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GNRO-2009/00041

July 9, 2009

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

SUBJECT: Grand Gulf Nuclear Station (GGNS) 2008 Annual Radioactive Effluent Release Report (ARERR) – Corrected Copy

Grand Gulf Nuclear Station, Unit 1
Docket No. 50-416
License No. NPF-29

REFERENCES: 1. GNRO-2009/00026, Grand Gulf Nuclear Station (GGNS) 2008 Annual Radioactive Effluent Release Report (ARERR), Submitted April 28, 2009

Dear Sir or Madam:

Attached is a corrected copy of the GGNS Annual Radioactive Effluent Release Report for the period January 1, 2008 through December 31, 2008. This report was previously submitted via a letter dated April 28, 2009 (GNRO-2009/00026). The corrected page is page 14 and the corrected information is annotated with a revision bar. Specifically the 2008 Airborne Effluent Dose (mrem) direct radiation as determined by thermoluminescent dosimeter (TLD) quarterly totals were corrected and the reported total value was changed from 2.7 to 3.8 mrem. A copy of the GGNS Offsite Dose Calculation Manual was also previously submitted via the letter dated April 28, 2009 and requires no correction.

This letter does not contain any commitments.

If you have questions or require additional information concerning these reports, please contact Mr. Richard Scarbrough at (601) 437-6978 or Michael Larson at (601) 437-6685.

Sincerely,

for C. L. Perino

CLP/MJL

Attachment: Annual Radioactive Effluent Release Report – Corrected Copy

cc: (See Next Page)

cc:

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ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION

ANNUAL
RADIOACTIVE EFFLUENT RELEASE REPORT

January 1, 2008 - December 31, 2008

/ 4-21-09

Prepared By

/ 4-22-09

Reviewed By

/ 4-22-09

Approved By

Corrected Copy
July 9, 2009
Page 14 Only

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I. INTRODUCTION

This Annual Radioactive Effluent Release Report (ARERR) for the period of January 1 through December 31, 2008 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.

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

II. DETAILED INFORMATION

A. Regulatory Limits

1. 10CFR20 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)

$= \overline{X/Q}\, \Sigma_i K_i\, Q_i' \leq 500$ mrem/yr

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

$= \overline{X/Q}\, \Sigma_i (L_i + 1.1\, M_i)\, Q_i' \leq 3000$ 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)

$= \Sigma_i W P_i \overline{Q'_i} \leq 1500$ 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

$$= 3.17 \times 10^{-6} \Sigma_i M_i \overline{X/Q'} Q_i \leq 5 \text{ mrad/qtr}$$

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

D_β = air dose due to beta emissions from noble gases

$$= 3.17 \times 10^{-6} \Sigma_i N_i \overline{X/Q'} Q_i \leq 10 \text{ mrad/qtr}$$

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

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)

$$= 3.17 \times 10^{-6} \Sigma_i R_i W' Q_i \leq 7.5 \text{ mrem/qtr Any Organ}$$

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

where the terms are defined in the GGNS ODCM.

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

$$D_{Tau} = \sum_i [A_{iTau} \sum_{i=1}^{m} \Delta t_i C_{it} F_i] \leq 1.5 \text{ mrem/qtr Total Body}$$

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

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

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

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:

Fission and Activation Gases	Particulates
Radioiodines	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:

Kr-87	Xe-133	Xe-135
Kr-88	Xe-133m	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:

$$C_i = U_i \div m$$

where

C_i = isotopic calibration factor for isotope i

U_i = concentration of isotope i in the grab sample in μCi/ml.

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

II. DETAILED INFORMATION (CONT'D)

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
Mn-54	Cs-134
Fe-59	Cs-137
Co-58	Ce-141
Co-60	Ce-144
Sr-89	I-131
Sr-90	
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 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 6.11.4-1). Currently, Strontium analysis is performed by a qualified contract laboratory.

4. For Batch Releases: Gases

The processing of batch type releases (from Containment Purge or Turbine Building Occasional Release Point) are analogous to that for continuous releases.

II. DETAILED INFORMATION (CONT'D)

5. For Batch Releases: Liquid Effluents

The radionuclides listed below are considered when evaluating liquid effluents:

H-3	Sr-90
Mn-54	Mo-99
Fe-55	I-131
Co-58	Cs-134
Co-60	Cs-137
Fe-59	Ce-141
Zn-65	Ce-144
Sr-89	

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 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

	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Year
a. Number of releases	61	78	87	86	312
Time Period (in minutes)					
b. Total for all batches	1.96E+04	2.50E+04	2.78E+04	2.73E+04	9.97E+04
c. Max time for a batch	4.25E+02	4.16E+02	4.30E+02	4.30E+02	4.30E+02
d. Avg time for a batch	3.21E+02	3.20E+02	3.20E+02	3.17E+02	3.20E+02
e. Min time for a batch	2.53E+02	2.60E+02	1.10E+02	2.30E+02	1.10E+02

2. Gaseous

No batch releases were made during the report period.

II. DETAILED INFORMATION (CONT'D)

F. Abnormal Releases

1. Liquid

   a. Number of Releases: 0

   b. Total Activity Released: 0.00E+00 Ci

2. Gaseous

   a. Number of Releases: 3

   b. Total Activity Released: 1.02E-1 Ci

On March 19, 2008, one Turbine Building smoke exhaust hatch was found opened. Calculated activity released was 2.32E-03 Ci. The dose and specific activities are included in the applicable sections of this report.

On November 17, 2008, Turbine Building smoke exhaust hatches were opened to vent smoke following a fire. Calculated activity released was 5.38E-04 Ci. The dose and specific activities are included in the applicable sections of this report.

On August 21, 2008, a Kr-85 gas source was found to be broken on receipt inspection. Calculated activity released was 9.91E-02 Ci. The dose and specific activities are included in the applicable sections of this report.

G. Estimate of Total Error

1. Liquid

The maximum errors are collectively estimated to be as follows:

	Fission & Activation Products	Tritium	Dissolved & Entrained Gases	Gross Alpha
Sampling %	2.60E+01	2.60E+01	2.60E+01	2.60E+01
Measurement %	6.80E+01	6.50E+01	6.10E+01	9.20E+01
TOTAL %	7.30E+01	7.00E+01	6.60E+01	9.50E+01

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.

II. DETAILED INFORMATION (CONT'D)

2. Gaseous

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

	Fission & Activation Products	Iodine	Particulate	Alpha	Gross Tritium
Sampling %	3.20E+01	2.30E+01	2.20E+01	2.20E+01	2.30E+01
Measurement %	6.10E+01	6.70E+01	6.50E+01	1.01E+02	6.20E+01
TOTAL %	6.90E+01	7.10E+01	6.90E+01	1.03E+02	6.60E+01

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.

H. Solid Radioactive Waste Shipments

See Table 3 for shipment information.

I. Meteorological Data

The data recovery for the reporting period was 99.5%. The predominant wind direction was from the North-East approximately 10.7% of the time. The predominant stability class was class "D" approximately 32.3% of the time. Average wind speed during the reporting period was approximately 4.5 miles per hour.

The annual meteorological data (Hourly Average Data or 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 reporting period.

K. Annual Sewage Disposal Summary

There were no sewage disposals in 2008.

III. RADIATION DOSE SUMMARY

Indicated below is the annual summary of offsite doses attributable to GGNS during 2008. 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.

2008 Liquid Effluent Dose (mrem)

	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	TOTAL
Bone	3.89E-02	1.88E-02	5.17E-02	1.04E-01	2.15E-01
Liver	1.19E-01	4.47E-02	7.61E-02	2.16E-01	4.57E-01
Thyroid	4.72E-03	6.03E-03	2.91E-03	2.57E-03	1.60E-02
Kidney	7.40E-02	2.58E-02	4.58E-02	1.41E-01	2.88E-01
Lung	3.47E-03	4.89E-03	4.84E-03	3.51E-03	1.67E-02
GI-LLI	1.44E-01	4.76E-02	6.17E-02	1.60E-01	4.15E-01
Whole Body	5.31E-02	2.01E-02	4.05E-02	1.04E-01	2.19E-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.

During routine operations the dispersion and deposition factors used for dose calculations are from historical annual average meteorological data.

III. RADIATION DOSE SUMMARY (CONT'D)

Organ Dose

The maximum organ dose to a MEMBER OF THE PUBLIC (critical receptor) from radioiodines, tritium and particulates was calculated for this report using the most recent land use census and dispersion and deposition parameters from 2008 meteorological data. The critical receptor residence was determined to be located in the southwest sector at a distance of 1432 meters (0.89 miles) from the plant. 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. It was assumed that the age group receiving the maximum dose lived at the residence and that the receptor consumed food products that were raised or produced at the residence.

Average Total Body and Skin Dose Rate

Individual total body and skin dose rates from exposure to a semi-infinite cloud of noble gas are computed for a location in the south sector at a distance of 644 meters (0.40 miles) from the plant. This location corresponds to the highest annual average atmospheric dispersion factor for a location at an unrestricted area within 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 rate received by members of the public.

Air Dose From Gamma and Beta Emissions

Air doses from gaseous effluents were calculated for this report using dispersion parameters from the 2008 meteorological data. The highest dispersion factor for an unrestricted area was in the south sector within the site boundary, 644 meters (0.40 miles) from the plant.

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. GGNS reported measured doses in 2008 as net exposure normalized to 92 days.

2008 Airborne Effluent Dose (mrem)					
	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	TOTAL
Iodine, Tritium & Particulates	1.65E-01	5.77E-03	2.95E-02	1.71E-02	2.18E-01
Percent of Limit	2.20E+00	7.70E-02	3.94E-01	2.28E-01	1.45E+00
Total Body Dose Rate (mrem/yr)	1.28E-01	2.93E-01	2.46E-01	7.99E-01	
Percent of Limit	0.026%	0.059%	0.049%	0.160%	
Skin Dose Rate (mrem/yr)	2.87E-01	4.40E-01	5.16E-01	1.86E+00	
Percent of Limit	0.010%	0.015%	0.017%	0.062%	
Gamma Air Dose*	9.66E-02	5.53E-02	6.62E-02	1.03E-01	3.21E-01
Percent of Limit	1.93E+00	1.11E+00	1.32E+00	2.05E+00	3.21E+00
Beta Air Dose*	6.00E-02	2.45E-02	3.36E-02	1.21E-01	2.39E-01
Percent of Limit	6.00E-01	2.45E-01	3.36E-01	1.21E+00	1.20E+00
Direct Radiation (mrem)	1.200E+00	1.40E+00	0.00E+00	1.10E+00	3.80E+00

*Measurement units are mrad

Corrected Page
July 9, 2009

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

A. Offsite Dose Calculation Manual (ODCM)

Revision 36 to the ODCM was issued during the reporting period. The changes are summarized below.

Revision 36: Adds Table 2.2-1.b, "Pathway Dose Factors for LCO 6.11.4 and Section 2.2.1.b, (Pi)", for age group "Child".
Changes note for section 2.2.1.b to use Child Inhalation Pi values from table 2.2-1b.

B. Radioactive Waste Treatment Systems

No major changes were made to the liquid or gaseous radwaste treatment systems in 2008.

TABLE 1A
ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION UNIT 1

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
GASEOUS EFFLUENTS – SUMMATION OF ALL RELEASES

REPORT FOR 2008	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Gases						
1. Total Release	Ci	1.75E+02	6.47E+01	8.76E+01	1.16E+02	4.43E+02
2. Avg. Release Rate	uCi/sec	2.22E+01	8.24E+00	1.10E+01	1.45E+01	1.40E+01
3. Percent of TS Limit	%	1.93e+00	1.11E+00	1.32E+00	2.05E+00	3.21E+00
Iodine-131						
1. Total Release	Ci	9.38E-03	1.42E-04	1.36E-03	9.11E-04	1.18E-02
2. Avg. Release Rate	uCi/sec	1.19E-03	1.81E-05	1.71E-04	1.15E-04	3.73E-04
3. Percent of TS Limit	%	2.05E+00	3.11E-02	2.96E-01	1.99E-01	1.29E+00
Particulates Half Life >= 8 days						
1. Total Release	Ci	9.13E-05	3.61E-05	7.75E-06	1.56E-05	1.51E-04
2. Avg. Release Rate	uCi/sec	1.16E-05	4.59E-06	9.76E-07	1.97E-06	4.77E-06
3. Percent of TS Limit	%	1.14E-01	1.65E-02	6.25E-02	7.13E-03	1.00E-01
Tritium						
1. Total Release	Ci	3.29E+00	2.40E+00	2.85E+00	1.77E+00	1.03E+01
2. Avg. Release Rate	uCi/sec	4.19E-01	3.05E-01	3.59E-01	2.23E-01	3.26E-01
3. Percent of TS Limit	%	4.03E-02	2.94E-02	3.49E-02	2.17E-02	6.32E-02
Gross Alpha Radioactivity						
1. Total Release	Ci	2.21E-08	0.00E+00	1.77E-08	1.48E-08	5.47E-08
2. Avg. Release Rate	uCi/sec	2.81E-09	0.00E+00	2.23E-09	1.87E-09	1.73E-09

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

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
GASEOUS EFFLUENTS – ELEVATED RELEASES
JANUARY – DECEMBER 2008

(Not Applicable – GGNS Releases Are Considered Ground-Level)

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

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
GASEOUS EFFLUENTS – GROUND-LEVEL RELEASE-CONTINUOUS

REPORT FOR 2008	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Gases						
AR-41	Ci	4.12E+00	7.92E+00	3.57E+00	4.16E-01	1.60E+01
KR-85	Ci	0.00E+00	0.00E+00	9.91E-02	0.00E+00	9.91E-02
KR-85M	Ci	4.47E+01	2.21E+01	7.82E+00	2.06E+00	7.67E+01
KR-87	Ci	1.64E-01	0.00E+00	0.00E+00	2.03E+00	2.20E+00
KR-88	Ci	1.38E+01	9.11E+00	1.89E+00	1.01E+00	2.58E+01
KR-89	Ci	0.00E+00	0.00E+00	0.00E+00	6.53E+00	6.53E+00
XE-133	Ci	6.63E+01	9.20E+00	1.02E+01	1.01E+01	9.58E+01
XE-133M	Ci	1.66E-01	0.00E+00	0.00E+00	0.00E+00	1.66E-01
XE-135	Ci	1.08E+01	4.81E+00	1.26E+01	1.36E+01	4.18E+01
XE-135M	Ci	2.27E+01	9.84E+00	3.63E+01	2.27E+01	9.15E+01
XE-137	Ci	1.46E+00	0.00E+00	0.00E+00	2.87E+01	3.02E+01
XE-138	Ci	1.07E+01	1.73E+00	1.50E+01	2.84E+01	5.59E+01
Totals for Period...	Ci	1.75E+02	6.47E+01	8.76E+01	1.16E+02	4.43E+02
Iodines						
I-131	Ci	9.38E-03	1.42E-04	1.36E-03	9.11E-04	1.18E-02
I-133	Ci	9.86E-03	1.14E-03	5.26E-03	5.97E-04	1.69E-02
I-135	Ci	1.14E-04	1.62E-03	9.13E-04	1.20E-04	2.77E-03
Totals for Period...	Ci	1.94E-02	2.90E-03	7.53E-03	1.63E-03	3.14E-02
Particulates Half Life >= 8 days						
BA-140	Ci	1.25E-06	0.00E+00	0.00E+00	3.92E-06	5.17E-06
CE-141	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CO-58	Ci	2.72E-06	1.28E-06	0.00E+00	8.12E-07	4.81E-06
CO-60	Ci	4.58E-06	2.07E-06	1.22E-06	2.36E-06	1.02E-05
CR-51	Ci	7.21E-05	1.25E-05	2.05E-06	0.00E+00	8.67E-05
CS-137	Ci	0.00E+00	0.00E+00	5.69E-08	1.20E-06	1.26E-06
FE-59	Ci	0.00E+00	4.78E-06	0.00E+00	0.00E+00	4.78E-06
MN-54	Ci	1.58E-06	6.32E-06	0.00E+00	2.21E-06	1.01E-05
RU-106	Ci	0.00E+00	3.93E-06	0.00E+00	0.00E+00	3.93E-06
SR-89	Ci	9.04E-06	5.23E-06	4.42E-06	1.16E-06	1.99E-05
ZN-65	Ci	0.00E+00	0.00E+00	0.00E+00	3.98E-06	3.98E-06
Totals for Period...	Ci	9.13E-05	3.61E-05	7.75E-06	1.56E-05	1.51E-04
Tritium						
H-3	Ci	3.29E+00	2.40E+00	2.85E+00	1.77E+00	1.03E+01
Totals for Period...	Ci	3.29E+00	2.40E+00	2.85E+00	1.77E+00	1.03E+01
Gross Alpha Radioactivity						
ALPHA	Ci	2.21E-08	0.00E+00	1.77E-08	1.48E-08	5.47E-08
Totals for Period...	Ci	2.21E-08	0.00E+00	1.77E-08	1.48E-08	5.47E-08

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

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
Radioactive Gaseous Waste Sampling and Analysis Program
JANUARY – DECEMBER 2008

Gaseous Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD) (uCi/ml)[a]
A. (1) Radwaste Building Ventilation Exhaust	31 Days Grab Sample (f)	31 Days	Principal Gamma Emitters (b,e) H-3	$1x10^{-4}$ $1X10^{-6}$
(2) Fuel Handling Area Ventilation Exhaust	Continuous (d)(f)	7 Days (c) Charcoal Sample	I-131 I-133	$1x10^{-12}$ $1x10^{-10}$
(3) Containment Ventilation Exhaust	Continuous (d)(f)	7 Days (c) Particulate Sample	Principal Gamma Emitters (e) (I-131, Others)	$1x10^{-11}$
(4A) Turbine Building Ventilation Exhaust (4B) Turbine Building Occasional Release Point (when in service)	Continuous (d)(f)	31 Days Composite Particulate Sample	Gross Alpha	$1x10^{-11}$
	Continuous (d)(f)	92 Days Composite Particulate Sample	Sr-89, Sr-90	$1x10^{-11}$
	Continuous (f)	Noble Gas Monitor	Noble Gases Gross Beta or Gamma	$1x10^{-6}$
B. (1) Offgas Post Treatment Exhaust, whenever there is flow	31 Days Grab Sample (f)	31 Days	Principal Gamma Emitters (e)	$1x10^{-4}$
(2) Standby Gas Treatment A Exhaust, whenever there is flow	31 Days Grab Sample (f)	31 Days	Principal Gamma Emitters(e)	$1x10^{-4}$
(3) Standby Gas Treatment B Exhaust, whenever there is flow	31 Days Grab Sample (f)	31 Days	Principal Gamma Emitters(e)	$1x10^{-4}$

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

TABLE 2A
ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION UNIT 1

RADIOACTIVE EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
LIQUID EFFLUENTS – SUMMATION OF ALL RELEASES

REPORT FOR 2008	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Products						
1. Total Release	Ci	2.02E-01	7.02E-02	5.26E-02	4.62E-02	3.71E-01
2. Avg. Diluted Conc.	uCi/ml	3.87E-07	1.20E-07	6.66E-08	6.71E-08	1.43E-07
3. Percent of Limit	%	3.54E+00	1.34E+00	2.70E+00	6.95E+00	7.30E+00
Tritium						
1. Total Release	Ci	1.64E+01	2.30E+01	3.26E+01	2.69E+01	9.90E+01
2. Avg. Diluted Conc.	uCi/ml	3.15E-05	3.95E-05	4.13E-05	3.90E-05	3.83E-05
3. Percent of Limit	%	3.15E-01	3.95E-01	4.13E-01	3.90E-01	3.83E-01
Dissolved and Entrained Gases						
1. Total Release	Ci	4.63E-03	5.60E-03	4.70E-03	2.44E-03	1.74E-02
2. Avg. Diluted Conc.	uCi/ml	8.88E-09	9.59E-09	5.95E-09	3.54E-09	6.72E-09
3. Percent of Limit	%	4.44E-03	4.80E-03	2.98E-03	1.77E-03	3.36E-03
Gross Alpha Radioactivity						
1. Total Release	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Volume of liquid waste	liters	6.83E+06	8.61E+06	9.64E+06	9.36E+06	3.44E+07
Volume of dil. water	liters	5.15E+08	5.75E+08	7.80E+08	6.80E+08	2.55E+09

TABLE 2B
ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION UNIT 1

RADIOACTIVE EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
LIQUID EFFLUENTS – CONTINUOUS AND BATCH MODES

REPORT FOR 2008	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Products						
AG-110M	Ci	9.49E-04	1.08E-03	7.84E-04	5.03E-04	3.31E-03
AS-76	Ci	1.89E-04	0.00E+00	1.05E-04	0.00E+00	2.94E-04
BA-140	Ci	3.68E-05	0.00E+00	0.00E+00	0.00E+00	3.68E-05
CE-141	Ci	1.31E-03	7.93E-04	6.14E-04	5.83E-04	3.30E-03
CO-58	Ci	5.29E-03	5.87E-04	4.74E-04	6.16E-04	6.96E-03
CO-60	Ci	7.73E-03	3.63E-03	5.66E-03	4.29E-03	2.13E-02
CR-51	Ci	1.45E-01	2.53E-02	1.50E-02	1.50E-02	2.00E-01
CS-137	Ci	0.00E+00	0.00E+00	5.31E-05	4.05E-05	9.36E-05
CU-64	Ci	8.69E-04	0.00E+00	5.34E-05	1.41E-04	1.06E-03
FE-55	Ci	2.56E-02	3.33E-02	2.30E-02	8.80E-03	9.07E-02
FE-59	Ci	9.17E-04	0.00E+00	0.00E+00	2.07E-05	9.38E-04
I-131	Ci	1.61E-04	1.58E-04	3.38E-05	1.97E-05	3.73E-04
I-133	Ci	0.00E+00	4.73E-05	8.18E-06	0.00E+00	5.54E-05
LA-140	Ci	3.81E-03	2.05E-03	9.33E-04	1.22E-03	8.02E-03
MN-54	Ci	4.71E-03	1.47E-03	1.68E-03	3.69E-03	1.15E-02
NB-95	Ci	3.05E-05	0.00E+00	0.00E+00	0.00E+00	3.05E-05
NP-239	Ci	8.53E-05	0.00E+00	0.00E+00	0.00E+00	8.53E-05
RB-88	Ci	0.00E+00	3.39E-04	0.00E+00	3.58E-04	6.97E-04
RU-103	Ci	2.01E-05	0.00E+00	0.00E+00	0.00E+00	2.01E-05
RU-106	Ci	3.00E-04	0.00E+00	0.00E+00	0.00E+00	3.00E-04
SB-125	Ci	0.00E+00	7.43E-06	2.34E-05	6.65E-05	9.73E-05
SR-89	Ci	0.00E+00	0.00E+00	1.30E-03	1.97E-03	3.27E-03
SR-90	Ci	0.00E+00	0.00E+00	8.62E-05	1.09E-04	1.95E-04
SR-92	Ci	5.35E-05	7.98E-05	3.38E-05	2.24E-05	1.90E-04
TC-99M	Ci	1.77E-04	9.83E-06	5.65E-06	0.00E+00	1.93E-04
TE-125M	Ci	0.00E+00	0.00E+00	0.00E+00	4.87E-04	4.87E-04
W-187	Ci	2.00E-05	0.00E+00	0.00E+00	0.00E+00	2.00E-05
ZN-65	Ci	4.59E-03	1.32E-03	2.76E-03	8.29E-03	1.70E-02
ZN-69M	Ci	3.00E-04	0.00E+00	0.00E+00	0.00E+00	3.00E-04
ZR-95	Ci	8.24E-06	0.00E+00	0.00E+00	0.00E+00	8.24E-06
Totals for Period...	Ci	2.02E-01	7.02E-02	5.26E-02	4.62E-02	3.71E-01
Tritium						
H-3	Ci	1.64E+01	2.30E+01	3.26E+01	2.69E+01	9.90E+01
Totals for Period...	Ci	1.64E+01	2.30E+01	3.26E+01	2.69E+01	9.90E+01
Dissolved and Entrained Gases						
XE-133	Ci	4.17E-03	4.55E-03	3.97E-03	2.03E-03	1.47E-02
XE-133M	Ci	2.01E-05	0.00E+00	0.00E+00	1.18E-05	3.19E-05
XE-135	Ci	4.41E-04	1.05E-03	7.31E-04	3.98E-04	2.62E-03
Totals for Period...	Ci	4.63E-03	5.60E-03	4.70E-03	2.44E-03	1.74E-02
Gross Alpha Radioactivity						
ALPHA	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Totals for Period...	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TABLE 2C
ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION UNIT 1

RADIOACTIVE EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM
JANUARY – DECEMBER 2008

Liquid Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD) (uCi/ml)(a)
A. Batch Waste Release Tanks (c)	Prior to Release Each Batch	Prior to Release Each Batch	Principal Gamma Emitters (d) I-131	$5x10^{-7}$ $1X10^{-6}$
	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 Gross Alpha	$1x10^{-5}$ $1x10^{-7}$
	Prior to Release Each Batch	92 Days Composite (b)	Sr-89, Sr-90 Fe-55	$5x10^{-8}$ $1x10^{-6}$
B. SSW Basin (Before Blowdown)	Prior to Release Each Blowdown	Prior to Release Each Batch	Principal Gamma Emitters (d) I-131	$5x10^{-7}$ $1x10^{-6}$

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

TABLE 3
ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION UNIT 1

RADIOACTIVE EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
SOLID RADIOACTIVE WASTE AND IRRADIATED FUEL SHIPMENTS
JANUARY – DECEMBER 2008

A. SOILD WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (NOT IRRADIATED FUEL)

1. Type of Waste	Unit	Class A	Class B	Class C	Est. Total Error %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m^3 Ci	7.65E+01 6.39E+02	0.00E+00 0.00E+00	0.00E+00 0.00E+00	+/- 25%
b. Dry compressible waste, contaminated equipment, etc.	m^3 Ci	7.44E+02 2.47E+01	0.00E+00 0.00E+00	0.00E+00 0.00E+00	+/- 25%
c. Irradiated componants, control rods, etc.	m^3 Ci	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	+/- 25%
d. Other: oil drum sealand, mixed waste	m^3 Ci	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	+/- 25%

2. Estimate of Major Nuclide Composition (by type of waste)

a. Spent resins, filter sludges, evaporator bottoms, etc.
None
b. Dry compressible waste, contaminated equipment, etc.
None
c. Irradiated components, control rods, etc.
None

d. Other: oil drum sealand, mixed waste for volume reduction.

Isotope (greater than 0.01%)	Percent	Curies
Co-58	4.13E-01	2.74E+00
Co-60	1.86E+00	1.24E+01
Cr-51	2.79E+00	1.85E+01
Fe-55	8.69E+01	5.76E+02
Fe-59	1.01E+00	6.75E+00
Mn-54	5.63E+00	3.74E+01
Ni-63	3.60E-01	2.39E+00
Zn-65	5.18E-01	3.44E+00
C-14	3.30E-01	2.19E+00

TABLE 3
ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION UNIT 1

RADIOACTIVE EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
SOLID RADIOACTIVE WASTE AND IRRADIATED FUEL SHIPMENTS
JANUARY – DECEMBER 2008 (Cont)

3. Solid Waste Dispostion

Number of Shipments	Destinations Name	City	State	Mode of Transportation
1	Duratek, LLC	Oak Ridge	TN	Southern Pines
10	Duratek, LLC	Oak Ridge	TN	Hittman
4	GTS Duratek-Gallaher Road Facility	Oak Ridge	TN	Hittman
1	Studsvik/RACE LLC	Memphis	TN	Studsvik Logistics
7	Studsvik	Erwin	TN	Hittman

NRC Class	Disposal Volume(ft^3)	Description	Number of Containers	Waste Type Description
A	96	B-25 BOX	14	DAW-U-NA B25 BOX
A	202	RWE ES-210	13	BR-D-NA SRT
A	1280	20' SEALAND	23	DAW-U-NA 20FT SL
A	1290	shielded sealand	1	Shielded sealand
A	199.4	ES-210 (solidification)	2	PR-D-NA CPS/RWCU-B
A	132.4	EL-142	1	DAW-U-NA
A	202	ES-210 (open top)	1	DAW-U-NA

B. Irradiated Fuel Shipments (Disposition)

NUMBER OF SHIPMENTS	MODE OF TRANSPORTATION	DESTINATION
None	N/A	N/A

ATTACHMENT I

NEI Groundwater Protection Initiative Sample Results

NEI GPI Ground Water samples are collected from four onsite monitoring wells. Samples were analyzed for gamma emitting nuclides and tritium per the Radiological Environmental Monitoring Program requirements for ground water. Results are shown in the table that follows.

Well ID	1st Qtr Tritium	1st Qtr Gamma	2nd Qtr Tritium	2nd Qtr Gamma
MW-1020B	<MDA	<MDA	<MDA	<MDA
MW-1026B	<MDA	<MDA	<MDA	<MDA
MW-1027B	<MDA	<MDA	<MDA	<MDA
MW-1134B	<MDA	<MDA	<MDA	<MDA

Well ID	3rd Qtr Tritium	3rd Qtr Gamma	4th Qtr Tritium	4th Qtr Gamma
MW-1020B	<MDA	<MDA	<MDA	<MDA
MW-1026B	<MDA	<MDA	<MDA	<MDA
MW-1027B	<MDA	<MDA	<MDA	<MDA
MW-1134B	<MDA	<MDA	<MDA	<MDA