMATION (CONT'D)

concentrations are determined using distillation and liquid scintillation techniques. During major operational occurrences, the frequency of sampling is increased to satisfy the requirements of footnote "c" of Table 1D, "Radioactive Gaseous Waste Sampling and Analysis," (GGNS ODCM Appendix A, Table 4.11.2.1.2-1 [6.11.4-1]). Currently, Strontium analysis is performed by a qualified contract laboratory.

Appendix A of Regulatory Guide 1.21 states "In estimating releases for periods when analyses were not performed, the average of the two adjacent data points spanning this period should be used."

In addition to releases from routine gaseous release points, three additional planned releases occurred. Two were from the Turbine Building smoke exhaust hatches: to remove paint fumes - (June), and during repair to the hatch latching mechanism - (September). The third was from the exhaust of a temporary laundry facility which operated during Refueling Outage 7 (April-June). Each of the planned releases was evaluated as a ground level release and documented. None had a significant effect on the total release from the site.

4. For Batch Releases: Gases

The processing of batch type releases (from Containment Purge) is analogous to that for continuous releases.

5. For Batch Releases: Liquid Effluents

The radionuclides listed below are considered when evaluating liquid effluents:

| | |
|-------|--------|
| H-3 | Mo-99 |
| Co-58 | Tc-99m |
| Co-60 | I-131 |
| Fe-55 | I-132 |
| Fe-59 | I-133 |
| Zn-65 | I-135 |
| Mn-54 | Cs-134 |
| Cr-51 | Cs-137 |
| Sr-89 | Ba-140 |
| Sr-90 | La-140 |
| Nb-95 | Ce-141 |
| Zr-95 | Ce-144 |

Representative pre-release grab samples are obtained and analyzed as required by Table 2C. Isotopic analyses are performed using the computerized pulse height analysis system previously described. Aliquots of each pre-released sample, proportional to the waste volume released, are composited in accordance with the requirements of Table 2C. Strontium-89, 90 and Iron-55 values are obtained by chemical separation and counting the

II. DETAILED INFORMATION (CONT'D)

separated strontium and iron using liquid scintillation techniques. Gross alpha determinations are made using 2-pi gas flow proportional counter. Tritium is determined using distillation and liquid scintillation techniques. Dissolved gases are determined employing grab sampling techniques and then counting on the pulse height analyzer system. Currently, Iron and Strontium analyses are performed by a qualified contract laboratory.

E. Batch Releases

1. Liquid Batch Releases

| | 1st Qtr | 2nd Qtr | 3rd Qtr | 4th Qtr | 1995 TOTAL |
|--------------------------|------------|------------|------------|------------|---------------|
| a. Number of releases | 60 | 63 | 59 | 43 | 225 |
| Time Period (in minutes) | | | | | |
| b. Total for all batches | 16900 | 18330 | 17780 | 13173 | |
| c. Max time for a batch | 320 | 330 | 330 | 410 | |
| d. Avg time for a batch | 282 | 291 | 301 | 306 | |
| e. Min time for a batch | 1 | 130 | 250 | 210 | |

2. Gaseous

No batch releases were made during the report period.

F. Unplanned Releases

1. Liquid

No unplanned liquid releases occurred during the report period.

2. Gaseous

Five unplanned gaseous releases occurred via the Turbine Building smoke exhaust hatches in 1995. On two occasions (May and July), high winds forced hatches open. Three additional releases occurred (one in March, two in August) due to unknown cause(s). In September, a weakened hatch latch was repaired. No additional releases have occurred since September. Each of the unplanned releases was evaluated as a ground level release and documented. None had a significant effect on the total release from the site.

II. DETAILED INFORMATION (CONT'D)

G. Estimate of Total Error

1. Liquid

The maximum errors are collectively estimated to be

| | Fission & Activation Products | Tritium | Dissolved & Entrained Gases | Gross Alpha |
|--------------|-------------------------------------|------------|-----------------------------------|----------------|
| Sampling | 26% | 26% | 26% | 26% |
| Measurement | 68% | 65% | 61% | 92% |
| TOTAL | 73% | 70% | 66% | 95% |

Sampling errors include uncertainty associated with mixing, representative sampling and discharge volume. Measurement errors include uncertainty associated with instrument calibration and the preparation and counting of low-activity samples. Counting errors are based on measurements of blank samples and, for germanium detectors, the least-readily-detectable radioisotope. Calibration errors are calculated by summing the errors associated with the calibration of a particular instrument with a radioactive source.

Total error is calculated by taking the square root of the sum of the squares of the individual errors.

2. Gaseous

The maximum errors (not including sample line loss) are collectively estimated to be

| | Fission & Activation Products | Iodine | Particulate | Alpha | Gross Tritium |
|--------------|-------------------------------------|------------|-------------|-------------|------------------|
| Sampling | 32% | 23% | 22% | 22% | 23% |
| Measurement | 61% | 67% | 65% | 101% | 62% |
| TOTAL | 69% | 71% | 69% | 103% | 66% |

Sampling errors include uncertainty associated with sample flow, vent flow and monitor calibration.

Measurement errors include uncertainty associated with instrument calibration and preparation and counting of low-activity samples. Measurement and total errors are calculated by the same methods used for liquid effluents.

3. Solid Radioactive Waste

See Table 3 for error terms.

I. DETAILED INFORMATION (CONT'D)

H. Solid Radioactive Waste Shipments

See Table 3 for shipment information.

I. Meteorological Data

The annual summary (joint frequency distribution) will be maintained on site in a file that shall be provided to the NRC upon request.

J. Radioactive Effluent Monitoring Instrumentation Operability

No reportable instances of inoperability occurred during the report period.

K. Annual Sewage Disposal Summary

There was no sewage disposal in 1995.

III. RADIATION DOSE SUMMARY

Indicated below is the annual summary of offsite doses attributable to GGNS during 1994. Inspection of the values indicate that GGNS releases were within the 10CFR50, Appendix I design objectives.

Since there are no other fuel cycle facilities within 8 km of GGNS, 40CFR190 limits have also been met during this period.

All parameters listed were calculated in accordance with the GGNS ODCM.

A. Water-Related Exposure Pathways

The values calculated in this section utilize the information provided in Tables 2A and 2B of this report and the calculational methodology of the ODCM.

Liquid Effluents

Total body dose and critical organ doses are computed for the maximum exposed individual. The maximum dose contribution from liquid effluents is considered to occur in the adult age group via consumption of fish.

III. RADIATION DOSE SUMMARY (CONT'D)

1995 Liquid Effluent Dose (mrem)

| | 1st Qtr | 2nd Qtr | 3rd Qtr | 4th Qtr | TOTAL |
|------------|----------|----------|----------|----------|----------|
| Whole Body | 8.92E-03 | 1.82E-02 | 1.24E-02 | 9.26E-03 | 4.89E-02 |
| Bone | 8.55E-03 | 8.06E-03 | 7.95E-03 | 5.33E-03 | 2.99E-02 |
| Liver | 1.86E-02 | 3.57E-02 | 2.19E-02 | 1.76E-02 | 9.38E-02 |
| Thyroid | 2.66E-03 | 2.30E-03 | 1.70E-03 | 2.91E-03 | 9.57E-03 |
| Kidney | 5.22E-03 | 9.15E-03 | 5.45E-03 | 5.63E-03 | 2.54E-02 |
| Lung | 5.97E-03 | 5.43E-03 | 4.53E-03 | 5.00E-03 | 2.09E-02 |
| GI-LLI | 6.11E-02 | 1.66E-01 | 9.33E-02 | 6.59E-02 | 3.85E-01 |

B. Airborne-Related Exposure Pathways

The values presented in this section utilize information provided in Tables 1A and 1C of this report and the calculational methodology of the ODCM. Dose and dose rates are computed for locations at the site boundary or at unrestricted areas beyond the site boundary. Because members of the public may, on occasion, be found within the site boundary, locations within the site boundary were considered when selecting locations for dose calculations.

Consideration of site boundary locations as well as unrestricted areas within and beyond the site boundary provides assurance that offsite doses will not be substantially underestimated while attempting to provide an accurate dose calculation.

The most limiting location for a member of the public is used for the dose calculations.

Particulate, Radioiodine and Tritium

Organ dose rate from exposure to radioiodines, tritium and particulates are computed for an individual located at the site boundary.

Organ dose from exposure to radioiodines, tritium and particulates are computed for an individual located in the southwest sector at a distance of 0.89 miles. This location corresponds to a residence beyond the site boundary. Pathways considered for use in the organ dose calculations are inhalation, ground plane, grass/cow/meat and vegetation. There is no grass/cow/milk pathway within five miles of GGNS. Dose factors for the age group receiving the maximum dose are used in the calculation of organ dose and dose rate.

III. RADIATION DOSE SUMMARY (CONT'D)

Noble Gases

Gamma and beta air dose and individual total body and skin dose rates from exposure to a semi-infinite cloud of noble gas are computed for a location in the southwest sector at a distance of 0.85 miles. This location corresponds to the highest annual average atmospheric dispersion for a location at the site boundary.

The total body and skin dose rates reported are the quarterly average of the maximum instantaneous dose rates determined daily during the reporting period and would represent the maximum possible dose received by members of the public.

Direct Radiation

Direct radiation dose is calculated by subtracting average doses measured by thermoluminescent dosimeter (TLD) badges located at control locations from average doses measured by TLD badges located near the site boundary.

| | 1995 Airborne Effluent Dose (mrem) | | | | |
|---|------------------------------------|---------|---------|---------|---------|
| | 1st Qtr | 2nd Qtr | 3rd Qtr | 4th Qtr | TOTAL |
| Iodine, Tritium & Particulates | 1.12E-2 | 8.04E-3 | 1.96E-2 | 2.23E-2 | 6.13E-2 |
| Fission and Activation Gases (Total Body dose, mrem/yr) | 9.34E-3 | 1.30E-1 | 2.70E-1 | 2.75E-2 | |
| (Skin dose, mrem/yr) | 1.78E-2 | 2.12E-1 | 5.75E-1 | 5.26E-2 | |
| Gamma Air dose* | 2.38E-3 | 8.74E-3 | 1.01E-2 | 5.34E-3 | 2.66E-2 |
| Beta Air dose* | 2.58E-3 | 6.34E-3 | 1.28E-2 | 5.79E-3 | 2.75E-2 |
| Direct Radiation | 0.4 | 0 | 1 | 0.6 | 2.0 |

*Measurement units are mrad

IV. OFFSITE DOSE CALCULATION MANUAL/ RADIOACTIVE WASTE TREATMENT SYSTEM CHANGES

A. Offsite Dose Calculation Manual (ODCM)

Revision 17 was issued in March 1995 implementing changes resulting from Improved Technical Specifications and incorporating updated meteorological parameters (dispersion and deposition) used in calculation of gaseous effluent doses and noble gas monitor setpoints. [See Attachment I]

B. Radioactive Waste Treatment Systems

No major changes were made during the report period.

TABLE 1A
EFFLUENT AND DISPOSAL ANNUAL REPORT 1995
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES
JANUARY - JUNE 1995

| | Unit | Quarter | Quarter | Est Total |
|----------------------------|--------|---------|---------|-----------|
| Grand Gulf Nuclear Station | UNIT 1 | 1 | 2 | Error % |

A. Fission & Activation Gases

| | | | | |
|---------------------------------------|---------|----------|----------|----------|
| 1. Total release | Ci | 8.78E+00 | 9.88E+00 | 6.90E+01 |
| 2. Average release rate for period | uCi/sec | 1.12E+00 | 1.26E+00 | |
| 3. % of Technical specification limit | % | 4.76E-02 | 1.75E-01 | |

B. Iodines

| | | | | |
|---------------------------------------|---------|----------|----------|----------|
| 1. Total iodine-131 | Ci | 2.31E-07 | 3.78E-05 | 7.10E+01 |
| 2. Average release rate for period | uCi/sec | 2.93E-08 | 4.81E-06 | |
| 3. % of Technical specification limit | % | 4.78E-05 | 8.79E-03 | |

C. Particulates

| | | | | |
|--|---------|----------|----------|----------|
| 1. Particulates with half lives>8 days | Ci | 1.86E-05 | 5.89E-05 | 6.90E+01 |
| 2. Average release rate for period | uCi/sec | 2.37E-06 | 7.49E-06 | |
| 3. % of Technical specification limit | % | 1.75E-03 | 2.00E-03 | |
| 4. Gross alpha radioactivity | Ci | 1.59E-08 | 1.51E-08 | |

D. Tritium

| | | | | |
|---------------------------------------|---------|----------|----------|----------|
| 1. Total release | Ci | 1.16E+01 | 5.12E+00 | 6.60E+01 |
| 2. Average release rate for period | uCi/sec | 1.48E+00 | 6.51E-01 | |
| 3. % of Technical specification limit | % | 1.49E-01 | 9.64E-02 | |

E. Tritium, radioiodines and particulates

| | | | | |
|---------------------------------------|---|----------|----------|--|
| 1. % of Technical specification limit | % | 1.51E-01 | 1.07E-01 | |
|---------------------------------------|---|----------|----------|--|

TABLE 1A
EFFLUENT AND DISPOSAL ANNUAL REPORT 1995
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES
JULY - DECEMBER 1995

| | Unit | Quarter | Quarter | Est Total |
|----------------------------|--------|---------|---------|-----------|
| Grand Gulf Nuclear Station | UNIT 1 | 3 | 4 | Error % |

A. Fission & Activation Gases

| | | | | |
|---------------------------------------|---------|----------|----------|----------|
| 1. Total release | Ci | 2.80E+01 | 1.18E+01 | 6.90E+01 |
| 2. Average release rate for period | uCi/sec | 3.56E+00 | 1.50E+00 | |
| 3. % of Technical specification limit | % | 2.03E-01 | 1.07E-01 | |

B. Iodines

| | | | | |
|---------------------------------------|---------|----------|----------|----------|
| 1. Total iodine-131 | Ci | 7.72E-05 | 0.00E+00 | 7.10E+01 |
| 2. Average release rate for period | uCi/sec | 9.82E-06 | 0.00E+00 | |
| 3. % of Technical specification limit | % | 1.86E-02 | 0.00E+00 | |

C. Particulates

| | | | | |
|--|---------|----------|----------|----------|
| 1. Particulates with half-lives > 8 days | Ci | 1.72E-06 | 0.00E+00 | 6.90E+01 |
| 2. Average release rate for period | uCi/sec | 2.19E-07 | 0.00E+00 | |
| 3. % of Technical specification limit | % | 1.51E-05 | 0.00E+00 | |
| 4. Gross alpha radioactivity | Ci | 1.89E-08 | 2.60E-08 | |

D. Tritium

| | | | | |
|---------------------------------------|---------|----------|----------|----------|
| 1. Total release | Ci | 1.28E+01 | 1.58E+01 | 6.60E+01 |
| 2. Average release rate for period | uCi/sec | 1.63E+00 | 2.01E+00 | |
| 3. % of Technical specification limit | % | 2.43E-01 | 2.97E-01 | |

E. Tritium, radioiodines and particulates

| | | | | |
|---------------------------------------|---|----------|----------|--|
| 1. % of Technical specification limit | % | 2.61E-01 | 2.97E-01 | |
|---------------------------------------|---|----------|----------|--|

TABLE 1B
ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION

GASEOUS EFFLUENTS - ELEVATED RELEASES

(Not Applicable - GGNS releases are considered ground level)

TABLE 1C
ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION

EFFLUENT AND DISPOSAL ANNUAL REPORT 1995
GASEOUS EFFLUENTS - GROUND-LEVEL RELEASE
JANUARY - JUNE 1995

| | | CONTINUOUS MODE | | BATCH MODE | |
|-------------------|------|-----------------|----------|------------|----------|
| Nuclides Released | Unit | Quarter | Quarter | Quarter | Quarter |
| | | 1 | 2 | 1 | 2 |
| 1. Fission gases | | | | | |
| XE-133 | Ci | 4.11E+00 | 3.64E+00 | 0.00E+00 | 0.00E+00 |
| KR-88 | Ci | 1.75E-01 | 1.93E-01 | 0.00E+00 | 0.00E+00 |
| XE-135 | Ci | 3.93E+00 | 3.49E+00 | 0.00E+00 | 0.00E+00 |
| XE-138 | Ci | 1.05E-01 | 9.43E-01 | 0.00E+00 | 0.00E+00 |
| XE-135M | Ci | 4.63E-01 | 5.19E-01 | 0.00E+00 | 0.00E+00 |
| KR-87 | Ci | 0.00E+00 | 1.53E-01 | 0.00E+00 | 0.00E+00 |
| AR-41 | Ci | 0.00E+00 | 9.34E-01 | 0.00E+00 | 0.00E+00 |
| Total for period | Ci | 8.78E+00 | 9.88E+00 | 0.00E+00 | 0.00E+00 |
| 2. Iodines | | | | | |
| I-131 | Ci | 2.31E-07 | 3.78E-05 | 0.00E+00 | 0.00E+00 |
| I-132 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| I-133 | Ci | 0.00E+00 | 5.99E-05 | 0.00E+00 | 0.00E+00 |
| I-134 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| I-135 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Total for period | Ci | 2.31E-07 | 9.78E-05 | 0.00E+00 | 0.00E+00 |
| 3. Particulates | | | | | |
| H-3 | Ci | 1.16E+01 | 5.12E+00 | 0.00E+00 | 0.00E+00 |
| Sr-89 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Sr-90 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MN-54 | Ci | 2.27E-06 | 1.20E-05 | 0.00E+00 | 0.00E+00 |
| CO-60 | Ci | 1.27E-05 | 1.78E-05 | 0.00E+00 | 0.00E+00 |
| CO-58 | Ci | 0.00E+00 | 1.67E-06 | 0.00E+00 | 0.00E+00 |
| CR-51 | Ci | 3.69E-06 | 2.74E-05 | 0.00E+00 | 0.00E+00 |
| Total for period | Ci | 1.16E+01 | 5.12E+00 | 0.00E+00 | 0.00E+00 |

TABLE 1C
ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION

EFFLUENT AND DISPOSAL ANNUAL REPORT 1995
GASEOUS EFFLUENTS - GROUND-LEVEL RELEASE
JULY - DECEMBER 1995

| | | CONTINUOUS MODE | | BATCH MODE | |
|-------------------|------|-----------------|----------|------------|----------|
| Nuclides Released | Unit | Quarter | Quarter | Quarter | Quarter |
| | | 3 | 4 | 3 | 4 |
| 1. Fission gases | | | | | |
| XE-133 | Ci | 1.44E+01 | 5.54E+00 | 0.00E+00 | 0.00E+00 |
| KR-88 | Ci | 2.25E-01 | 2.34E-01 | 0.00E+00 | 0.00E+00 |
| XE-135 | Ci | 1.19E+01 | 5.24E+00 | 0.00E+00 | 0.00E+00 |
| XE-138 | Ci | 1.35E-01 | 1.40E-01 | 0.00E+00 | 0.00E+00 |
| XE-135M | Ci | 8.71E-01 | 6.18E-01 | 0.00E+00 | 0.00E+00 |
| KR-85M | Ci | 2.77E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| XE-133M | Ci | 3.48E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Total for period | Ci | 2.80E+01 | 1.18E+01 | 0.00E+00 | 0.00E+00 |
| 2. Iodines | | | | | |
| I-131 | Ci | 7.72E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| I-132 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| I-133 | Ci | 1.64E-04 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| I-134 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| I-135 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Total for period | Ci | 2.41E-04 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 3. Particulates | | | | | |
| H-3 | Ci | 1.28E+01 | 1.58E+01 | 0.00E+00 | 0.00E+00 |
| Sr-89 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Sr-90 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MN-54 | Ci | 1.09E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| CO-60 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| CR-51 | Ci | 6.34E-07 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Total for period | Ci | 1.28E+01 | 1.58E+01 | 0.00E+00 | 0.00E+00 |

TABLE 1D
ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION

RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM

| Gaseous Release Type | Sampling Frequency | Minimum Analysis Frequency | Type of Activity Analysis | Lower Limit of Detection (LLD) Required ($\mu\text{Ci/ml}$) ^a |
|--|----------------------------|--|---|--|
| A. (1) Radwaste Building Ventilation Exhaust | 31 Days Grab Sample (f) | 31 Days | Principal Gamma Emitters (b,e) | 1×10^{-4} |
| | | | H-3 | 1×10^{-6} |
| | Continuous (d) (f) | 7 Days (c) Charcoal Sample | I-131 | 1×10^{-12} |
| | | | I-133 | 1×10^{-10} |
| | Continuous (d) (f) | 7 Days (c) Particulate Sample | Principal Gamma Emitters (e) (I-131, Others) | 1×10^{-11} |
| | | | | |
| | Continuous (d) (f) | 31 Days Composite Particulate Sample | Gross Alpha | 1×10^{-11} |
| | | | | |
| | Continuous (d) (f) | 92 Days Composite Particulate Sample | Sr-89, Sr-90 | 1×10^{-11} |
| | | | | |
| | Continuous (f) | Noble Gas Monitor | Noble Gases Gross Beta or Gamma | 1×10^{-6} |
| B. (1) Offgas Post Treatment Exhaust, whenever there is flow | 31 Days Grab Sample (f) | 31 Days | Principal Gamma Emitters(e) | 1×10^{-4} |
| (2) Standby Gas Treatment A Exhaust, whenever there is flow | | | | |
| (3) Standby Gas Treatment B Exhaust, whenever there is flow | | | | |

NOTE: Footnotes indicated are listed in GGNS ODCM, Appendix A, Table 6.11.4-1.

TABLE 2A
ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION

LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES
JANUARY - JUNE 1995

| | Unit | Quarter 1 | Quarter 2 | Est Total Error % |
|---|--------|--------------|--------------|----------------------|
| A. Fission & activation products | | | | |
| 1. Total release (not including H3, gases, alpha) | Ci | 7.94E-02 | 1.20E-01 | 7.30E+01 |
| 2. Average diluted concentration during period | uCi/ml | 1.70E-07 | 1.99E-07 | |
| 3. Percent of applicable limit | % | 1.54E-01 | 3.40E-01 | |
| B. Tritium | | | | |
| 1. Total release | Ci | 3.75E+01 | 2.65E+01 | 7.00E+01 |
| 2. Average diluted concentration during period | uCi/ml | 8.05E-05 | 4.40E-05 | |
| 3. Percent of applicable limit | % | 8.05E-01 | 4.40E-01 | |
| C. Dissolved and entrained gases | | | | |
| 1. Total release | Ci | 3.28E-05 | 1.31E-04 | 6.60E+01 |
| 2. Average diluted concentration during period | uCi/ml | 7.04E-11 | 2.18E-10 | |
| 3. Percent of applicable limit | % | 1.01E-03 | 3.11E-03 | |
| D. Gross alpha radioactivity | | | | |
| 1. Total release | Ci | 0.00E+00 | 0.00E+00 | 9.50E+01 |
| E. Volume of waste (prior to dilution) | | | | |
| | liters | 5.83E+06 | 6.30E+06 | 5.00E+00 |
| F. Volume of dilution water used | | | | |
| | liters | 4.60E+08 | 5.96E+08 | 5.00E+00 |

TABLE 2A
ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION

LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES
JULY - DECEMBER 1995

| | Unit | Quarter 3 | Quarter 4 | Est Total Error % |
|---|--------|--------------|--------------|----------------------|
| A. Fission & activation products | | | | |
| 1. Total release (not including H3, gases, alpha) | Ci | 9.52E-02 | 5.79E-02 | 7.30E+01 |
| 2. Average diluted concentration during period | uCi/ml | 1.72E-07 | 1.72E-07 | |
| 3. Percent of applicable limit | % | 2.47E-01 | 2.05E-01 | |
| B. Tritium | | | | |
| 1. Total release | Ci | 2.83E+01 | 3.98E+01 | 7.00E+01 |
| 2. Average diluted concentration during period | uCi/ml | 5.12E-05 | 1.15E-04 | |
| 3. Percent of applicable limit | % | 5.12E-01 | 1.15E+00 | |
| C. Dissolved and entrained gases | | | | |
| 1. Total release | Ci | 4.61E-05 | 1.03E-05 | 6.60E+01 |
| 2. Average diluted concentration during period | uCi/ml | 8.33E-11 | 3.04E-11 | |
| 3. Percent of applicable limit | % | 1.22E-03 | 4.35E-04 | |
| D. Gross alpha radioactivity | | | | |
| 1. Total release | Ci | 0.00E+00 | 0.00E+00 | 9.50E+01 |
| E. Volume of waste (prior to dilution) | liters | 6.07E+06 | 4.52E+06 | 5.00E+00 |
| F. Volume of dilution water used | liters | 5.47E+08 | 3.33E+08 | 5.00E+00 |

TABLE 2B
ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION

LIQUID EFFLUENTS - CONTINUOUS AND BATCH MODES
JANUARY - JUNE 1995

| Nuclides Released | Unit | CONTINUOUS MODE | | BATCH MODE | |
|--------------------------|------|-----------------|----------|------------|----------|
| | | Quarter | Quarter | Quarter | Quarter |
| | | 1 | 2 | 1 | 2 |
| strontium-89 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| strontium-90 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| cesium-134 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| cesium-137 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| iodine-131 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | | | | | |
| cobalt-58 | Ci | 0.00E+00 | 0.00E+00 | 1.17E-03 | 5.00E-03 |
| cobalt-60 | Ci | 0.00E+00 | 0.00E+00 | 1.83E-02 | 5.84E-02 |
| iron-59 | Ci | 0.00E+00 | 0.00E+00 | 2.54E-05 | 4.54E-04 |
| zinc-65 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| manganese-54 | Ci | 0.00E+00 | 0.00E+00 | 6.51E-03 | 1.82E-02 |
| chromium-51 | Ci | 0.00E+00 | 0.00E+00 | 1.21E-02 | 4.89E-03 |
| | | | | | |
| zirconium-niobium-95 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| molybdenum-99 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| technetium-99m | Ci | 0.00E+00 | 0.00E+00 | 2.98E-06 | 6.70E-06 |
| barium-lanthanum-140 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| cerium-141 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | | | | | |
| Sb-125 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.49E-04 |
| Cu-64 | Ci | 0.00E+00 | 0.00E+00 | 8.95E-05 | 4.94E-04 |
| As-76 | Ci | 0.00E+00 | 0.00E+00 | 3.96E-05 | 2.35E-04 |
| Mn-56 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.26E-05 |
| Ag-110m | Ci | 0.00E+00 | 0.00E+00 | 4.12E-05 | 6.08E-05 |
| Na-24 | Ci | 0.00E+00 | 0.00E+00 | 2.49E-05 | 3.40E-05 |
| Sb-124 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 7.38E-05 |
| Fe-55 | Ci | 0.00E+00 | 0.00E+00 | 4.11E-02 | 3.20E-02 |
| | | | | | |
| Total for period (above) | Ci | 0.00E+00 | 0.00E+00 | 7.94E-02 | 1.20E-01 |
| | | | | | |
| xenon-133 | Ci | 0.00E+00 | 0.00E+00 | 8.87E-06 | 2.61E-05 |
| xenon-135 | Ci | 0.00E+00 | 0.00E+00 | 2.39E-05 | 1.05E-04 |
| Xe-133m | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

TABLE 2B
ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION

LIQUID EFFLUENTS - CONTINUOUS AND BATCH MODES
JULY - DECEMBER 1995

| Nuclides Released | Unit | CONTINUOUS MODE | | BATCH MODE | |
|--------------------------|------|-----------------|----------|------------|----------|
| | | Quarter | Quarter | Quarter | Quarter |
| | | 3 | 4 | 3 | 4 |
| strontium-89 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| strontium-90 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| cesium-134 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| cesium-137 | Ci | 0.00E+00 | 0.00E+00 | 1.49E-05 | 0.00E+00 |
| iodine-131 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | | | | | |
| cobalt-58 | Ci | 0.00E+00 | 0.00E+00 | 2.66E-03 | 8.29E-04 |
| cobalt-60 | Ci | 0.00E+00 | 0.00E+00 | 3.84E-02 | 1.92E-02 |
| iron-59 | Ci | 0.00E+00 | 0.00E+00 | 5.38E-04 | 3.36E-04 |
| zinc-65 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| manganese-54 | Ci | 0.00E+00 | 0.00E+00 | 8.82E-03 | 6.36E-03 |
| chromium-51 | Ci | 0.00E+00 | 0.00E+00 | 9.11E-03 | 7.32E-03 |
| | | | | | |
| zirconium-niobium-95 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| molybdenum-99 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| technetium-99m | Ci | 0.00E+00 | 0.00E+00 | 1.52E-05 | 2.78E-06 |
| barium-lanthanum-140 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| cerium-141 | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | | | | | |
| Sb-125 | Ci | 0.00E+00 | 0.00E+00 | 9.93E-06 | 0.00E+00 |
| Cu-64 | Ci | 0.00E+00 | 0.00E+00 | 1.04E-04 | 5.43E-05 |
| As-76 | Ci | 0.00E+00 | 0.00E+00 | 1.44E-05 | 0.00E+00 |
| Ag-110m | Ci | 0.00E+00 | 0.00E+00 | 1.06E-04 | 2.24E-05 |
| Na-24 | Ci | 0.00E+00 | 0.00E+00 | 3.28E-06 | 0.00E+00 |
| Sb-124 | Ci | 0.00E+00 | 0.00E+00 | 6.35E-06 | 0.00E+00 |
| Fe-55 | Ci | 0.00E+00 | 0.00E+00 | 3.54E-02 | 2.38E-02 |
| | | | | | |
| Total for period (above) | Ci | 0.00E+00 | 0.00E+00 | 9.52E-02 | 5.79E-02 |
| | | | | | |
| xenon-133 | Ci | 0.00E+00 | 0.00E+00 | 2.42E-05 | 0.00E+00 |
| xenon-135 | Ci | 0.00E+00 | 0.00E+00 | 2.19E-05 | 1.03E-05 |
| Xe-133m | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

TABLE 2C
ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

| Liquid Release Type | Sampling Frequency | Minimum Analysis Frequency | Type of Activity Analysis | Lower Limit of Detection (LLD) (μCi/ml) (a) ^a |
|----------------------------------|--------------------------------|--------------------------------|--|--|
| A. Batch Waste Release Tanks (c) | Prior to Release Each Batch | Prior to Release Each Batch | Principal Gamma Emitters (d) | 5x10 ⁻⁷ |
| | | | I-131 | 1x10 ⁻⁶ |
| | Prior to Release One Batch /M | 31 Days | Dissolved and Entrained Gases (Gamma Emitters) | 1x10 ⁻⁵ |
| | Prior to Release Each Batch | 31 Days Composite (b) | H-3 | 1x10 ⁻⁵ |
| | | | Gross Alpha | 1x10 ⁻⁷ |
| | Prior to Release Each Batch | 92 Days Composite (b) | Sr-89, Sr-90 | 5x10 ⁻⁸ |
| | | | Fe-55 | 1x10 ⁻⁶ |
| | B. SSW Basin (before blowdown) | Prior to Release Each Blowdown | Prior to Release Each Batch | Principal Gamma Emitters(d) |
| I-131 | | | | 1x10 ⁻⁶ |

NOTE: Footnotes indicated are listed in GGNS ODCM, Appendix A, Table 6.11.1-1.

TABLE 3
ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION

SOLID RADIOACTIVE WASTE AND IRRADIATED FUEL SHIPMENTS
JANUARY - DECEMBER 1995

A. Solid Waste Shipped Offsite for Burial or Disposal

1.

| Type of Waste | Unit | 1st Qtr | 2nd Qtr | 3rd Qtr | 4th Qtr | Estimate Total Error (%) |
|--|-----------------------|----------------------|----------------------|----------------------|----------------------|--------------------------------|
| a. Spent resins, filter, sludges, oil, evaporator bottoms, etc. | m ³ *Ci | 2.34E+01 2.86E+02 | 1.35E+02 8.28E+02 | 6.04E+01 3.08E+02 | 1.53E+01 4.00E+01 | 7.2E+01 |
| b. Dry compressible waste, contaminated equipment, etc. | m ³ *Ci | 3.95E+00 1.28E-01 | 1.99E+01 4.75E+00 | 1.07E+00 7.41E-01 | 8.21E+00 5.84E+01 | 6.9E+01 |
| c. Irradiated components, control rods, etc. | m ³ *Ci | None | None | None | None | N/A |
| d. Other | m ³ *Ci | None | None | None | None | N/A |

*Total curie quantity determined by measurement. Total volume used is burial container volume. All solid waste was Class "A" as defined by 10CFR Part 61.

2. Estimate of major radionuclide composition (by type of waste as identified above)

| | 1st Qtr | 2nd Qtr | 3rd Qtr | 4th Qtr |
|------------|------------|------------|------------|------------|
| a. Fe-55 | 72% | 75% | 73% | 76% |
| Co-60 | 13% | 10% | 13% | 10% |
| Mn-54 | 8% | 8% | 7% | 7% |
| Cr-51 | 2% | 3% | 2% | 2% |
| C-14 | 3% | 2% | 3% | 3% |
| H-3 | 1% | 1% | 1% | 1% |
| All Others | <1% | 1% | <1% | <1% |
| b. Fe-55 | 76% | 72% | 75% | 74% |
| Mn-54 | 12% | 12% | 12% | 13% |
| Co-60 | 8% | 8% | 7% | 6% |
| Cr-51 | 3% | 4% | 4% | 3% |
| All Others | 1% | 4% | 2% | 4% |
| c. N/A | N/A | N/A | N/A | N/A |
| d. N/A | N/A | N/A | N/A | N/A |

TABLE 3
ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION

SOLID RADIOACTIVE WASTE AND IRRADIATED FUEL SHIPMENTS (CONT'D)
JANUARY - DECEMBER 1995

A. Solid Waste Shipped Offsite for Burial or Disposal (Cont'd)

3. Solid Waste Disposition

- a. Resins were dewatered in steel liners or High Integrity Containers ILSAO according to the requirements of the GGNS PCP and shipped to Barnwell, South Carolina, for burial. Some resin was shipped to Scientific Ecology Group (SEG) of Oak Ridge, Tennessee, for volume reduction. SEG shipped reduced waste to Barnwell, South Carolina. Reduced resin was solidified with Portland Cement and shipped in liners and High Integrity Containers (LSA).
- b. DAW was packaged in 20' sealand containers and shipped to Scientific Ecology Group (SEG) of Oak Ridge, Tennessee, for volume reduction. SEG shipped reduced waste to Barnwell, South Carolina. Reduced volume was used in providing information given in A.1.b.
- c. No irradiated components were shipped.
- d. No waste in this category.

| <u>Number of Shipments</u> | <u>Mode of Transportation</u> | <u>Destination</u> |
|----------------------------|-------------------------------|--------------------|
| 13 | Truck | Barnwell, SC |

B. Irradiated Fuel Shipments (Disposition)

| <u>Number of Shipments</u> | <u>Mode of Transportation</u> | <u>Destination</u> |
|----------------------------|-------------------------------|--------------------|
| None | N/A | N/A |

C. Annual Sewage Sludge Summary

| <u>Number of Shipments</u> | <u>Total Gallons</u> | <u>Average Co-60 Activity (pCi/l)</u> | <u>Average Mn-54 Activity (pCi/l)</u> |
|----------------------------|----------------------|---|---|
|----------------------------|----------------------|---|---|

No sewage was disposed of during 1995.

ATTACHMENT I

OFFSITE DOSE CALCULATION MANUAL

REVISION 17