



Entergy Operations, Inc.
P. O. Box 756
Port Gibson, MS 39150

James Nadeau
Manager, Regulatory Assurance
Grand Gulf Nuclear Station
Tel. (601) 437-2103

GNRO-2015/00028

April 27, 2015

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Grand Gulf Nuclear Station 2014 Annual Radioactive Effluent Release
Report (ARERR)
Grand Gulf Nuclear Station, Unit 1
Docket No. 50-416
License No. NPF-29

Dear Sir or Madam:

Attached is the Grand Gulf Nuclear Station (GGNS) Annual Radioactive Effluent Release Report (ARERR) for the period January 1, 2014 through December 31, 2014. This report is submitted in accordance with the requirements of 10CFR50.36(a)(2) and GGNS Technical Specification 5.6.3. The ARERR also complies with the GGNS Offsite Dose Calculation Manual (ODCM).

This letter does not contain any new commitments. If you have any questions or require additional information concerning this report, please contact Richard Sumrall at (601) 437-2115.

Sincerely,

A handwritten signature in cursive script that reads "James Nadeau".

JN/tmc

Attachment: Grand Gulf Nuclear Station 2014 Annual Radioactive Effluent Release Report
(ARERR)

cc: (see next page)

cc:

NRC Senior Resident Inspector
Grand Gulf Nuclear Station
Port Gibson, MS 39150

U.S. Nuclear Regulatory Commission
ATTN: Mr. Marc Dapas (w/2)
Regional Administrator, Region IV
1600 East Lamar Boulevard
Arlington, TX 76011-4511

U.S. Nuclear Regulatory Commission
ATTN: Mr. A. Wang, NRR/DORL (w/2)
Mail Stop OWFN 8 B1
Washington, DC 20555-0001

Mr. B. J. Smith
Director, Division of Radiological Health
Mississippi State Department of Health
Division of Radiological Health
P.O. Box 1700
Jackson, MS 39205

Dr. Mary Currier, M.D., M.P.H
State Health Officer
Mississippi Department of Health
P.O. Box 1700
Jackson, MS 39205-1700

Attachment
to GNRO-2015/00028

Grand Gulf Nuclear Station 2014 Annual Radioactive Effluent Release Report
(ARERR)

ANNUAL RADIOACTIVE EFFLUENT REPORT

JANUARY 1, 2014 – DECEMBER 31, 2014

Sandra Stringfellow / *[Signature]* / 4/20/15
Prepared By

Josh Mulvey / *[Signature]* / 4/22/15
Reviewed By

[Signature] / 4/24/15
Approved By

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I. INTRODUCTION

This Annual Radioactive Effluent Release Report (ARERR) for the period of January 1 through December 31, 2014, 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 known gaseous releases during the reporting period is reported in Table 1A.

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

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

The radioactive gaseous sampling and analysis program implemented at GGNS is described in Table 1D.

The summation of all liquid releases during the reporting period is reported in Table 2A

The continuous and batch mode liquid releases are reported in Table 2B.

The radioactive liquid waste sampling and analysis program implemented at GGNS is described in Table 2C.

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

Groundwater Protection Initiative (GPI) well sample tritium results, which are not included in the AREOR are included as Attachment I to the ARERR.

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

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:

$$D_{tb} = \text{average total body dose rate in the current year (mrem/yr)} \\ = \overline{X/Q} \sum_i K_i Q_i \leq 500 \text{ mrem/yr}$$

$$D_s = \text{average skin dose rate in the current year (mrem/yr)} \\ = \overline{X/Q} \sum_i (L_i + 1.1 M_i) Q_i \leq 3000 \text{ mrem/yr}$$

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:

$$D_o = \text{average organ dose rate in current year (mrem/yr)} \\ = \sum_i W P_i Q_i \leq 1500 \text{ mrem/yr}$$

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

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

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

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

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

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

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)

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

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

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.

Gaseous dose rates rather than Effluent Concentration Limits are used to calculate permissible release rates for gaseous releases. The maximum permissible dose rates for gaseous releases are defined in the GGNS ODCM 6.11.4.a as 500 mrem/yr (Total Body) and 3000 mrem/yr (Skin) and in 6.11.4.b as 1500 mrem/yr (Organ).

2. Liquid

The 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.

The GGNS ODCM limits the instantaneous dose equivalent rates due to the release of noble gases to less than or equal to 500 mrem/year to the total body and less than or equal to 3000 mrem/year to the skin. The average beta and gamma energies of the radionuclide mixture in releases of fission and activation gases as described in Regulatory Guide 1.21, "Measuring, Evaluation, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," may be used to calculate doses in lieu of more sophisticated software. The GGNS radioactive effluent programs employs the methodologies presented in U.S. NRC Regulatory Guide 1.109 "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants, October 1978. Therefore, average energies are not applicable to GGNS.

II. DETAILED INFORMATION (CONT'D)

D. Measurements and Approximations of Total Activity

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

Fission and Activation Gases	Particulates
Radioiodines	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 gamma spectral analysis 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. The radionuclides that are detected are used in this computation. When no radionuclides are detected, a historical mixture is used. 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 $\mu\text{Ci/ml}$.

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

At a minimum, the following 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, Containment Building, Fuel Handling Area, Turbine Building, and Turbine Building Occasional Release Point). Particulate material is collected by filtration. Radioiodines are collected by adsorption onto a charcoal filter. Periodically these filters are removed and analyzed by gamma spectral analysis utilizing high-resolution germanium detectors to identify and quantify radioactive materials collected. Particulate filters are then analyzed for gross alpha and Strontium-89/90 as required. Gross alpha is analyzed using a gas flow proportional technique. Strontium-89/90 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). Strontium analysis is performed by a qualified contract laboratory. Carbon-14 (C-14) activity of 14.51 Curies released per year in gaseous form was obtained by estimation using EPRI spreadsheet BWR Source Term Calculation (MAL-1)_r1 and the information in NEAD-NS-11-0060-Rev1-EC42519 and adjusted by 284.5 full power production days. Carbon-14 curies are reported in Tables 1A and 1C of this report and based on a constant release rate throughout the year.

4. For Batch Releases: Gases

Gaseous batch releases are not normally performed at GGNS.

II. DETAILED INFORMATION (CONT'D)

5. For Batch Releases: Liquid Effluents

At a minimum, 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 by gamma spectral analysis utilizing high-resolution germanium detectors. 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. Strontium-89/90 is analyzed using gas flow proportional techniques. Iron-55 is analyzed using liquid scintillation techniques. Gross alpha is analyzed using a gas flow proportional technique. Tritium is distilled and then analyzed using liquid scintillation techniques. Dissolved gases are determined employing grab sampling techniques and analyzed by gamma spectral analysis utilizing high-resolution germanium detectors. 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	38	47	35	42	162
Time Period (in minutes)					
b. Total for all batches	1.09E+04	1.52E+04	1.05E+04	1.10E+04	4.76E+04
c. Max time for a batch	4.20E+02	1.00E+03	3.27E+02	4.05E+02	1.00E+03
d. Avg time for a batch	2.86E+02	3.24E+02	3.01E+02	2.61E+02	2.94E+02
e. Min time for a batch	4.30E+01	2.00E+00	2.62E+02	1.30E+02	2.00E+00
f. Avg. dil. water flow gpm	5.84E+03	6.76E+03	8.35E+03	6.10E+03	6.77E+03

2. Gaseous

No batch releases occurred during the report period.

II. DETAILED INFORMATION (CONT'D)

F. Abnormal Releases

1. Liquid

- a. Number of Releases: 1
- b. Total Activity Released: 1.09E+00 Ci

On March 10th, 2014 contamination was discovered on the ground outside the radiologically controlled area (RCA) but within the protected area (PA) resulting in a reportable event under 10CFR50.72. Apparent cause evaluation determined the leak was from a structurally compromised liquid radwaste system cross-tie pipe for the abandoned Unit 2. The source of the water was reactor cavity draining during Unit 1 refueling outage activities. The release is estimated to be 1.09E+00 Curies of tritium and mixed fission and activation products. The leak is contained on site so there is no dose to the public. Condition Report GGN-2014-2598 was written and an apparent cause evaluation was performed.

2. Gaseous

- a. Number of Releases: 0
- b. Total Activity Released: 0.00E+00 Ci

No abnormal gaseous releases were identified for this reporting period.

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. For germanium detectors, the least-readily-detectable radioisotope is used to determine the counting error. Calibration errors are calculated by summing the errors associated with the calibration of a particular instrument with a radioactive source.

The 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 and total errors are calculated by the same methods used for liquid effluents.

3. Solid Radioactive Waste

Estimated Total Error % for all waste types is $\pm 2.50E+01$. Sampling errors include uncertainty associated with mixing and representative sampling.

H. Solid Radioactive Waste Shipments

See Table 3 for shipment information.

I. Meteorological Data

The data recovery for the reporting period was 98.9%. The predominant wind direction was from the North-Northeast approximately 9.6% of the time. The predominant stability class was class "D" approximately 30.4% of the time. Average wind speed during the reporting period was approximately 4.2 miles per hour at the 33 foot elevation.

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 2014.

III. RADIATION DOSE SUMMARY

Indicated below is the annual summary of offsite doses attributable to GGNS during 2014. Inspection of the values indicates 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.

Table III.A 2014 Liquid Effluent Dose (mrem)

	1 st Qtr	2nd Qtr	3rd Qtr	4th Qtr	TOTAL
Bone	1.93E-02	2.57E-02	2.35E-02	1.27E-02	8.30E-02
Liver	5.29E-02	4.67E-02	4.11E-02	2.59E-02	1.67E-01
Thyroid	1.39E-03	8.62E-04	5.97E-04	1.16E-03	3.82E-03
Kidney	3.38E-02	2.29E-02	1.85E-02	1.50E-02	8.83E-02
Lung	2.29E-03	5.15E-03	3.73E-03	2.33E-03	1.40E-02
GI-LLI	3.73E-02	2.39E-02	1.21E-02	1.65E-02	8.61E-02
Applicable Limit	5	5	5	5	10
Percent of Limit	1.06E+00	9.34E-01	8.22E-01	5.18E-01	1.67E+00
Whole Body	2.48E-02	2.37E-02	2.45E-02	1.46E-02	8.83E-02
Applicable Limit	1.5	1.5	1.5	1.5	3
Percent of Limit	1.65E+00	1.58E+00	1.63E+00	9.73E-01	2.94E+00

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. Dose and dose rates are computed for locations at the site boundary or at unrestricted areas within 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 2014 meteorological data and on the most recent land use census, with the most limiting location used.

During normal operations, the dispersion and deposition factors used for dose calculations are from five-year 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 2014 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 as two separate entries. The first organ dose entry excludes C-14 while the second entry includes organ dose from tritium, radioiodines, particulates, and C-14.

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 based on 2014 meteorological data.

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 2014 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 2014 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. Carbon-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 are calculated based on the CO₂ fraction of the carbon released in gaseous form. A CO₂ fraction of 95% is used based on EPRI Technical Report 1021106, "Estimation of Carbon-14 in Nuclear Power Plant Gaseous Effluents." The highest atmospheric dispersion factor for an actual garden based on the land use census was used to determine dose from C-14. Carbon-14 is dispersed as a gas (CO₂) to the garden location, where it is then incorporated into plant material.

Carbon-14 dose is calculated to a MEMBER OF THE PUBLIC for the most age restrictive group (Child) and organ (bone) at the garden location. This dose is then added to dose for the same organ from tritium, iodine, and particulates. This organ dose is recorded and compared to the limit in the following table.

Table III.B 2014 Airborne Effluent Dose (mrem)					
	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	TOTAL
Iodine, Tritium & Particulates (excluding Carbon-14)					
Child (mrem)	8.48E-03	2.57E-03	4.10E-03	6.32E-03	2.15E-02
Organ	Thyroid	Thyroid	Thyroid	Thyroid	Thyroid
Applicable Limit	7.5	7.5	7.5	7.5	15
Percent of Limit	1.13E-01	3.43E-02	5.47E-02	8.43E-02	1.43E-01
Iodine, Tritium & Particulates (including Carbon-14)					
Child (mrem)	2.36E+00	2.36E+00	2.36E+00	2.36E+00	9.44E+00
Organ	Bone	Bone	Bone	Bone	Bone
Applicable Limit	7.5	7.5	7.5	7.5	15
Percent of Limit	3.15E+01	3.15E+01	3.15E+01	3.15E+01	6.29E+01
Total Body Dose Rate (mrem/yr)	1.31E+00	3.40E-01	6.13E-01	2.41E-01	
Applicable Limit	500	500	500	500	
Percent of Limit	2.62E-01	6.80E-02	1.23E-01	4.82E-02	
Skin Dose Rate (mrem/yr)	1.87E+00	5.51E-01	8.95E-01	3.66E-01	
Applicable Limit	3000	3000	3000	3000	
Percent of Limit	6.23E-02	1.84E-02	2.98E-02	1.22E-02	
Gamma Air Dose*	1.05E-01	9.12E-02	1.79E-01	7.43E-02	4.50E-01
Applicable Limit	5	5	5	5	10
Percent of Limit	2.11E+00	1.82E+00	3.58E+00	1.49E+00	4.50E+00
Beta Air Dose*	4.02E-02	5.42E-02	7.06E-02	3.36E-02	2.01E-01
Applicable Limit	10	10	10	10	20
Percent of Limit	4.02E-01	5.42E-01	7.06E-01	3.36E-01	1.01E+00
Direct Radiation (mrem)	0.0	0.1	0.5	0.3	0.9

*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 during this reporting period.

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 2014	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
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Fission and Activation Gases

1. Total Release	Ci	9.18E+01	1.16E+02	1.48E+02	8.29E+01	4.53E+02
2. Avg. Release Rate	uCi/sec	1.18E+01	1.48E+01	1.86E+01	1.04E+01	1.39E+01
3. Percent of TS Limit						
a. Gamma Air	%	*	*	*	*	*
b. Beta Air	%	*	*	*	*	*

Iodine-131

1. Total Release	Ci	1.42E-04	8.01E-07	1.86E-06	7.21E-06	1.52E-04
2. Avg. Release Rate	uCi/sec	1.82E-05	1.02E-07	2.35E-07	9.07E-07	4.81E-06
3. Percent of TS Limit	%	*	*	*	*	*

Particulates Half Life >= 8 days

1. Total Release	Ci	4.94E-06	9.09E-07	9.24E-07	3.52E-06	1.03E-05
2. Avg. Release Rate	uCi/sec	6.35E-07	1.16E-07	1.16E-07	4.43E-07	3.26E-07
3. Percent of TS Limit	%	*	*	*	*	*

Tritium

1. Total Release	Ci	5.71E+00	2.46E+00	3.91E+00	5.93E+00	1.80E+01
2. Avg. Release Rate	uCi/sec	7.34E-01	3.13E-01	4.92E-01	7.46E-01	5.71E-01
3. Percent of TS Limit	%	*	*	*	*	*

Carbon 14

1. Total Release	Ci	3.62E+00	3.63E+00	3.63E+00	3.63E+00	1.45E+01
2. Avg. Release Rate	uCi/sec	4.66E-01	4.62E-01	4.57E-01	4.57E-01	4.60E-01

Gross Alpha

1. Total Release	Ci	4.84E-09	1.29E-07	5.30E-08	4.80E-08	2.35E-07
2. Avg. Release Rate	uCi/sec	6.22E-10	1.64E-08	6.67E-09	6.04E-09	7.45E-09

* Applicable limits are expressed in terms of dose. See Table III.B of this report.

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

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
GASEOUS EFFLUENTS - ELEVATED RELEASES
JANUARY - DECEMBER 2014

(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 2014	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Gases						
AR-41	Ci	9.28E+00	1.11E+01	3.62E+01	1.86E+01	7.51E+01
KR-85	Ci	0.00E+00	0.00E+00	0.00E+00	1.34E+01	1.34E+01
KR-85M	Ci	2.45E+01	6.68E+00	1.87E+01	5.52E+00	5.54E+01
KR-87	Ci	3.49E-01	5.35E+00	2.11E+00	0.00E+00	7.82E+00
KR-88	Ci	2.57E+01	1.49E+01	3.20E+01	1.05E+01	8.31E+01
XE-133	Ci	1.90E+01	3.97E+01	3.40E+01	1.75E+01	1.10E+02
XE-135	Ci	1.14E+01	3.37E+01	2.17E+01	1.53E+01	8.21E+01
XE-135M	Ci	1.32E+00	3.97E+00	2.56E+00	1.78E+00	9.63E+00
XE-138	Ci	2.99E-01	9.01E-01	5.82E-01	4.04E-01	2.19E+00
Totals for Period...	Ci	9.18E+01	1.16E+02	1.48E+02	8.29E+01	4.39E+02
Iodines						
I-131	Ci	1.42E-04	8.01E-07	1.86E-06	7.21E-06	1.52E-04
I-133	Ci	5.02E-04	3.51E-06	1.68E-05	5.69E-05	5.79E-04
I-135	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Totals for Period...	Ci	6.44E-04	4.31E-06	1.87E-05	6.41E-05	7.31E-04
Particulates Half Life >= 8 days						
CO-60	Ci	4.41E-06	0.00E+00	0.00E+00	0.00E+00	4.41E-06
MN-54	Ci	2.42E-07	0.00E+00	0.00E+00	0.00E+00	2.42E-07
RU-106	Ci	0.00E+00	0.00E+00	2.87E-07	3.52E-06	3.81E-06
SR-89	Ci	1.71E-07	6.29E-07	0.00E+00	0.00E+00	8.01E-07
SR-90	Ci	1.18E-07	2.79E-07	6.37E-07	0.00E+00	1.03E-06
Totals for Period...	Ci	4.94E-06	9.09E-07	9.24E-07	3.52E-06	1.03E-05
Other						
H-3	Ci	5.71E+00	2.46E+00	3.91E+00	5.93E+00	1.80E+01
C-14	Ci	3.62E+00	3.63E+00	3.63E+00	3.63E+00	1.45E+01
Gross Alpha	Ci	4.84E-09	1.29E-07	5.30E-08	4.80E-08	2.35E-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 2014

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	$\frac{1 \times 10^{-4}}{1 \times 10^{-6}}$
(2) Fuel Handling Area Ventilation Exhaust	Continuous (d)(f)	7 Days (c) Charcoal Sample	$\frac{I-131}{I-133}$	$\frac{1 \times 10^{-12}}{1 \times 10^{-10}}$
(3) Containment Ventilation Exhaust	Continuous (d)(f)	7 Days (c) Particulate Sample	Principal Gamma Emitters (e) (I-131, Others)	1×10^{-11}
(4A) Turbine Building Ventilation Exhaust	Continuous (d)(f)	31 Days Composite Particulate Sample	Gross Alpha	1×10^{-11}
(4B) Turbine Building Occasional Release Point(g) (when in service)	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	31 Days Grab Sample (f)	31 Days	Principal Gamma Emitters(e)	1×10^{-4}
(3) Standby Gas Treatment B Exhaust, whenever there is flow	31 Days Grab Sample (f)	31 Days	Principal Gamma Emitters(e)	1×10^{-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 2014	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Products						
1. Total Release	Ci	1.31E-02	4.14E-02	6.78E-03	4.18E-03	6.55E-02
2. Avg. Diluted Conc.	uCi/ml	5.34E-08	1.05E-07	2.02E-08	1.62E-08	5.31E-08
3. Percent of Limit	%	*	*	*	*	*
Tritium						
1. Total Release	Ci	1.55E+01	1.36E+01	1.01E+01	1.28E+01	5.20E+01
2. Avg. Diluted Conc.	uCi/ml	6.32E-05	3.45E-05	3.00E-05	4.96E-05	4.22E-05
3. Percent of Limit	%	*	*	*	*	*
Dissolved and Entrained Gases						
1. Total Release	Ci	2.47E-03	5.23E-05	9.88E-06	2.17E-06	2.53E-03
2. Avg. Diluted Conc.	uCi/ml	1.01E-08	1.33E-10	2.94E-11	8.42E-12	2.05E-09
3. Percent of Limit	%	*	*	*	*	*
Gross Alpha Radioactivity						
1. Total Release	Ci	3.78E-06	3.56E-05	0.00E+00	0.00E+00	3.94E-05
Volume of liquid waste						
Volume of liquid waste	liters	3.78E+06	4.49E+06	3.64E+06	3.77E+06	1.57E+07
Volume of dil. water						
Volume of dil. water	liters	2.41E+08	3.89E+08	3.32E+08	2.54E+08	1.22E+09

* Applicable limits are expressed in terms of dose. See table III.A of this report

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 2014	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
----- Fission and Activation Products -----						
AG-110M	Ci	3.02E-04	9.86E-05	2.46E-05	2.61E-04	6.86E-04
AS-76	Ci	0.00E+00	5.22E-05	0.00E+00	0.00E+00	5.22E-05
CO-58	Ci	2.40E-04	5.37E-05	1.21E-05	7.10E-05	3.77E-04
CO-60	Ci	1.05E-03	1.21E-03	8.15E-04	1.39E-03	4.46E-03
CR-51	Ci	2.71E-04	2.69E-05	0.00E+00	0.00E+00	2.98E-04
CS-134	Ci	0.00E+00	0.00E+00	7.84E-06	0.00E+00	7.84E-06
CS-136	Ci	1.05E-06	0.00E+00	0.00E+00	0.00E+00	1.05E-06
CS-137	Ci	9.06E-06	1.05E-04	1.84E-04	6.24E-05	3.61E-04
CS-138	Ci	0.00E+00	2.63E-05	0.00E+00	0.00E+00	2.63E-05
FE-55	Ci	8.46E-03	3.58E-02	2.22E-03	0.00E+00	4.65E-02
FE-59	Ci	7.29E-06	2.49E-05	0.00E+00	0.00E+00	3.22E-05
I-131	Ci	3.69E-06	0.00E+00	0.00E+00	0.00E+00	3.69E-06
LA-140	Ci	0.00E+00	0.00E+00	0.00E+00	2.71E-04	2.71E-04
MN-54	Ci	6.52E-04	7.27E-04	3.55E-04	5.89E-04	2.32E-03
NA-24	Ci	0.00E+00	0.00E+00	1.59E-05	1.84E-05	3.44E-05
PT-195M	Ci	0.00E+00	0.00E+00	0.00E+00	2.18E-05	2.18E-05
RB-88	Ci	2.98E-04	2.06E-03	2.16E-03	4.00E-04	4.92E-03
RU-106	Ci	1.88E-05	3.70E-05	2.99E-04	1.30E-04	4.84E-04
SR-90	Ci	5.20E-06	0.00E+00	0.00E+00	0.00E+00	5.20E-06
SR-92	Ci	2.91E-05	0.00E+00	6.25E-06	2.65E-05	6.19E-05
TE-125M	Ci	0.00E+00	0.00E+00	0.00E+00	4.73E-04	4.73E-04
ZN-65	Ci	1.73E-03	1.20E-03	6.81E-04	4.62E-04	4.07E-03

Totals for Period...	Ci	1.31E-02	4.14E-02	6.78E-03	4.18E-03	6.55E-02
----- Tritium -----						
H-3	Ci	1.55E+01	1.36E+01	1.01E+01	1.28E+01	5.20E+01

Totals for Period...	Ci	1.55E+01	1.36E+01	1.01E+01	1.28E+01	5.20E+01
----- Dissolved and Entrained Gases -----						
KR-85M	Ci	6.16E-06	0.00E+00	0.00E+00	0.00E+00	6.16E-06
XE-133	Ci	2.31E-03	1.42E-05	0.00E+00	0.00E+00	2.33E-03
XE-133M	Ci	1.35E-05	0.00E+00	0.00E+00	0.00E+00	1.35E-05
XE-135	Ci	1.32E-04	3.81E-05	9.88E-06	2.17E-06	1.82E-04

Totals for Period...	Ci	2.47E-03	5.23E-05	9.88E-06	2.17E-06	2.53E-03
----- Gross Alpha Radioactivity -----						
ALPHA	Ci	3.78E-06	3.56E-05	0.00E+00	0.00E+00	3.94E-05

Totals for Period...	Ci	3.78E-06	3.56E-05	0.00E+00	0.00E+00	3.94E-05

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 2014

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	$\frac{5 \times 10^{-7}}{1 \times 10^{-6}}$
	Prior to Release One Batch /M	31 Days	Dissolved and Entrained Gases (Gamma Emitters)	1×10^{-5}
	Prior to Release Each Batch	31 Days Composite (b)	H-3 Gross Alpha	$\frac{1 \times 10^{-5}}{1 \times 10^{-7}}$
	Prior to Release Each Batch	92 Days Composite (b)	Sr-89, Sr-90 Fe-55	$\frac{5 \times 10^{-8}}{1 \times 10^{-6}}$
B. SSW Basin (Before Blowdown)	Prior to Release Each Blowdown	Prior to Release Each Batch	Principal Gamma Emitters (d) I-131	$\frac{5 \times 10^{-7}}{1 \times 10^{-6}}$

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 2014

A. SOLID 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	9.91E+01	5.72E+00	0.00E+00	+/- 25%
	Ci	2.02E+02	6.91E+02	0.00E+00	
b. Dry compressible waste, contaminated equipment, etc.	m ³	1.33E+03	0.00E+00	0.00E+00	+/- 25%
	Ci	5.32E-01	0.00E+00	0.00E+00	
c. Irradiated components, control rods, etc.	m ³	0.00E+00	0.00E+00	0.00E+00	+/- 25%
	Ci	0.00E+00	0.00E+00	0.00E+00	
d. Other: Condensate Pre-Coat Septa Bundle	m ³	7.22E+00	0.00E+00	0.00E+00	+/- 25%
	Ci	3.93E+00	0.00E+00	0.00E+00	

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

- a. Spent resins, filter sludges, evaporator bottoms, etc.

Isotope (greater than 0.1%)	Percent	Curies
Mn-54	7.509	6.71E+01
Fe-55	61.352	5.48E+02
Co-58	1.053	9.40E+00
Co-60	18.984	1.70E+02
Cs-137	0.249	2.23E+00
Ag-110m	0.414	3.70E+00
Ni-63	0.427	3.82E+00
Zn-65	9.710	8.67E+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 2014

b. Dry compressible waste, contaminated equipment, etc.

Isotope (greater than 0.1%)	Percent	Curies
Cr-51	4.081	2.17E-02
Mn-54	25.581	1.36E-01
Fe-55	12.519	6.65E-02
Fe-59	2.513	1.34E-02
Co-58	1.233	6.55E-03
Co-60	43.281	2.30E-01
Ni-63	0.403	2.14E-03
Zn-65	4.595	2.44E-02
Zr-95	1.160	6.16E-03
Nb-95	1.803	9.58E-03
Ag-110m	1.148	6.10E-03
Cs-137	1.008	5.36E-03
Ce-144	0.300	1.59E-03
Pu-241	0.248	1.32E-03

c. Irradiated components, control rods, etc.

There were none in 2014.

d. Other: Condensate Oil Drum Sealand

Isotope (greater than 0.1%)	Percent	Curies
Cr-51	1.690	6.65E-05
Mn-54	27.497	1.08E-03
Fe-55	12.898	5.07E-04
Fe-59	1.575	6.19E-05
Co-58	1.007	3.96E-05
Co-60	47.429	1.86E-03
Ni-63	0.403	1.58E-05
Zn-65	4.991	1.96E-04
Ag-110m	0.993	3.90E-05
Cs-137	1.006	3.96E-05
Pu-241	0.360	1.42E-05

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 2014 (Cont)

3. Solid Waste Disposition

Number of Shipments	Destination Name	City	State	Mode of Transportation
28	EnergySolutions(Duratek), LLC	Oak Ridge	TN	Hittman
13	EnergySolutions – Gallaher Road Facility	Oak Ridge	TN	Hittman
1	Studsvik	Erwin	TN	Hittman

NRC Class	Disposal Volume(ft ³)	Description	Number of Containers	Waste Type Description
B	120.3	8/120 HIC	2	Poly HIC-RWCU-A
A	205.8	215 Linear	10	Carbon Steel Liner - SRT
A	90	B-25	2	Metal/DAW
A	680	Intermodal	5	Bulk Soil
A	1180	20' SEALAND	44	DAW/GIC
A	199.4	ES-210 (Solidification)	9	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

Nuclear Energy Institute, NEI, Groundwater Protection Initiative Sample Results

JANUARY – DECEMBER 2014

GPI Ground Water samples are collected from onsite dewatering wells, DW; monitoring wells, MW; observation wells, OW; and sump wells, SW. Samples were analyzed for tritium and selected samples were analyzed for gamma and/or hard to detect (HTD) isotopes (Gross Alpha, Iron-55, Nickel-63, Strontium-89 and Strontium-90). Analyses are to the Lower Level of Detection (LLD) values for the GGNS Radiological Environmental Monitoring Program.

No dose to the public is attributed to ground water since wells with results above MDA are bounded by wells which are <MDA. Tritium, gamma and HTD results are shown in the table below.

All results were less than Reporting Levels of GGNS-ODCM table 6.12.1-2.

LOCATION	DATE	TRITIUM (pCi/L)	GAMMA/HTD (pCi/L)
DW-01	2/9/2014	2957	<MDA
DW-01	6/13/2014	5536	<MDA
DW-01	9/12/2014	6688	<MDA
DW-01	11/7/2014	3490	<MDA
DW-07	9/12/2014	4611	<MDA
DW-07	11/6/2014	5779	<MDA
MW-01	2/9/2014	<530	<MDA
MW-01	6/13/2014	<417	<MDA
MW-01	9/11/2014	<497	<MDA
MW-01	DUP 9/11/2014	<416	<MDA
MW-01	11/7/2014	<504	<MDA
MW-08	2/8/2014	<326	<MDA
MW-08	6/13/2014	<347	<MDA
MW-08	DUP 6/13/2014	<350	<MDA
MW-09	2/9/2014	<234	<MDA
MW-09	6/13/2014	<342	<MDA
MW-10	6/13/2014	<337	<MDA
MW-13	6/20/2014	<284	<MDA
MW-15	6/20/2014	<342	<MDA
MW-18	6/20/2014	<275	<MDA
MW-21	6/20/2014	<277	<MDA
MW-22	6/20/2014	446	<MDA
MW-23	2/9/2014	<233	<MDA
MW-23	6/12/2014	<346	<MDA

ATTACHMENT I
Nuclear Energy Institute, NEI, Groundwater Protection Initiative Sample Results

JANUARY – DECEMBER 2014 (Cont)

LOCATION	DATE	TRITIUM (pCi/L)	GAMMA/HTD (pCi/L)
MW-100B	2/9/2014	<234	<MDA
MW-100B	6/12/2014	<341	<MDA
MW-100B	9/12/2014	<204	<MDA
MW-100B	11/8/2014	<263	<MDA
MW-101B	2/9/2014	<522	<MDA
MW-102B	9/12/2014	<578	<MDA
MW-103A	9/12/2014	<218	<MDA
MW-103B	2/8/2014	<471	<MDA
MW-103B	6/13/2014	<339	<MDA
MW-103B	9/12/2014	<215	<MDA
MW-103B	11/7/2014	<271	<MDA
MW-104B	2/9/2014	<469	<MDA
MW-105B	2/9/2014	1873	<MDA
MW-106B	2/9/2014	<507	<MDA
MW-106B	6/12/2014	<500	<MDA
MW-106B	9/12/2014	<472	<MDA
MW-106B	11/7/2014	<468	<MDA
MW-107B	2/8/2014	1321	<MDA
MW-107B	6/12/2014	1465	<MDA
MW-107B	9/12/2014	1625	<MDA
MW-107B	11/6/2014	1028	<MDA
MW-108B	2/8/2014	1347	<MDA
MW-108B	6/13/2014	1337	<MDA
MW-108B	9/12/2014	1873	<MDA
MW-108B	11/6/2014	2327	<MDA
MW-109B	2/8/2014	<578	<MDA
MW-109B	6/13/2014	<434	<MDA
MW-109B	9/12/2014	1168	<MDA
MW-109B	11/6/2014	801	<MDA

ATTACHMENT I

Nuclear Energy Institute, NEI, Groundwater Protection Initiative Sample Results

JANUARY – DECEMBER 2014 (Cont)

LOCATION	DATE	TRITIUM (pCi/L)	GAMMA/HTD (pCi/L)
MW-110B	2/9/2014	<546	N/A
MW-110B	6/13/2014	<441	<MDA
MW-110B	9/11/2014	<515	<MDA
MW-110B	11/8/2014	<472	<MDA
MW-111B	1/17/2014	1519	<MDA
MW-111B	6/13/2014	2710	<MDA
MW-111B	9/11/2014	2627	<MDA
MW-111B	11/7/2014	3646	<MDA
MW-112B	2/9/2014	<515	<MDA
MW-112B	6/13/2014	<417	<MDA
MW-112B	9/11/2014	<510	<MDA
MW-112B	11/7/2014	<525	<MDA
MW-113B	2/9/2014	<474	<MDA
MW-113B	6/13/2012	<450	<MDA
MW-113B	DUP 6/13/2014	<504	<MDA
MW-113B	9/12/2014	<357	<MDA
MW-113B	11/7/2014	<352	<MDA
MW-114B	2/9/2014	1746	<MDA
MW-114B	6/13/2014	1983	<MDA
MW-114B	9/12/2014	2744	<MDA
MW-115B	2/9/2014	5630	<MDA
MW-115B	DUP 2/9/2014	4510	<MDA
MW-115B	6/13/2014	1680	<MDA
MW-115B	9/12/2014	5230	<MDA
MW-115B	11/7/2014	2510	<MDA
MW-116B	1/17/2014	508	<MDA
MW-116B	6/13/2014	442	<MDA
MW-116B	9/11/2014	508	<MDA
MW-116B	11/6/2014	472	<MDA
MW-1007C	6/14/2014	<472	<MDA
MW-1009C	6/19/2014	<283	<MDA
MW-1012C	6/14/2014	<473	<MDA
MW-1019B	6/20/2014	<336	<MDA

ATTACHMENT I

Nuclear Energy Institute, NEI, Groundwater Protection Initiative Sample Results

JANUARY – DECEMBER 2014 (Cont)

LOCATION	DATE	TRITIUM (pCi/L)	GAMMA/HTD (pCi/L)
MW-1020C	6/14/2014	<473	<MDA
MW-1022B	6/19/2014	<512	<MDA
MW-1024C	6/12/2014	<470	<MDA
MW-1027B	6/20/2014	<540	<MDA
MW-1027C	6/14/2014	<468	<MDA
MW-1042C	6/12/2014	<476	<MDA
MW-1082C	6/12/2014	<474	<MDA
MW-1134C	6/12/2014	<462	<MDA
OW-209B	2/9/2014	<563	<MDA
OW-209B	6/12/2014	<492	<MDA
OW-209B	9/11/2014	<579	<MDA
OW-1108	2/09/2014	<523	<MDA
SW-103A	2/09/2014	<520	<MDA
SW-103A	6/14/2014	<503	<MDA
SW-103A	9/11/2014	<519	<MDA

(<MDA = less than minimum detectable activity)
(DUP = separate sample collected and analyzed)
(N/A = not analyzed)

ATTACHMENT II

HISTORICAL RELEASE INFORMATION

In third Quarter 2013, GGNS released approximately 1,540 Ci of gaseous effluent. This amount was higher than normal due to refrigeration equipment issues affecting charcoal adsorption efficiency. The Radwaste Building Vent contributed approximately 90% of the release during that quarter. The Dose Assessment performed for this period calculated 2.1E-2 mrem for the most age restrictive group (child), with the bone being the most restricted organ. This dose was within the limit of 7.5 mrem for the quarter.