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GNRO-2011/00030

April 28, 2011

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

Subject: Grand Gulf Nuclear Station (GGNS) 2010 Annual Radioactive Effluent Release Report (ARERR)
Grand Gulf Nuclear Station (GGNS), Unit 1
Docket No. 50-416
License No. NPF-29

Dear Sir or Madam:

Attached is the GGNS Annual Radioactive Effluent Release Report (ARERR) for the period January 1, 2010 through December 31, 2010. This report is submitted in accordance with the requirements of 10CFR50.36a(a)(2) and the GGNS Technical Specification (TS) 5.6.3. The ARERR also complies with the GGNS Offsite Dose Calculation Manual (ODCM).

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.

Sincerely,

CLP\RRJ

Attachment: 1. Annual Radioactive Effluent Release Report

cc: (See Next Page)

cc:

WITHOUT ATTACHMENT

NRC Senior Resident Inspector Grand Gulf Nuclear Station Port Gibson, MS 39150
U.S. Nuclear Regulatory Commission Region Administrator, Region IV ATTN: Mr. Elmo E. Collins, Jr. 612 East Lamar Blvd, Suite 400 Arlington, TX 76011-4125
U. S. Nuclear Regulatory Commission ATTN: Mr. Alan Wang, NRR/DORL Mail Stop OWFN/8 B1 Washington, DC 20555-0001

GNRO-2011/00030
Attachment 1

Attachment 1

to

GNRO-2011/00030

Annual Radioactive Effluent Release Report

ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION

ANNUAL
RADIOACTIVE EFFLUENT RELEASE REPORT

January 1, 2010 - December 31, 2010

Dennis Jackson / 4-19-2011

Prepared By

[signature] / 4-20-11

Reviewed By

[signature] / 4-20-11

Approved By

TABLE OF CONTENTS

TABLE OF CONTENTS (CONT'D)

I. INTRODUCTION

This Annual Radioactive Effluent Release Report (ARERR) for the period of January 1 through December 31, 2010 is submitted in accordance with Technical Specifications, Section 5.6.3 of Grand Gulf Nuclear Station (GGNS) License No. NPF-29. The monitoring of radioactive effluents is referenced in Offsite Dose Calculation Manual (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.

Elevated gaseous releases are not applicable at GGNS as reported in Table 1B.

The summation of all ground-level gaseous release during the reporting period is given in Table 1C.

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

The continuous and batch mode liquid 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.

Groundwater Protection Initiative well sample tritium results not included in the AREOR are included as attachment I.

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, Tritium 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

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

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

D_β = air dose due to beta emissions from noble gases

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

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

where the terms are defined in the GGNS ODCM.

b. Radioiodines, Tritium 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)

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

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

where the terms are defined in the GGNS ODCM.

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

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

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

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

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

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:

Fission and Activation Gases	Particulates
Radioiodines	Carbon-14
Liquid Effluents	

Tables 1D and 2C give sampling frequencies and Lower Limit of Detection 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 levels 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	Kr-88	Xe-133
Xe-133m	Xe-135	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	Mo-99
Mn-54	Cs-134
Fe-59	Cs-137
Co-58	Ce-141
Co-60	Ce-144
Sr-89	I-131
Sr-90	I-133

Other radionuclides with half lives greater than 8 days.

3. For Continuous Releases

Continuous sampling is performed on the continuous release points when releasing (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 a 2-pi gas flow proportional counter. Strontium-89 and -90 values are obtained by chemical separation and subsequent counting analysis using gas flow proportional 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. Carbon-14, C-14, activity of 9.5 Curies released per year in gaseous form was obtained from GGNS FSAR Table 11.3-9. C-14 curies are reported in Tables 1A and 1C of this report as the release is considered continuous throughout the year.

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 individual chemical separations and counting the separated strontium using gas flow proportional techniques and the separated iron using liquid scintillation techniques. Gross alpha determinations are made using a 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	17	47	28	9	101
Time Period (in minutes)					
b. Total for all batches	5.17E+03	1.42E+04	8.41E+03	2.47E+03	3.02E+04
c. Max time for a batch	3.15E+02	3.20E+02	3.20E+02	3.20E+02	3.20E+02
d. Avg time for a batch	3.04E+02	3.01E+02	3.00E+02	2.75E+02	2.99E+02
e. Min time for a batch	2.90E+02	2.65E+02	2.62E+02	1.90E+01	1.90E+01

2. Gaseous

No batch releases occurred 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: 2

b. Total Activity Released: 5.26E-01 Ci

On 6/29/10, the Turbine Building Vent, TBV, iodine and particulate, I&P, sampler was removed but then placed back into the sample stream so the sample collected for two weeks from 6/22/10 to 7/6/10. This is contrary to ODCM Table 6.11.4-1 requirements for weekly samples. The filter and cartridge were analyzed on 7/6/10 and results were in the expected range. Results were compared with results from samples before and after the affected period. The highest concentrations from the samples compared were used for a worst case estimate. Estimated total particulate and iodine activity released was 4.00E-01 Ci. Doses and specific activities are included in the applicable sections of this report.

On 3/11/10, a small amount of oil was noticed on the TBV Particulate filter. The filter and associated cartridge were changed out and analyzed. The samples had collected for 42 hours from 3/9/10 to 3/11/10 when the oil was observed. A second set of sample media was in place in the alternate sample location which was also changed out and analyzed. Results from both sets of filters and cartridges were combined and the higher concentrations from each were used as a worst case estimate of the release concentrations. Estimated total particulate and iodine activity released was 1.26E-01 Ci. Doses and specific activities are included in the applicable sections of this report.

II. DETAILED INFORMATION (CONT'D)

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.

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

Estimated Total Error for all Waste Types: +/-25%. Sampling errors include uncertainty associated with mixing and representative sampling.

II. DETAILED INFORMATION (CONT'D)

H. Solid Radioactive Waste Shipments

See Table 3 for shipment information.

I. Meteorological Data

The data recovery for the reporting period was 99.7%. The predominant wind direction was from the North-East approximately 10.2% of the time. The predominant stability class was class "D" approximately 24.1% of the time. Average wind speed during the reporting period was approximately 4.2 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 2010.

III. RADIATION DOSE SUMMARY

Indicated below is the annual summary of offsite doses attributable to GGNS during 2010. 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 were also met during this period.

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 calculation 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.

2010 Liquid Effluent Dose (mrem)

	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	TOTAL
Bone	2.36e-03	1.61e-02	3.65e-04	1.25e-03	2.09e-2
Liver	4.15e-03	4.34e-02	1.18e-03	4.45e-03	5.54e-2
Thyroid	6.84e-04	1.92e-03	7.66e-04	3.51e-04	3.73e-3
Kidney	1.98e-03	2.61e-02	9.02e-04	2.76e-03	3.31e-2
Lung	1.03e-03	2.91e-03	8.82e-04	2.90e-04	5.17e-3
GI-LLI	1.36e-03	3.17e-02	1.15e-03	5.50e-03	4.12e-2
Whole Body	2.89e-03	2.22e-02	9.22e-04	2.14e-03	2.92e-2

B. Airborne-Related Exposure Pathways

The values presented in this section utilize information provided in Tables 1A and 1C of this report and the calculation methodology of the ODCM. Carbon-14 doses were calculated using Electric Power Research Institute, EPRI, methodology and calculation software which was validated on site using Regulatory Guide 1.109. 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, two fishing lakes, the recreational vehicle laydown area, and the GGNS Energy Services Center locations were also evaluated.

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.

Doses for a Member of the Public are computed based on land use census and the most limiting location is used.

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 2010 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. This dose is documented in the following table with C-14 organ doses added and critical organ dose displayed as a separate entry.

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 southwest sector at a distance of 1368 meters (0.85 miles) from the plant. This location corresponds to the highest annual average atmospheric dispersion factor for a location at or 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 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 2010 meteorological data. The highest dispersion factor for an unrestricted area was in the southwest sector at the site boundary, 1368 meters (0.85 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 2010 as net exposure normalized to 92 days.

III. RADIATION DOSE SUMMARY (CONT'D)

Carbon-14

Carbon-14 (C-14) is a naturally occurring isotope of carbon. Nuclear weapons testing in the 1950s and 1960s significantly increased the amount of C-14 in the atmosphere. C-14 is also produced in commercial nuclear reactors, but the amounts produced are much less than those produced naturally or from weapons testing. In recent years, the analytical methods for determining C-14 have improved. Coincidentally the radioactive effluents from commercial nuclear power plants have also decreased to the point that C-14 has emerged as a principal radionuclide in gaseous effluents.

The only significant dose pathway to a member of the public from C-14 release is through consumption of vegetation. Vegetation incorporates C-14 in form of carbon dioxide, CO2, during photosynthesis so doses were calculated based on CO2 fraction. A CO2 fraction of 95% was chosen based on EPRI Technical Report 1021106, "Estimation of Carbon-14 in Nuclear Power Plant Gaseous Effluents".

Additionally, CO2 is dispersed as a gas so atmospheric dispersion factors were applied.

C-14 dose is calculated for maximum organ dose to a MEMBER OF THE PUBLIC and added to other organ dose for comparison to limits in the following table.

III. RADIATION DOSE SUMMARY (CONT'D)

2010 Airborne Effluent Dose (mrem)					
	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	TOTAL
Iodine, Tritium & Particulates (excluding Carbon-14)					
Child (mrem)	3.80E-02	2.40E-02	5.49E-03	4.26E-03	7.16E-02
Organ	Thyroid	Thyroid	Gi-LLI	Thyroid	Thyroid
Applicable Limit	7.5	7.5	7.5	7.5	15
Percent of Limit	5.07E-01	3.19E-01	7.32E-02	5.67E-02	4.77E-01
Iodine, Tritium & Particulates (including Carbon-14)					
Child Bone (mrem)	1.49E+00	1.49E+00	1.49E+00	1.49E+00	5.94E+00
Applicable Limit	7.5	7.5	7.5	7.5	15
Percent of Limit	1.98E+01	1.98E+01	1.98E+01	1.98E+01	3.96E+01
Total Body Dose Rate (mrem/yr)	1.09E+00	4.81E-01	2.65E-01	8.42E-02	
Applicable Limit	500	500	500	500	
Percent of Limit	2.18e-01	9.62e-02	5.30e-02	1.68e-02	
Skin Dose Rate (mrem/yr)	1.67E+00	8.97E-01	6.16E-01	1.71E-01	
Applicable Limit	3000	3000	3000	3000	
Percent of Limit	5.52e-02	2.99e-02	2.05e-02	5.70e-03	
Gamma Air Dose*	1.52E-01	8.99E-02	7.97E-02	2.55E-02	3.47E-01
Applicable Limit	5	5	5	5	10
Percent of Limit	3.05E+00	1.80E+00	1.59E+00	5.10E-01	3.47E+00
Beta Air Dose*	7.64E-02	8.74E-02	9.51E-02	2.40E-02	2.83E-01
Applicable Limit	10	10	10	10	20
Percent of Limit	7.64E-01	8.74E-01	9.51E-01	2.40E-01	1.41E+00
Direct Radiation (mrem)	0.6	0.0	0.3	0.8	1.8

*Measurement units are mrad

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

A. Offsite Dose Calculation Manual (ODCM)

No revisions to the ODCM were issued during the reporting period.

B. Radioactive Waste Treatment Systems

No major changes were made to the liquid or gaseous radwaste treatment systems in 2010.

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 2010	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Gases						
1. Total Release	Ci	1.44E+02	2.75E+02	7.17E+01	2.82E+01	5.19E+02
2. Avg. Release Rate	uCi/sec	1.85E+01	3.50E+01	9.02E+00	3.55E+00	1.65E+01
3. Percent of TS Limit	%	3.05E+00	1.80E+00	1.59E+00	5.10E-01	3.47E+00
Iodine-131						
1. Total Release	Ci	1.84E-03	9.82E-04	1.74E-05	2.34E-05	2.86E-03
2. Avg. Release Rate	uCi/sec	2.37E-04	1.25E-04	2.18E-06	2.94E-06	9.08E-05
3. Percent of TS Limit	%	3.82E-01	2.04E-01	3.61E-03	4.85E-03	2.97E-01
Particulates Half Life >= 8 days						
1. Total Release	Ci	7.97E-06	3.31E-05	3.47E-05	1.22E-05	8.80E-05
2. Avg. Release Rate	uCi/sec	1.03E-06	4.21E-06	4.36E-06	1.54E-06	2.79E-06
3. Percent of TS Limit	%	2.85E-02	2.41E-02	1.29E-03	7.91E-03	2.78E-02
Tritium						
1. Total Release	Ci	8.34E+00	4.90E+00	5.77E+00	4.34E+00	2.34E+01
2. Avg. Release Rate	uCi/sec	1.07E+00	6.23E-01	7.26E-01	5.47E-01	7.40E-01
3. Percent of TS Limit	%	9.65E-02	5.66E-02	6.67E-02	5.03E-02	1.35E-01
Carbon 14						
1. Total Release	Ci	2.34E+00	2.37E+00	2.39E+00	2.39E+00	9.50E+00
2. Avg. Release Rate	uCi/sec	3.01E-01	3.01E-01	3.01E-01	3.01E-01	3.01E-01
Gross Alpha						
1. Total Release	Ci	1.02E-08	2.95E-08	2.68E-08	8.21E-08	1.49E-07
2. Avg. Release Rate	uCi/sec	1.31E-09	3.75E-09	3.37E-09	1.03E-08	4.71E-09

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

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
GASEOUS EFFLUENTS – ELEVATED RELEASES
JANUARY – DECEMBER 2010

(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 2010	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Gases						
AR-41	Ci	2.43E+01	3.34E+00	5.58E+00	1.12E+00	3.44E+01
KR-85M	Ci	4.57E+01	6.23E+00	2.19E+00	5.18E-01	5.46E+01
KR-87	Ci	1.31E+01	1.97E-01	6.37E-03	1.04E-01	1.34E+01
KR-88	Ci	2.91E+01	5.42E+00	3.04E-02	5.81E-02	3.46E+01
KR-89	Ci	0.00E+00	0.00E+00	1.05E+01	0.00E+00	1.05E+01
XE-133	Ci	1.82E+01	1.20E+02	8.10E-01	1.47E+00	1.40E+02
XE-133M	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
XE-135	Ci	2.87E+00	1.16E+02	2.65E+00	2.74E+00	1.24E+02
XE-135M	Ci	7.15E+00	1.65E+01	8.55E+00	6.13E+00	3.83E+01
XE-137	Ci	0.00E+00	0.00E+00	2.53E+01	5.31E+00	3.06E+01
XE-138	Ci	3.45E+00	8.02E+00	1.60E+01	1.08E+01	3.83E+01
Totals for Period...	Ci	1.44E+02	2.75E+02	7.17E+01	2.82E+01	5.19E+02
Iodines						
I-131	Ci	1.84E-03	9.82E-04	1.74E-05	2.34E-05	2.86E-03
I-133	Ci	2.49E-03	2.15E-03	1.18E-04	1.50E-04	4.91E-03
I-135	Ci	6.26E-04	3.24E-04	0.00E+00	0.00E+00	9.50E-04
Totals for Period...	Ci	4.96E-03	3.46E-03	1.35E-04	1.73E-04	8.72E-03
Particulates Half Life >= 8 days						
BA-140	Ci	2.19E-06	7.92E-06	2.35E-05	4.79E-06	3.84E-05
CE-141	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CO-58	Ci	0.00E+00	0.00E+00	0.00E+00	3.09E-08	3.09E-08
CO-60	Ci	0.00E+00	4.35E-06	7.22E-07	0.00E+00	5.07E-06
CR-51	Ci	0.00E+00	9.01E-06	0.00E+00	0.00E+00	9.01E-06
CS-136	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CS-137	Ci	0.00E+00	0.00E+00	6.61E-07	2.42E-07	9.03E-07
FE-59	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MN-54	Ci	0.00E+00	3.31E-06	0.00E+00	0.00E+00	3.31E-06
RU-106	Ci	2.68E-06	0.00E+00	3.72E-06	0.00E+00	6.39E-06
SR-89	Ci	3.11E-06	4.55E-06	6.09E-06	5.47E-06	1.92E-05
SR-90	Ci	0.00E+00	0.00E+00	0.00E+00	1.68E-06	1.68E-06
ZN-65	Ci	0.00E+00	3.95E-06	0.00E+00	0.00E+00	3.95E-06
Totals for Period...	Ci	7.97E-06	3.31E-05	3.47E-05	1.22E-05	8.80E-05
Other						
H-3	Ci	8.34E+00	4.90E+00	5.77E+00	4.34E+00	2.34E+01
C-14	Ci	2.34E+00	2.37E+00	2.39E+00	2.39E+00	9.50E+00
Gross Alpha	Ci	1.02E-08	2.95E-08	2.68E-08	8.21E-08	1.49E-07

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 2010

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	Continuous (d)(f)	31 Days Composite Particulate Sample	Gross Alpha	$1x10^{-11}$
(4B) Turbine Building Occasional Release Point (when in service)	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)	$1x10^{-4}$

b. Analyses shall also be performed following startup from cold shutdown, or a THERMAL POWER change exceeding 15 percent of the RATED THERMAL POWER within a one
hour period. This requirement does not apply if:
(1) routine analysis required by the Surveillance Requirements of LCO 3.4.8 shows
that the DOSE EQUIVALENT I-131 concentration in the primary coolant has not increased more than a factor of 3; and
(2) the noble gas monitor shows that effluent activity has not increased more than a factor of 3.

c. Samples shall be changed at least once per 7 days and analyses shall be completed within 48 hours after changing or after removal from sampler. Sampling and analyses shall be performed at least once per 24 hours for at least 7 days following each shutdown, startup or THERMAL POWER change exceeding 15 percent of RATED THERMAL POWER in one hour. When samples collected for 24 hours are analyzed, the corresponding LLD's may be increased by a factor of 10. This requirement does not apply if:
(1) routine analysis required by the Surveillance Requirements of LCO 3.4.8 shows that the DOSE EQUIVALENT I-131 concentration in the primary coolant has not increased more than a factor of 3; and
(2) the noble gas monitor shows that effluent activity has not increased more than a factor of 3.
d. The ratio of the sample flow rate to the sampled stream flow rate shall be known
for the time period covered by each dose or dose rate calculation made in accordance with LCOs 6.11.4 and 6.11.6.
e. The principal gamma emitters for which the LLD specification applies exclusively
are the following radionuclides: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 for gaseous emissions and Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141 and Ce-144 for particulate emissions. This list does not mean that
only these nuclides are to be detected and reported. Other peaks which are measurable and identifiable, together with the above nuclides, shall also be identified and reported.
f. When a monitor is placed in an inoperable status solely for performance of required
Surveillance's, entry into associated Conditions and Required Actions in accordance with LCO 6.3.10 may be delayed for up to 1 hour.

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 2010	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Products						
1. Total Release	Ci	5.98E-04	1.08E-02	1.67E-03	2.12E-03	1.52E-02
2. Avg. Diluted Conc.	uCi/ml	4.22E-09	2.40E-08	6.97E-09	3.32E-08	1.70E-08
3. Percent of Limit	%	1.93E-01	1.48E+00	6.15E-02	1.42E-01	9.74E-01
Tritium						
1. Total Release	Ci	9.94E+00	3.22E+01	1.16E+01	3.28E+00	5.70E+01
2. Avg. Diluted Conc.	uCi/ml	7.02E-05	7.19E-05	4.84E-05	5.12E-05	6.38E-05
3. Percent of Limit	%	7.02E-01	7.19E-01	4.84E-01	5.12E-01	6.38E-01
Dissolved and Entrained Gases						
1. Total Release	Ci	1.11E-03	1.36E-03	6.84E-04	2.21E-04	3.37E-03
2. Avg. Diluted Conc.	uCi/ml	7.83E-09	3.02E-09	2.86E-09	3.46E-09	3.77E-09
3. Percent of Limit	%	3.92E-03	1.51E-03	1.43E-03	1.73E-03	1.89E-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	1.76E+06	4.88E+06	2.89E+06	8.20E+05	1.04E+07
Volume of dil. water	liters	1.40E+08	4.44E+08	2.36E+08	6.32E+07	8.83E+08

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 2010	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Products						
AG-110M	Ci	1.59E-05	1.15E-05	0.00E+00	2.92E-05	5.66E-05
AS-76	Ci	1.53E-05	0.00E+00	0.00E+00	0.00E+00	1.53E-05
CO-58	Ci	0.00E+00	2.81E-04	0.00E+00	1.06E-05	2.92E-04
CO-60	Ci	1.44E-04	1.63E-03	9.44E-05	9.41E-04	2.81E-03
CR-51	Ci	3.14E-04	5.24E-03	0.00E+00	2.79E-05	5.58E-03
CS-137	Ci	1.93E-05	6.31E-05	0.00E+00	0.00E+00	8.24E-05
CS-138	Ci	0.00E+00	1.36E-05	0.00E+00	0.00E+00	1.36E-05
CU-64	Ci	0.00E+00	7.09E-05	0.00E+00	0.00E+00	7.09E-05
FE-55	Ci	0.00E+00	5.84E-05	1.56E-03	5.98E-04	2.22E-03
FE-59	Ci	0.00E+00	5.83E-05	0.00E+00	1.43E-05	7.26E-05
I-131	Ci	0.00E+00	0.00E+00	0.00E+00	3.60E-06	3.60E-06
I-133	Ci	0.00E+00	0.00E+00	0.00E+00	7.48E-06	7.48E-06
LA-140	Ci	5.24E-05	1.30E-04	0.00E+00	0.00E+00	1.82E-04
MN-54	Ci	1.13E-05	1.40E-03	0.00E+00	3.39E-04	1.75E-03
NB-95	Ci	0.00E+00	5.38E-06	0.00E+00	0.00E+00	5.38E-06
RU-106	Ci	0.00E+00	7.34E-05	0.00E+00	0.00E+00	7.34E-05
SB-125	Ci	5.65E-06	1.12E-04	0.00E+00	0.00E+00	1.18E-04
TC-99M	Ci	2.98E-06	2.31E-05	1.27E-06	2.56E-06	2.99E-05
ZN-65	Ci	1.69E-05	1.60E-03	9.44E-06	1.50E-04	1.78E-03
ZN-69M	Ci	0.00E+00	8.90E-06	0.00E+00	0.00E+00	8.90E-06
Totals for Period...	Ci	5.98E-04	1.08E-02	1.67E-03	2.12E-03	1.52E-02
Tritium						
H-3	Ci	9.94E+00	3.22E+01	1.16E+01	3.28E+00	5.70E+01
Totals for Period...	Ci	9.94E+00	3.22E+01	1.16E+01	3.28E+00	5.70E+01
Dissolved and Entrained Gases						
XE-133	Ci	7.33E-04	8.07E-04	3.94E-04	1.44E-04	2.08E-03
XE-135	Ci	3.74E-04	5.48E-04	2.90E-04	7.75E-05	1.29E-03
Totals for Period...	Ci	1.11E-03	1.36E-03	6.84E-04	2.21E-04	3.37E-03
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 2010

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	$5x10^{-7}$ $1x10^{-6}$

(b) A composite sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid waste discharged in which the method of sampling employed results in a specimen which is representative of the liquid released.

(c) A batch release is the discharge of liquid wastes of a discrete volume. Before sampling for analyses, each batch shall be isolated, and then thoroughly mixed to assure representative sampling

(d) The principal gamma emitters for which the LLD specification applies exclusively are the following radionuclides: Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141, and Ce-144

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 2010

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	8.15E+01 1.58E+04	2.83E+00 1.02E+03	0.00E+00 0.00E+00	+/- 25%
b. Dry compressible waste, contaminated equipment, etc.	m^3 Ci	7.07E+02 1.16E+00	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	7.22E+00 9.11E-01	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 0.1%)	Percent	Curies
Ni-63	3.43E-01	3.42E+00
Co-60	1.36E+01	9.15E+01
Cr-51	4.00E-02	2.04E+00
Cs-137	4.36E-01	1.43E+00
Fe-55	4.73E+01	7.92E+02
Fe-59	4.32E-02	1.43E+00
Mn-54	1.07E+01	9.00E+02
Sr-89	1.13E-01	1.39E-01
Zn-65	4.22E+00	5.59E+01
Sr-90	6.16E-01	5.03E-01
Pu-241	3.88E+00	1.98E+02
C-14	2.71E+00	7.89E- 01

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 2010 (Cont)

3. Solid Waste Disposition

Number of Shipments	Destination Name	City	State	Mode of Transportation
1	EnergySolutions, Clive Disposal Facility (Containerized Waste)	Clive	UT	Hittman
2	EnergySolutions, Clive Disposal Facility (Bulk Waste)	Clive	UT	Hittman
12	Duratek, LLC	Oak Ridge	TN	Hittman
5	Studsvik	Erwin	TN	Hittman

NRC Class	Disposal Volume(ft^3)	Description	Number of Containers	Waste Type Description
B	120.3	8/120 HIC	1	Poly HIC – RWCU-A
A	199.4	ES-210	12	Carbon Steel Liner - SRT
A	1280	20' SEALAND	24	20FT Sealand
A	199.4	ES-210 (solidification)	4	Stainless Steel Liner CPS/RWCU-B

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

JANUARY – DECEMBER 2010

NEI GPI Ground Water samples are collected from onsite dewatering wells, DW; monitoring wells, MW; and observation wells, OW. Samples were analyzed for gamma emitting nuclides and tritium per the Radiological Environmental Monitoring Program requirements for ground water. All gamma results were less than minimum detectable. Tritium and gamma results are shown in the table below. All results were less than Reporting Levels of GGNS-ODCM table 6.12.1-2.
(<MDA = less than minimum detectable activity)

LOCATION	DATE	TRITIUM (pCi/L)	GAMMA
DW-01	10/18/2010	10,533	<MDA
DW-01	11/17/2010	3,990	<MDA
DW-01	12/7/2010	4,722	<MDA
DW-03	3/17/2010	719	<MDA
DW-03	5/27/2010	<MDA	<MDA
DW-03	8/11/2010	520	<MDA
DW-03	11/18/2010	545	<MDA
DW-04	5/27/2010	<MDA	<MDA
DW-04	8/11/2010	753	<MDA
DW-04	11/17/2010	895	<MDA
DW-05	8/11/2010	<MDA	<MDA
DW-05	11/17/2010	<MDA	<MDA
DW-07	8/12/2010	2,106	<MDA
DW-07 GG	8/12/2010	2,695	<MDA
DW-07	9/8/2010	2,992	<MDA
DW-07	10/18/2010	2,863	<MDA
DW-07	11/17/2010	3,273	<MDA
DW-08	8/12/2010	<MDA	<MDA
DW-08	11/16/2010	<MDA	<MDA
MW-01	9/9/2010	973	<MDA
MW-01	10/18/2010	686	<MDA
MW-01	11/18/2010	<MDA	<MDA
MW-06	9/8/2010	741	<MDA
MW-06	10/18/2010	713	<MDA
MW-06	11/16/2010	666	<MDA

ATTACHMENT I

NEI Groundwater Protection Initiative Sample Results

JANUARY – DECEMBER 2010 (Cont)

LOCATION	DATE	TRITIUM (pCi/L)	GAMMA
MW-07	5/27/2010	1,639	<MDA
MW-07	6/16/2010	1,657	<MDA
MW-07	6/16/2010	1,731	<MDA
MW-07	8/12/2010	2,571	<MDA
MW-07 GG	8/12/2010	2,399	<MDA
MW-07	9/9/2010	2,760	<MDA
MW-07 GG	9/9/2010	2,728	<MDA
MW-07	10/18/2010	6,900	<MDA
MW-07 GG	10/18/2010	6,832	<MDA
MW-07	11/17/2010	2,027	<MDA
MW-07	12/7/2010	10,687	<MDA
MW-07 GG	12/7/2010	10,385	<MDA
MW-09	3/16/2010	<MDA	<MDA
MW-09	5/25/2010	<MDA	<MDA
MW-09	8/11/2010	<MDA	<MDA
MW-09	11/16/2010	<MDA	<MDA
MW-1026B	5/26/2010	<MDA	<MDA
MW-1026B	8/12/2010	<MDA	<MDA
MW-1026B	11/17/2010	<MDA	<MDA
MW-1026B GG	11/17/2010	<MDA	<MDA
MW-1026D	8/12/2010	<MDA	<MDA
MW-1027B	5/26/2010	<MDA	<MDA
MW-1027B	8/12/2010	<MDA	<MDA
MW-1027B	11/17/2010	<MDA	<MDA
MW-1043B	3/17/2010	<MDA	<MDA
MW-1043B GG	3/17/2010	294	<MDA
MW-1043B	5/26/2010	<MDA	<MDA
MW-1043B	8/11/2010	<MDA	<MDA
MW-1043B	11/18/2010	<MDA	<MDA
MW-1045B	5/26/2010	<MDA	<MDA
MW-1045B	8/11/2010	<MDA	<MDA
MW-1045B	11/16/2010	<MDA	<MDA
MW-1120	2/25/2010	<MDA	<MDA
MW-1126	2/25/2010	<MDA	<MDA

ATTACHMENT I

NEI Groundwater Protection Initiative Sample Results

JANUARY – DECEMBER 2010 (Cont)

LOCATION	DATE	TRITIUM (pCi/L)	GAMMA
MW-1127	2/25/2010	<MDA	<MDA
MW-1134B	2/25/2010	<MDA	<MDA
MW-1134B	3/16/2010	<MDA	<MDA
MW-1134B	5/26/2010	<MDA	<MDA
MW-1134B	8/12/2010	<MDA	<MDA
MW-1134B	11/17/2010	<MDA	<MDA
MW-14	3/17/2010	<MDA	<MDA
MW-14	5/25/2010	<MDA	<MDA
MW-14 GG	5/25/2010	<MDA	<MDA
MW-14	8/10/2010	<MDA	<MDA
MW-14	11/16/2010	<MDA	<MDA
MW-23	3/17/2010	<MDA	<MDA
MW-23	5/27/2010	<MDA	<MDA
MW-23	8/11/2010	<MDA	<MDA
MW-23	11/17/2010	<MDA	<MDA
MW-26	5/25/2010	<MDA	<MDA
MW-26 GG	5/25/2010	<MDA	<MDA
MW-26	8/11/2010	<MDA	<MDA
MW-26	11/17/2010	<MDA	<MDA
OW-202	6/16/2010	<MDA	<MDA
OW-202	6/16/2010	<MDA	<MDA
OW-209B	5/26/2010	3,698	<MDA
OW-209B	6/16/2010	4,230	<MDA
OW-209B	8/13/2010	3,257	<MDA
OW-209B	9/8/2010	6,242	<MDA
OW-209B	10/17/2010	6,202	<MDA
OW-209B	11/17/2010	6,813	<MDA
OW-209B	12/8/2010	7,344	<MDA

GG Indicates duplicate sample.