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GNRO-2013/00037

May 1, 2013

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

SUBJECT: Grand Gulf Nuclear Station 2012 Annual Radiological Environmental Operating Report (AREOR)
Grand Gulf Nuclear Station, Unit 1
Docket No. 50-416
License No. NPF-29

Dear Sir or Madam:

In accordance with Grand Gulf Nuclear Station (GGNS) Unit 1 Technical Specification 5.6.2, attached is the Annual Radiological Environmental Operating Report for the period January 1, 2012 through December 31, 2012.

There are no commitments contained in this submittal. If you have any questions or need additional information, please contact Tommy Tankersley at 601-437-6936.

Sincerely,

CRR/cjj

Attachment: 2012 Annual Radiological Environmental Operating Report

cc: (See Next Page)

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

U.S. Nuclear Regulatory Commission
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Attachment
To
GNRO-2013/00037

2012 Annual Radiological Environmental Operating Report

ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION

ANNUAL
RADIOLOGICAL ENVIRONMENTAL
OPERATING REPORT

January 1, 2012- December 31, 2012

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4-30-13

Approved By

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

Summary

The Annual Radiological Environmental Operating Report presents data obtained through analyses of environmental samples collected for Grand Gulf Nuclear Station's (GGNS) Radiological Environmental Monitoring Program (REMP) for the period January 1, 2012, through December 31, 2012. This report fulfills the requirements of GGNS Technical Specification 5.6.2.

To supplement the REMP, GGNS personnel installed duplicate TLDs and collected duplicate surface water and groundwater samples during the reporting period.

Radiological Environmental Monitoring Program

GGNS established the REMP in 1978 prior to the station becoming operational (1985) to provide data on background radiation and radioactivity normally present in the area. GGNS has continued to monitor the environment by sampling air, water, sediment, fish and food products, as well as measuring radiation directly. GGNS also samples milk, if commercial milk production occurs within five miles of the plant.

The REMP includes sampling indicator and control locations within an 18-mile radius of the plant. The REMP utilizes indicator locations near the site to show any increases or buildup of radioactivity that might occur due to station operation and control locations farther away from the site to indicate naturally occurring background radioactivity. GGNS personnel compare indicator results with control and preoperational results to assess any impact GGNS operation might have on the surrounding environment.

In 2012, GGNS personnel collected environmental samples for radiological analysis. The monitoring results for indicator locations when compared to control locations and previous studies show that GGNS has no significant effect on the local environment. The review of 2012 monitoring data, in many cases, showed undetectable radiation levels in the environment and near background levels in potential exposure pathways associated with GGNS.

Harmful Effects or Irreversible Damage

The REMP monitoring did not detect any harmful effects or evidence of irreversible damage in the current year.

Reporting Levels

When averaged over any calendar quarter, no environmental samples equaled or exceeded reporting levels for radioactivity as outlined in Offsite Dose Calculation Manual (ODCM) Specifications Table 6.12.1-2; the analytical results did not trigger any Radiological Monitoring Program Special Reports.

Radioactivity Not Attributable to GGNS

Over previous years, the GGNS REMP detected radioactivity attributable to other sources. These sources included the Chinese nuclear test in 1980 and the accident at the Chernobyl Nuclear Power Plant in 1986. In 2011, the GGNS REMP detected radioactivity released from the Fukushima Dai-ichi Nuclear Power Plant following the March 11, 2011, Tohoku earthquake. In 2012, the GGNS REMP detected no radioactivity attributable to other sources.

Comparison to Federal and State Programs

GGNS personnel compare REMP data to federal and state monitoring programs. Historically, the programs used for comparison included the U.S. Nuclear Regulatory Commission (NRC) Thermoluminescent Dosimeter (TLD) Direct Radiation Monitoring Network and the Mississippi State Department of Health (MSDH), Division of Radiological Health monitoring program.

Although the NRC TLD Network Program was discontinued in 1998, these results compared favorably to those from the GGNS REMP.

The MSDH and the GGNS REMP have similar monitoring requirements. These programs include concurrent air sampling and sharing sample media such as water, sediment, fish and food products. Both programs have obtained similar results. The 2012 results of the MSDH monitoring program compared favorably with the GGNS REMP results.

Sample Deviations

- **Milk**

  The GGNS ODCM requires collection of milk samples if there is a commercially available source within 5 miles (8 km) of the plant. In 2012, the REMP did not include milk sampling because no commercial milk production occurred within 5 miles of GGNS. GGNS personnel instead collected vegetation samples to monitor the ingestion pathway, as specified in ODCM Specifications Table 6.12.1-1.

- **Required Lower Limit of Detection (LLD) Values**

  Analytical lower limit of detection (LLD) values achieved in 2012 were within the limits required by the ODCM specifications for all samples required by the program. The analysis of three extra groundwater samples collected from Construction wells 1, 3 and 4 on September 14, 2012 did not meet the I-131 LLD of 15 pCi/L (Table A 4.1).

- **Thermoluminescent Dosimeters**

  There were no deviations in 2012.

- **Air Samples**

  The following air sample locations had reduced run times due to weather-related power outages or mechanical problems. As described in ODCM Specification Table 6.12.1-1, footnote (a), deviations from the required sampling schedule are permitted due to malfunction of sampling equipment and other legitimate reasons.

Table 1.1 Air Sampling Deviations in 2012

Sample Location	Date In	Date Out	Run Time (Hours)	Out-of-Service (Hours)	Comments
AS-3 61VA	6/12/12	6/19/12	165.75	2.05	Power Outage
AS-7 UH	6/26/12	7/3/12	167.25	0.78	Power Outage
AS-7 UH	7/3/12	7/10/12	167.30	0.78	Power Outage
AS-7 UH	7/10/12	7/17/12	167.79	3.46	Power Outage
AS-3 61VA	7/10/12	7/17/12	96.49	71.80	Equipment Malfunction
AS-7 UH	8/14/12	8/21/12	165.03	2.00	Power Outage
AS-7 UH	8/28/12	9/4/12	157.48	13.50	Power Outage
AS-1 PG	10/16/12	10/23/12	49.13	119.72	Equipment Malfunction
AS-1 PG	12/4/12	12/11/12	168.18	0.17	Power Outage
AS-7 UH	12/18/12	12/25/12	155.82	5.41	Power Outage
AS-7 UH	12/25/12	1/1/13	168.51	0.82	Power Outage

Based on the sample collection period reductions, air samples were collected the following percentages of the available time:

AS-1 PG	98.6%
AS-3 61VA	99.2%
AS-7 UH	99.6%

- **Missed Samples**

All required samples were collected in accordance with REMP requirements. There were no missed samples.

- **Unavailable Results**

GGNS received analytical results in adequate time for inclusion in this report.

Program Modifications

No REMP modifications took place during this sampling period.

Attachments

Attachment 1 contains results of TLD, air, water, sediment, fish, food products and special samples collected in 2012. TLDs were analyzed by Environmental Dosimetry Company (EDC) Stanford Dosimetry of Sterling, MA. Other samples were analyzed by the Entergy, River Bend Station (RBS), Environmental Laboratory located in St. Francisville, LA and GEL Laboratories, LLC of Charleston, SC. Attachment 1 also includes RBS results from participation in the interlaboratory comparison program and EDC's and GEL's Annual Quality Assurance Summary.

1.0 Introduction

1.1 Radiological Environmental Monitoring Program

GGNS established the REMP to ensure that plant operating controls properly function to minimize any radiation that could endanger human health or the environment. The REMP is designed to:

- Analyze important pathways for anticipated types and quantities of radionuclides released into the environment,
- Consider the possibility of a buildup of long-lived radionuclides in the environment and identify any physical and biological accumulations that may contribute to human exposures,
- Consider the potential radiation exposure to plant and animal life in the environment surrounding GGNS,
- Correlate levels of radiation and radioactivity in the environment with radioactive releases from the operation of GGNS.

1.2 Pathways Monitored

The airborne, direct radiation, waterborne and ingestion pathways, as seen in Figure 1-1 are monitored as required by the GGNS ODCM Table 6.12.1-1. A description of the GGNS REMP utilized to monitor the exposure pathways is provided in Table 1.1 and shown in Figures 1-2 and 1-3. GGNS may supplement this program with additional sampling in order to provide a comprehensive and well-balanced program.

Section 2.0 of this report provides a discussion of sampling results, with Section 3.0 providing a summary of results for the monitored exposure pathways.

1.3 Land Use Census

GGNS personnel conduct a biennial land use census, as required by ODCM Specification 6.12.2. The most recent land use census data are included in Table 2.1. The purpose of this census is to identify land use changes within each of the 16 meteorological sectors and within a 5-mile radius of GGNS that would require modifications to the REMP or the ODCM. The most purpose of the census is to identify the nearest

1) Occupied and unoccupied residences
2) Garden of greater than 50 square meters (m^2) [500 square feet (ft^2)] producing broadleaf vegetation
3) Animal milked for human consumption

GGNS personnel conduct the land use census by:

- Conducting field surveys in each meteorological sector out to five miles in order to confirm:
- Nearest occupied residence
- Nearest unoccupied residence
- Nearest garden and approximate size
- Nearest milking animal
- Identifying locations on maps and aerial photographs, measuring distances to GGNS and recording results on surveillance data sheets,
- Comparing current land use census results to previous results from the 2010 census, and
- Contacting the Claiborne County Agent for verification of nearest dairy animals

No significant differences were observed between the biennial land use census performed in 2010 and the one performed in 2012.

Table 1.2
Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Airborne	**Radioiodine and Particulates** 1 sample close to the SITE BOUNDARY having the highest calculated annual average ground level D/Q.	**AS-7 UH (Sector H, Radius 0.5 Miles)** – South-southeast of GGNS at the IBEW Union Hall.	Continuous sampler operation with sample collection per 7 days or as required by dust loading, whichever is more frequent	Radioiodine Canister – I-131; 7 days Particulate Sampler – Gross beta radioactivity following filter change, composite (by location) for gamma isotopic; 92 days
	Radioiodine and Particulates 1 sample from the vicinity of a community having the highest calculated annual average ground level D/Q.	**AS-1 PG (Sector G, Radius 5.5 Miles)** – Southeast of GGNS at the Port Gibson City Barn.		
	Radioiodine and Particulates 1 sample from a control location 15 -30 km (10 - 20 miles) distance.	**AS-3 61VA (Sector B, Radius 18 Miles)** – North-northeast of GGNS on Hwy 61, North of the Vicksburg Airport.		
Direct Radiation	**TLDs** An inner ring of stations in the general areas of the SITE BOUNDARY.	**M-16 (Sector A, Radius 0.9 Miles)** – Meteorological Tower. **M-19 (Sector E, Radius 0.5 Miles)** – Eastern SITE BOUNDARY Property line, North-northeast of HWSA.	92 days	Gamma dose; 92 days

Table 1.1
Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Direct Radiation	**TLDs** An inner ring of stations in the general areas of the SITE BOUNDARY.	**M-21 (Sector J, Radius 0.4 Miles)** – Near Former Training Center Building on Bald Hill Road. **M-22 (Sector G, Radius 0.5 Miles)** – Former RR Entrance Crossing On Bald Hill Road. **M-23 (Sector Q, Radius 0.5 Miles)** – Gin Lake Road 50 Yards North of Heavy Haul Road on Power Pole. **M-25 (Sector N, Radius 1.6 Miles)** – Radial Well Number 1. **M-28 (Sector L, Radius 0.9 Miles)** – Bald Hill Road. **M-94 (Sector R, Radius 0.8 Miles)** – Sector R Near Meteorological Tower.	92 days	Gamma dose; 92 days

Table 1.1
Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Direct Radiation	**TLDs** An inner ring of stations in the general areas of the SITE BOUNDARY.	**M-95 (Sector F, Radius 0.5 mi)** – Spoils Area, fence of old storage area, near entrance gate **M-96 (Sector B, Radius 0.7 mi.)** – North Gate Fence **M-97 (Sector D, Radius 0.8 mi.)** – Grand Gulf Road entrance gate to spoils area **M-98 (Sector H, Radius 0.5 mi.)** – Bald Hill Road, across from Union Hall, in curve **M-99 (Sector K, Radius 0.4 mi.)** – North Fence of old Ball Field near utility pole **M-100 (Sector C, Radius 0.6 mi.)** – Grand Gulf Road	92 days	Gamma dose; 92 days
	TLDs An outer ring approximately 3 to 5 miles from the site.	**M-36 (Sector P, Radius 5.0 Miles)** – Curve on HW 608, Point Nearest GGNS at Power Pole. **M-40 (Sector M, Radius 2.3 Miles)** – Headly Drive, Near River Port Entrance.		

Table 1.1
Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Direct Radiation	**TLDs** An outer ring approximately 3 to 5 miles from the site.	**M-48 (Sector K, Radius 4.8 Miles)** – 0.4 Miles South on Mont Gomer Road on West Side. **M-49 (Sector H, Radius 4.5 Miles)** – Fork in Bessie Weathers Road/Shaifer Road. **M-50 (Sector B, Radius 5.3 Miles)** – Panola Hunting Club Entrance. **M-55 (Sector D, Radius 5.0 Miles)** – Near Ingelside Karnac Ferry Road/Ashland Road Intersection. **M-57 (Sector F, Radius 4.5 Miles)** – Hwy 61, Behind the Welcome to Port Gibson Sign at Glensdale Subdivision.	92 days	Gamma dose; 92 days
	TLDs 8 stations in special interest areas such as population centers, nearby residences, schools, and in 1 or 2 areas to serve as control stations.	**M-01 (Sector E, Radius 3.5 Miles)** – Across the road from Lake Claiborne Entry Gate. (Special Interest) **M-07 (Sector G, Radius 5.5 Miles)** – AS-1 PG, Port Gibson City Barn. (Special Interest) **M-09 (Sector D, Radius 3.5 Miles)** – Warner Tully Y-Camp. (Special Interest) **M-10 (Sector A, Radius 1.5 Miles)** – Grand Gulf Military Park. (Special Interest)		

Table 1.1
Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Direct Radiation	**TLDs** 8 stations in special interest areas such as population centers, nearby residences, schools, and in 1 or 2 areas to serve as control stations	**M-14 (Sector B, Radius 18.0 Miles)** – AS-3-61VA, Hwy 61, North of Vicksburg Airport. (Control) **M-33 (Sector P, Radius 12.5 Miles)** – Newellton, Louisiana Water Tower. (Special Interest) **M-38 (Sector M, Radius 9.5 Miles)** – Lake Bruin State Park, Entrance Road. (Special Interest) **M-39 (Sector M, Radius 13.0 Miles)** – St. Joseph, Louisiana, Auxiliary Water Tank. (Special Interest)	92 days	Gamma dose; 92 days

Table 1.1
Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Waterborne	**Surface Water** 1 sample upstream. 1 sample downstream.	**MRUP (Sector R, Radius 1.8 Miles) -** At least 4500 ft upstream of the GGNS discharge point into the Mississippi River to allow adequate mixing of the Mississippi and Big Black Rivers. **MRDOWN (Sector N, Radius 1.6 Miles) -** At least 5000 ft downstream of the GGNS discharge point in the Mississippi River near Radial Well No. 1.	92 days	Gamma isotopic and tritium analyses; 92 days
	1 sample downstream during a Liquid Radwaste Discharge.	**MRDOWN (Sector P, Radius 1.3 Miles)** – Downstream of the GGNS discharge point in the Mississippi River near Radial Well No. 5.	366 days	Gamma isotopic and tritium analyses; 366 days
	1 sample from Outfall 007	**OUTFALL 007 (Sector N, Radius 0.2 Miles)** – Storm Drain System	31 days	Tritium; 31 days

Table 1.1
Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Waterborne	**Groundwater** Samples from 2 sources.	**PGWELL (Sector G, Radius 5.0 Miles)** - Port Gibson Wells – Taken from distribution system or one of the five wells. **CONSTWELL (Sector Q, Radius 0.4 Miles)** – GGNS Construction Water Well – Taken from distribution system or the well.	366 days	Gamma isotopic and tritium analyses; 366 days
	Sediment From Shoreline 1 sample from downstream area. 1 sample from upstream area.	**SEDHAM (Sector N, Radius 1.6 Miles)** – Downstream of the GGNS discharge point in the Mississippi River near Hamilton Lake outlet. **SEDCONT (Minimum of 100 yds)** – Upstream of the GGNS discharge point in the Mississippi River.	366 days	Gamma isotopic; 366 days
Ingestion	**Milk** 1 sample from milking animals within 8 km (5 miles) if milk is available commercially. 1 control sample (only if indicator exists) >8 km if milk is available.	Currently, no available milking animals within 8 km of GGNS. **ALCONT (Sector K, Radius 10.5 Miles) -** Located South-southwest of GGNS at Alcorn State University.	92 days when required	Gamma isotopic and I-131; 92 days

Table 1.1
Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Ingestion	**Fish** 1 sample in vicinity of GGNS discharge point. 1 sample uninfluenced by GGNS discharge.	**FISHDOWN** – Downstream of the GGNS discharge point into the Mississippi River **FISHUP** – Upstream of the GGNS discharge point into the Mississippi River uninfluenced by plant operations.	366 days	Gamma isotopic on edible portion; 366 days
	Food Products 1 sample of broadleaf vegetation grown in one of two different offsite locations with highest anticipated annual average ground level D/Q if milk sampling is not performed. 1 sample of similar vegetation grown 15 – 30 km distant if milk sampling is not performed.	**VEG-J (Sector J, Radius 0.4 Miles)** – South of GGNS near former Training Center on Bald Hill Road. **VEG-CONT (Sector K, Radius 10.5 Miles)** – Alcorn State University south-southwest of GGNS when available, otherwise a location 15-30 km distant.	92 days when available	Gamma isotopic and I-131; 92 days

FIGURE 1-1

Exposure Pathways

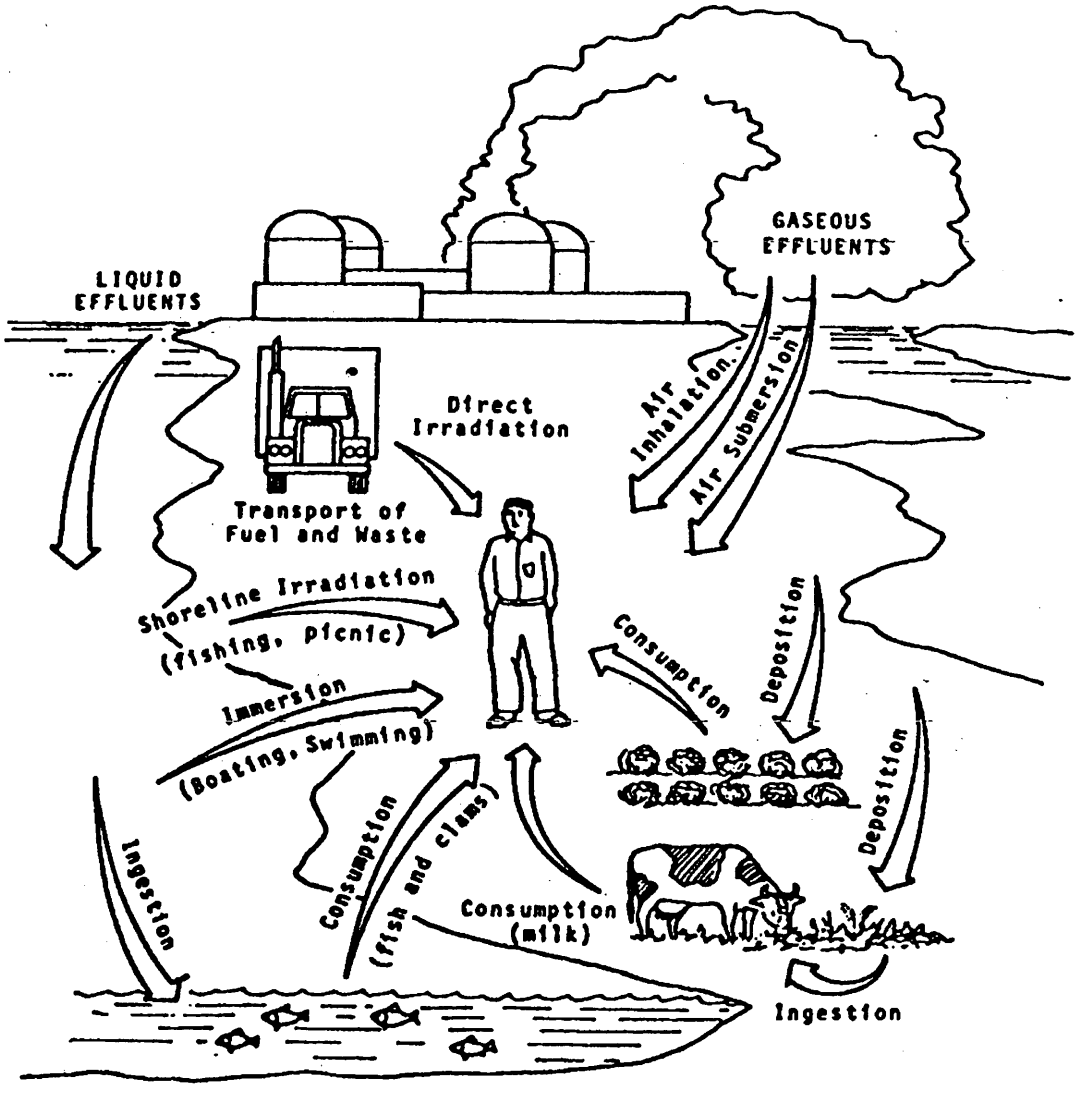


FIGURE 1-2
SAMPLE COLLECTION SITES – NEAR FIELD

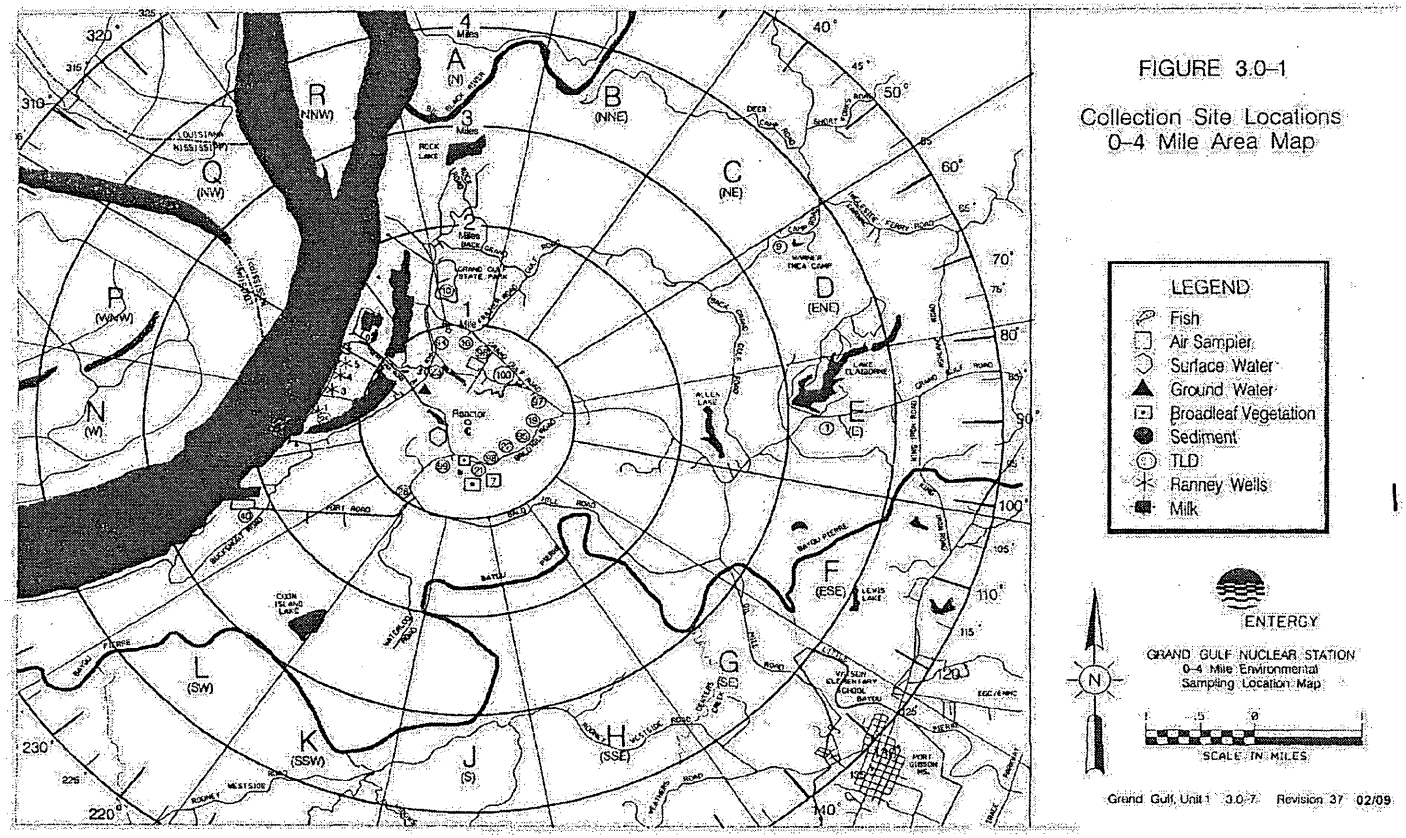
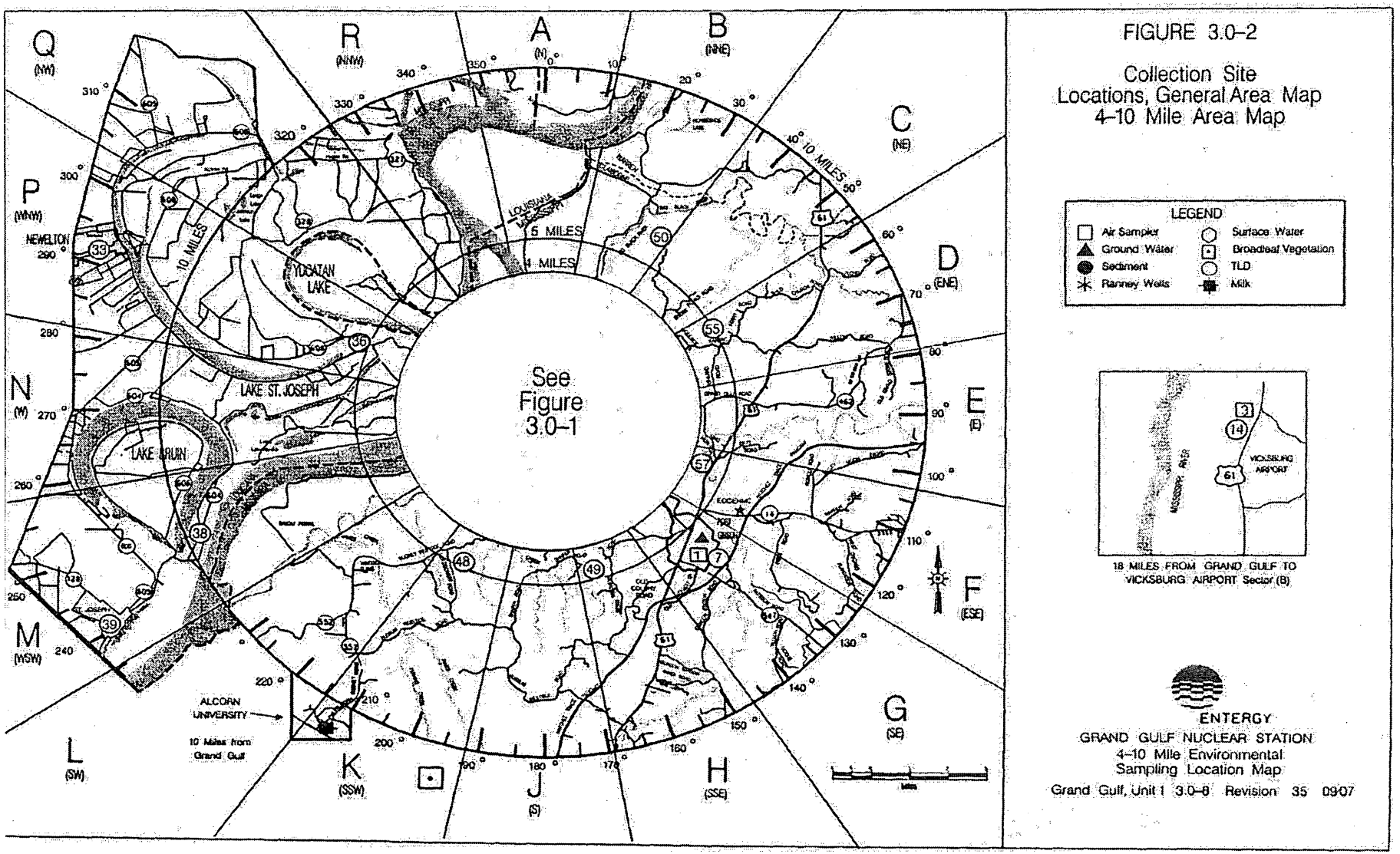


FIGURE 1-3
SAMPLE COLLECTION SITES – FAR FIELD



2.0 Interpretation and Trends of Results

2.1 Air Particulate and Radioiodine Sample Results

GGNS did not detect any plant related gamma emitting radionuclides in the quarterly air particulate composites.

The REMP had previously detected airborne radioactivity attributable to other sources in this pathway. These sources include the Chinese nuclear test in 1980 and the accident at the Chernobyl Nuclear Power Plant in 1986. In 2011, the GGNS REMP detected radioactivity released from the Fukushima Dai-ichi Nuclear Power Plant following the March 11, 2011, Tohoku earthquake No radioiodine was detected in 2012.

Table 3.1, which also includes gross beta activity, provides a comparison of the indicator and control means and ranges, further emphasizing that the airborne pathway remains at background levels. In the absence of plant-related gamma radionuclides, gross beta activity is attributed to naturally occurring radionuclides. Similar trends are present for control and indicator locations, which support the presence of naturally occurring radioactivity.

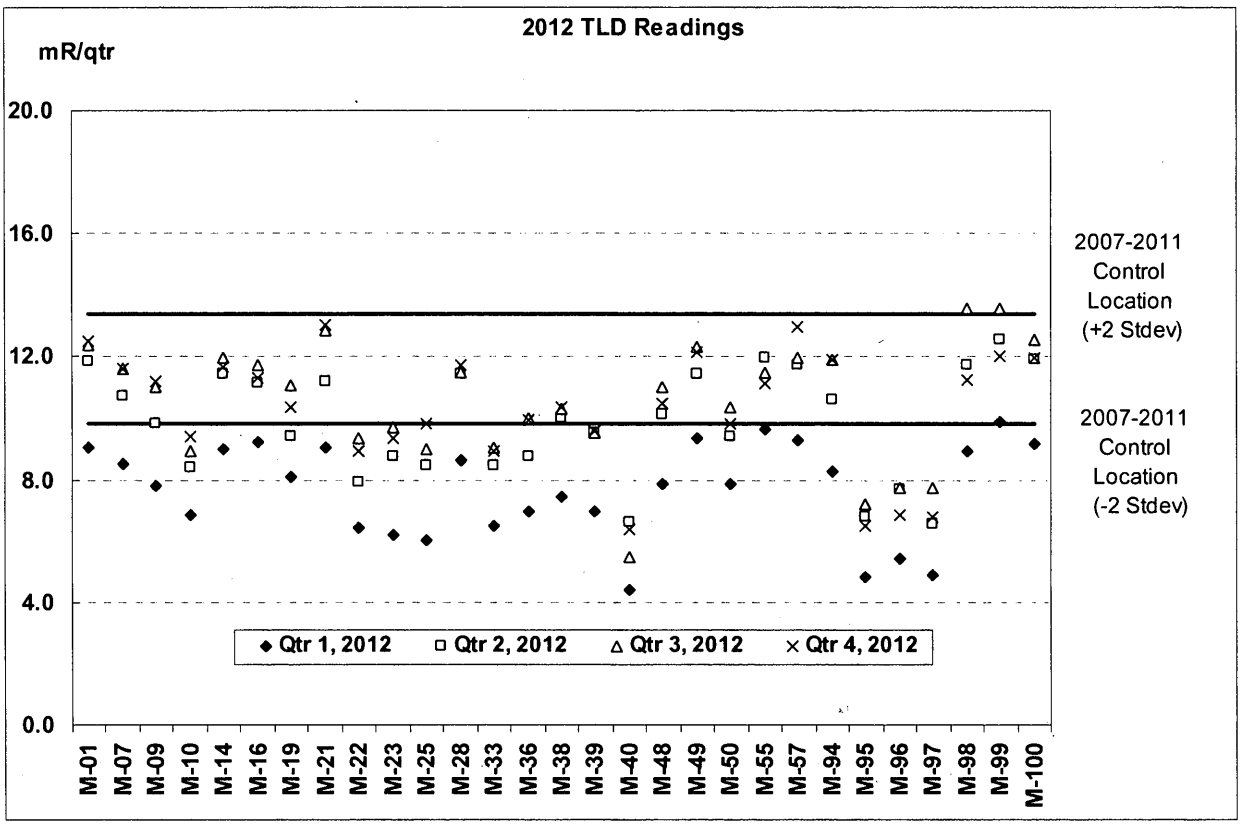
2.2 Thermoluminescent Dosimetry Sample Results

GGNS calculates dose by subtracting shield readings from control and indicator location readings and reports measured dose as net exposure, normalized to 92 days. GGNS relies on the comparison of the indicator locations to the control location as an indication of plant impact. Gamma radiation dose in the reporting period is compared to control location readings for previous years as shown in Figure 2-1.

The comparison of the indicator results to the control, and to previous indicator results, as seen in Figure 2-1 and Table 3.1, indicates that plant operation has had no significant impact on ambient radiation levels during the reporting period.

In previous years, TLD locations M-21 (Sector J, 0.4 miles), M-98 (Sector H, 0.5 miles and M-99 (Sector K, 0.4 miles) were above background. The dose rates at these three locations were the result of Nitrogen-16 (N-16) associated with the injection of hydrogen and subsequent N-16 production. Hydrogen injection into the feedwater system provides protection against Intergranular Stress Corrosion of plant components. Since November 2010, the hydrogen injection rate has been reduced and the dose rates at TLD locations M-21, M-98 and M-99 have returned to near background levels.

Figure 2-1



2.3 Water Sample Results

Surface water samples were collected from three indicator locations (Outfall 007, MRDOWN, and MRDOWN During Discharge) and one control location (MRUP) and analyzed for gamma emitting radionuclides and tritium. Plant related gamma emitting radionuclides and tritium remained undetectable in the upstream and downstream Mississippi River locations, which is consistent with preoperational and previous operational years. Storm waters contribute to Outfall 007 and can include tritium as a result of washout and entrainment of normal, previously monitored gaseous effluents. As a result, tritium is occasionally observed. In 2012, when detected, tritium was measured at an average concentration of 817 +/- 247 pCi/L in the Outfall 007 (indicator) location.

In addition to the tritium samples required by the REMP, five special surface water samples for gamma emitting radionuclides were collected at the Outfall 007 location Table A 8.1). Plant related gamma emitting radionuclides remained undetectable in these samples.

Based on review of results and historical data, plant operations had no significant impact on this pathway during the reporting period.

Groundwater samples were collected from two locations (indicator and control) and analyzed for gamma emitting radionuclides and tritium (Tables A 4.2 and A 4.3). In addition to the samples from the indicator and control locations, fourteen (14) extra samples were analyzed for gamma emitting radionuclides and tritium (Tables A 4.1 and A 4.2) GGNS did not detect any plant related gamma emitting radionuclides or tritium in groundwater samples during the reporting period.

Based on review of results and historical data, plant operations had no significant impact on this pathway during the reporting period.

2.4 Sediment Sample Results

Sediment samples were collected from two locations (indicator and control) and analyzed for gamma emitting radionuclides. In 2012, plant related gamma emitting radionuclides were below detectable concentrations in the upstream (control) location. Cesium-137 was detected near the minimum detection level at an average concentration of 38.8 pCi/kg in the downstream (indicator) location.

A review of REMP data collected at the downstream location from 1983 through 2011 indicates the Cesium-137 concentration has ranged from less than detectable to 300 pCi/Kg. Cesium-137 has previously been detected in the upstream (control) location. The presence of Cesium- 137 is attributed to atmospheric weapons testing. Based on review of results and historical data, plant operations had no significant impact on this pathway during the reporting period.

2.5 Milk Sample Results

Milk samples were not collected within five miles of the site in the reporting period due to the absence of milking animals. Since there are no dairies within five miles of GGNS, and based on non-detectable radioiodine and gamma radionuclides in air and vegetation samples, plant operations had no impact on this pathway during the reporting period.

2.6 Fish Sample Results

Fish samples were collected from two locations (indicator and control) and analyzed for gamma emitting radionuclides. GGNS did not detect any plant related gamma emitting radionuclides in fish samples (edible portions) during the reporting period, as has been the case in preoperational and previous operational years. These results indicate that this pathway has not been affected by plant operations.

2.7 Food Product (Vegetation) Sample Results

Food product samples were collected from control and indicator locations and analyzed for Iodine-131 and gamma emitting radionuclides. GGNS did not detect any plant related Iodine-131 or gamma emitting radionuclides in vegetation samples during the reporting period. These results indicate that this pathway has not been affected by plant operations.

2.8 Land Use Census Results

Results from the Land Use Census performed in 2012-13 are included in this report. Methods utilized to perform the Land Use Census include: visual surveys, door to door surveys, telephone interviews, Global Positioning System (GPS), Aerial Photography, and consultation with the local county agent concerning dairy production in Claiborne County.

During the survey the following information was obtained:

1) nearest location of occupied and unoccupied residences
2) nearest location of dairy production
3) nearest location of gardens

Changes from the previous Land Use Census were evaluated in accordance with GGNS surveillance "Land Use Census", 06-EN-S000-0-0002. The differences were compared to the locations and assumptions used in calculations for compliance with the ODCM Limiting Condition for Operation 6.11.6. The locations and assumptions currently used in ODCM were determined more conservative than any of the changes. Determinations from the most recent Land Use Census results are:

- Because of downwind location and/or distance from the site, in no case will the occupancy of an existing unoccupied residence cause any existing ODCM critical receptor calculation results to be less conservative.
- No additional sampling locations are required as the onsite vegetation sampling location (Sector J, 0.4 miles) is more conservative than changes identified in the land use census.
- Cattle are raised for human consumption (most notably in Sector H, J, and K). GGNS uses the Grass/Cow/Meat pathway.
- The milk pathway does not need to be activated because no commercial dairy production is occurring within 5 miles, as referenced by ODCM Table 6.12.1-1.
- Sectors M, N, P, and Q are remote areas in which the primary use is hunting. Areas were surveyed by vehicle and aerial photographs.
- Gardens, regardless of size, were included in the census data

Table 2.1
2012 Land Use Census

Parameter		Sector A*	Sector B	Sector C	Sector D*
I. Nearest Occupied Residence	a. Distance (mile) b. Degrees from true north	1.02 355.4	1.51 23.7	0.70 42.3	2.60 60.8
II. Nearest Unoccupied Residence (closer than occupied residence)	a. Distance (mile) b. Degrees from true north	0.94 8.0	0.83 15.1	None	None
III. Nearest Milk Animal	a. Distance	None	None	None	None
IV. Nearest Broadleaf Garden	a. Distance (mile) b. Garden size (ft^2) c. Degrees from true north	None	1.52 ≈ 4050 21.9	0.69[2] ≈ 1250 43.6	3.8 ≈ 800 76.0
V. Census Comparison	a. Is nearest occupied residence in same location as last census? b. Is nearest milk animal in same location as last census? c. Is nearest broadleaf garden in same location as last census?	Yes N/A No	Yes N/A Yes[1]	Yes N/A Yes	Yes N/A No

1- Retained previous garden location. Located no other gardens in Sector B.

2 -Currently not planted. Retained due to potential to plant. Next nearest garden @4.53 mi, 49 degrees ≈200 ft^2

* - Change from last census. See table of Land Use Census Changes

Table 2.1. 2012 Land Use Census continued.

Parameter		Sector E	Sector F*	Sector G*	Sector H
I. Nearest Occupied Residence	a. Distance (miles) b. Degrees from true north	0.86 93.9	2.25 101.3	3.71 131.8	1.10 151.4
II. Nearest Unoccupied Residence (closer than occupied residence)	a. Distance (miles) b. Degrees from true north	None	None	2.10 129.2	1.07 151.0
III. Nearest Milk Animal	a. Distance	None	None	None	None
IV. Nearest Broadleaf Garden	a. Distance (miles) b. Garden size (ft^2) c. Degrees from true north	0.89 ≈1000 86.9	4.81 ≈200 122	3.39 ≈3.2E5[1] 129	4.39 ≈ 200 155
V. Census Comparison	a. Is nearest occupied residence in same location as last census? b. Is nearest milk animal in same location as last census? c. Is nearest broadleaf garden in same location as last census?	Yes N/A Yes	Yes N/A No	No N/A Yes	Yes N/A Yes

1 - Fields plowed, not planted. Next nearest garden 4.93 miles, 128 degrees, ~ 500 ft^2

* - Change from last census. See table of Land Use Census Changes

Table 2.1. 2012 Land Use Census continued.

Parameter		Sector J	Sector K	Sector L	Sector M
I. Nearest Occupied Residence	a. Distance (miles) b. Degrees from true north	3.14 174.2	2.20 197.0	0.89 219.7	None
II. Nearest Unoccupied Residence (closer than occupied residence)	a. Distance (miles) b. Degrees from true north	None	1.70 203.3 (Hunting Lodge-Info Only)	None	None
III. Nearest Milk Animal	a. Distance (miles)	None	None	None	None
IV. Nearest Broadleaf Garden	a. Distance (miles) b. Garden size (ft^2) c. Degrees from true north	3.16 ≈ 500 174.0	2.18 ≈ 2500 196.3	0.89 ≈ 50 219.5	None
V. Census Comparison	a. Is nearest occupied residence in same location as last census? b. Is nearest milk animal in same location as last census? c. Is nearest broadleaf garden in same location as last census?	Yes N/A Yes	Yes N/A Yes	Yes N/A Yes	N/A N/A N/A

Table 2.1. 2012 Land Use Census continued.

Parameter		Sector N	Sector P	Sector Q	Sector R
I. Nearest Occupied Residence	a. Distance (miles) b. Degrees from true north	None	None	None	1.11 346.1
II. Nearest Unoccupied Residence (closer than occupied residence)	a. Distance (miles) b. Degrees from true north	1.58 82.2 (Bucksnort Camp-Info Only)	None	None	None
III. Nearest Milk Animal	a. Distance (miles)	None	None	None	None
IV. Nearest Broadleaf Garden	a. Distance (miles) b. Garden size (ft^2) c. Degrees from true north	None	None	None	None
V. Census Comparison	a. Is nearest occupied residence in same location as last census? b. Is nearest milk animal in same location as last census? c. Is nearest broadleaf garden in same location as last census?	N/A N/A N/A	N/A N/A N/A	N/A N/A N/A	Yes N/A N/A

2012 Land Use Census Changes

SECTOR	PARAMETER	Reason for Change
A	Nearest Broadleaf Garden	No garden at 2010 census location. No other gardens in Sector A.
D	Nearest Broadleaf Garden	No garden at 2010 census location. New garden location identified.
F	Nearest Broadleaf Garden	No garden at 2010 census location. New garden location identified.
G	Nearest Broadleaf Garden	Fields plowed, not planted. Next nearest garden 4.93 miles, 128 degrees, ~ 500 ft^2

2.9 Interlaboratory Comparison Results

The Entergy, River Bend Station (RBS) Environmental Laboratory analyzed interlaboratory comparison samples to fulfill the requirements of the ODCM Specifications 6.12.1. The results are shown in Table A 9.1. The comparison showed acceptable results between RBS and the test laboratory for all media and isotopes, except for I-131 in milk. It was concluded that this was an anomalous value after an acceptable follow-up analysis, a review of test procedures and a review of quality control data for the associated equipment identified no quality problems. No REMP milk samples were required by the GGNS REMP in 2012.

Environmental Dosimetry Company analyzed interlaboratory comparison Thermoluminescent Dosimeters. Results showed that 100% of the measurements passed precision and bias criteria (Table A 9.2).

The results of GEL Laboratories annual QA Review, which included interlaboratory comparisons, were acceptable and are summarized in Table A 9.3.

3.0 Radiological Environmental Monitoring Program Summary

3.1 Program Results Summary

Table 3.1 summarizes the REMP results. Values reported as less than the lower limit of detection (<LLD) were not used when determining ranges and means for indicator and control locations.

TABLE 3.1

Radiological Environmental Monitoring Program Summary

Name of Facility: Grand Gulf Nuclear Station **Docket No:** 50-416
Location of Facility: Claiborne County, Mississippi **Reporting Period:** January - December 2012

Sample Type (Units)	Type & Number of Analyses [a]	LLD [b]	Indicator Locations Mean (F) [c] [Range]	Location with Highest Annual Mean		Control Locations Mean (F) [c] [Range]	Number of Nonroutine Results [e]
				Location [d]	Mean (F) [c] [Range]		
Air Particulates (pCi/m^3)	GB 156	0.01	0.028 (104/104) [0.010 - 0.055]	AS-1 PG (Sector G, 5.5 mi)	0.028 (52/52) [0.010 - 0.050]	0.027 (52/52) [0.013 - 0.051]	0
	GS 12						
	Cs-134	0.05	<LLD	N/A	N/A	<LLD	0
	Cs-137	0.06	<LLD	N/A	N/A	<LLD	0
Airborne Iodine (pCi/m^3)	I-131 156	0.07	<LLD	N/A	N/A	<LLD	0
Inner Ring TLDs (mR/Qtr)	Gamma 56	f	9.5 (56/56) [4.8 - 13.6]	M-99 (Sector J, 0.4 mi.)	12.0 (4/4) [9.9 – 13.6]	N/A	0
Outer Ring TLDs (mR/Qtr)	Gamma 28	f	9.7 (28/28) [4.4 – 13.0]	M-57 (Sector F, 4.5 mi.)	11.5 (4/4) [9.3 – 13.0]	N/A	0
Special Interest TLDs (mR/Qtr)	Gamma 28	f	9.6 (28/28) [6.5 – 12.5]	M-01 (Sector E, 3.5 mi.)	11.4 (4/4) [9.0 – 12.5]	N/A	0
Control TLDs (mR/Qtr)	Gamma 4	f	N/A	N/A	N/A	11.0 (4/4) [9.0 - 12.0]	0

TABLE 3.1

Radiological Environmental Monitoring Program Summary

Name of Facility: Grand Gulf Nuclear Station **Docket No:** 50-416
Location of Facility: Claiborne County, Mississippi **Reporting Period:** January - December 2012

Sample Type (Units)	Type & Number of Analyses [a]	LLD [b]	Indicator Location Mean (F) [c] [Range]	Location with Highest Annual Mean		Control Locations Mean (F) [c] [Range]	Number of Nonroutine Results [e]
				Location [d]	Mean (F) [c] [Range]		
Surface Water (pCi/l)	H-3 26	3000	817 (2/22) [529 – 1104]	Outfall 007 (Sector N, Radius 0.2 mi.)	817 (2/12) [529 -1104]	<LLD	0
	GS 12						
	I-131	15	<LLD	N/A	N/A	<LLD	0
	Mn-54	15	<LLD	N/A	N/A	<LLD	0
	Fe-59	30	<LLD	N/A	N/A	<LLD	0
	Co-58	15	<LLD	N/A	N/A	<LLD	0
	Co-60	15	<LLD	N/A	N/A	<LLD	0
	Zn-65	30	<LLD	N/A	N/A	<LLD	0
	Zr-95	30	<LLD	N/A	N/A	<LLD	0
	Nb-95	15	<LLD	N/A	N/A	<LLD	0
	Cs-134	15	<LLD	N/A	N/A	<LLD	0
	Cs-137	18	<LLD	N/A	N/A	<LLD	0
	Ba-140	60	<LLD	N/A	N/A	<LLD	0
	La-140	15	<LLD	N/A	N/A	<LLD	0

TABLE 3.1

Radiological Environmental Monitoring Program Summary

Name of Facility: Grand Gulf Nuclear Station **Docket No:** 50-416
Location of Facility: Claiborne County, Mississippi **Reporting Period:** January - December 2012

Sample Type (Units)	Type & Number of Analyses [a]	LLD [b]	Indicator Locations Mean (F) [c] [Range]	Location with Highest Annual Mean		Control Locations Mean (F) [c] [Range]	Number of Nonroutine Results [e]
				Location [d]	Mean (F) [c] [Range]		
Groundwater (pCi/1)	H-3 16	2000	<LLD	N/A	N/A	<LLD	0
	I-131 2	1	<LLD	N/A	N/A	<LLD	0
	GS 16						
	Mn-54	15	<LLD	N/A	N/A	<LLD	0
	Fe-59	30	<LLD	N/A	N/A	<LLD	0
	Co-58	15	<LLD	N/A	N/A	<LLD	0
	Co-60	15	<LLD	N/A	N/A	<LLD	0
	Zn-65	30	<LLD	N/A	N/A	<LLD	0
	Zr-95	30	<LLD	N/A	N/A	<LLD	0
	Nb-95	15	<LLD	N/A	N/A	<LLD	0
	Cs-134	15	<LLD	N/A	N/A	<LLD	0
	Cs-137	18	<LLD	N/A	N/A	<LLD	0
	Ba-140	60	<LLD	N/A	N/A	<LLD	0
	La-140	15	<LLD	N/A	N/A	<LLD	0
Sediment (pCi/kg)	GS 2						
	Cs-134	150	<LLD	N/A	N/A	<LLD	0
	Cs-137	180	38.8 (2/2) [37.30-40.30]	SEDHAM (Sector N, 1.6 Miles)	38.8 (2/2) [37.30-40.30]	<LLD	0

TABLE 3.1

Radiological Environmental Monitoring Program Summary

Name of Facility: Grand Gulf Nuclear Station **Docket No:** 50-416
Location of Facility: Claiborne County, Mississippi **Reporting Period:** January - December 2012

Sample Type (Units)	Type & Number of Analyses [a]	LLD [b]	Indicator Location Mean (F) [c] [Range]	Location with Highest Annual Mean		Control Locations Mean (F) [c] [Range]	Number of Nonroutine Results [e]
				Location [d]	Mean (F) [c] [Range]		
Fish (pCi/kg)	GS 2						
	Mn-54	130	<LLD	N/A	N/A	<LLD	0
	Fe-59	260	<LLD	N/A	N/A	<LLD	0
	Co-58	130	<LLD	N/A	N/A	<LLD	0
	Co-60	130	<LLD	N/A	N/A	<LLD	0
	Zn-65	260	<LLD	N/A	N/A	<LLD	0
	Cs-134	130	<LLD	N/A	N/A	<LLD	0
	Cs-137	150	<LLD	N/A	N/A	<LLD	0
Food Products/Vegetation (pCi/kg)	I-131 8	60	<LLD	N/A	N/A	<LLD	0
	GS 8						
	Cs-134	60	<LLD	N/A	N/A	<LLD	0
	Cs-137	80	<LLD	N/A	N/A	<LLD	0

TABLE 3.1

Radiological Environmental Monitoring Program Summary

Name of Facility: Grand Gulf Nuclear Station Docket No: 50-416
Location of Facility: Claiborne County, Mississippi Reporting Period: January - December 2012

Sample Type (Units)	Type & Number of Analyses [a]	LLD [b]	Indicator Location Mean (F) [c] [Range]	Location with Highest Annual Mean		Control Locations Mean (F) [c] [Range]	Number of Nonroutine Results [e]
				Location [d]	Mean (F) [c] [Range]		
Surface Water (Special) (pCi/l)	GS 5						
	I-131	15	<LLD	N/A	N/A	<LLD	0
	Mn-54	15	<LLD	N/A	N/A	<LLD	0
	Fe-59	30	<LLD	N/A	N/A	<LLD	0
	Co-58	15	<LLD	N/A	N/A	<LLD	0
	Co-60	15	<LLD	N/A	N/A	<LLD	0
	Zn-65	30	<LLD	N/A	N/A	<LLD	0
	Zr-95	30	<LLD	N/A	N/A	<LLD	0
	Nb-95	15	<LLD	N/A	N/A	<LLD	0
	Cs-134	15	<LLD	N/A	N/A	<LLD	0
	Cs-137	18	<LLD	N/A	N/A	<LLD	0
	Ba-140	60	<LLD	N/A	N/A	<LLD	0
	La-140	15	<LLD	N/A	N/A	<LLD	0

[a] GB = Gross beta; I-131 = Iodine-131; H-3 = Tritium; GS = Gamma scan.

[b] LLD = Required lower limit of detection based on ODCM Table 6.12.1-3.

[c] Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parenthesis (F).

[d] Where applicable, locations are specified by name, distance from reactor site and meteorological sector.

[e] Non-routine results are those which exceed ten times the control station value. If no control station value is available, the result is considered non-routine if it exceeds ten times the preoperational value for the location.

[f] LLD is not defined in ODCM Table 6.12.1-3.

Attachment 1

Radiological Monitoring Report

Summary of Monitoring Results

TABLE OF CONTENTS

Table A1.1
Sample Type: Air Particulate Filter and Radioiodine Cartridge
Analysis: Gross Beta and I-131
Units: pCi/m^3
AIR SAMPLE AS-1 PG - Nearest Community

LLD (pCi/m^3) LAB ID	START DATE	END DATE	0.07 I-131	0.01 GROSS BETA	
20120013	12/27/2011	1/3/2012	< 0.016	0.034	+/- 0.0011
20120039	1/3/2012	1/10/2012	< 0.015	0.024	+/- 0.0009
20120062	1/10/2012	1/17/2012	< 0.021	0.022	+/- 0.0009
20120108	1/17/2012	1/24/2012	< 0.019	0.032	+/- 0.0010
20120125	1/24/2012	1/31/2012	< 0.022	0.018	+/- 0.0008
20120162	1/31/2012	2/7/2012	< 0.024	0.017	+/- 0.0008
20120228	2/7/2012	2/14/2012	< 0.018	0.030	+/- 0.0010
20120269	2/14/2012	2/21/2012	< 0.022	0.025	+/- 0.0009
20120304	2/21/2012	2/28/2012	< 0.026	0.022	+/- 0.0009
20120344	2/28/2012	3/6/2012	< 0.019	0.017	+/- 0.0008
20120365	3/6/2012	3/13/2012	< 0.021	0.019	+/- 0.0012
20120391	3/13/2012	3/20/2012	< 0.014	0.015	+/- 0.0008
20120415	3/20/2012	3/27/2012	< 0.018	0.020	+/- 0.0009
20120445	3/27/2012	4/3/2012	< 0.023	0.026	+/- 0.0009
20120458	4/3/2012	4/11/2012	< 0.018	0.024	+/- 0.0009
20120504	4/11/2012	4/17/2012	< 0.020	0.037	+/- 0.0012
20120554	4/17/2012	4/24/2012	< 0.016	0.022	+/- 0.0009
20120603	4/24/2012	5/1/2012	< 0.017	0.027	+/- 0.0010
20120648	5/1/2012	5/8/2012	< 0.018	0.014	+/- 0.0008
20120684	5/8/2012	5/15/2012	< 0.016	0.033	+/- 0.0011
20120732	5/15/2012	5/22/2012	< 0.020	0.040	+/- 0.0012
20120748	5/22/2012	5/29/2012	< 0.015	0.040	+/- 0.0012
20120797	5/29/2012	6/5/2012	< 0.012	0.026	+/- 0.0010
20120823	6/5/2012	6/12/2012	< 0.023	0.023	+/- 0.0009
20120878	6/12/2012	6/19/2012	< 0.026	0.022	+/- 0.0009
20120905	6/19/2012	6/26/2012	< 0.014	0.034	+/- 0.0011

LLD (pCi/m^3) LAB ID	START DATE	END DATE	0.07 I-131	0.01 GROSS BETA	
20120921	6/26/2012	7/3/2012	< 0.017	0.044	+/- 0.0012
20120940	7/3/2012	7/10/2012	< 0.021	0.025	+/-0.0009
20120981	7/10/2012	7/17/2012	< 0.016	0.013	+/-0.0007
20121033	7/17/2012	7/24/2012	< 0.021	0.010	+/- 0.0007
20121044	7/24/2012	7/31/2012	< 0.025	0.024	+/- 0.0010
20121080	7/31/2012	8/8/2012	< 0.022	0.024	+/- 0.0009
20121124	8/8/2012	8/14/2012	< 0.026	0.201	+/- 0.0010
20121207	8/14/2012	8/21/2012	< 0.026	0.024	+/- 0.0009
20121221	8/21/2012	8/28/2012	< 0.024	0.034	+/- 0.0011
20121235	8/28/2012	9/4/2012	< 0.021	0.016	+/- 0.0008
20121260	9/4/2012	9/11/2012	< 0.018	0.026	+/- 0.0010
20121288	9/11/2012	9/18/2012	< 0.026	0.028	+/- 0.0010
20121342	9/18/2012	9/25/2012	< 0.021	0.037	+/- 0.0011
20121391	9/25/2012	10/2/2012	< 0.031	0.032	+/- 0.0010
20121404	10/2/2012	10/9/2012	< 0.017	0.045	+/- 0.0012
20121496	10/9/2012	10/16/2012	< 0.021	0.046	+/- 0.0012
20121508	10/16/2012	10/23/2012	< 0.070	0.035	+/- 0.0024
20121589	10/23/2012	10/30/2012	< 0.017	0.023	+/- 0.0009
20121619	10/30/2012	11/6/2012	< 0.025	0.044	+/- 0.0012
20121646	11/6/2012	11/13/2012	< 0.023	0.026	+/- 0.0010
20121690	11/13/2012	11/20/2012	< 0.019	0.049	+/- 0.0012
20121733	11/20/2012	11/27/2012	< 0.020	0.050	+/- 0.0012
20121794	11/27/2012	12/4/2012	< 0.027	0.034	+/- 0.0011
20121861	12/4/2012	12/11/2012	< 0.021	0.022	+/-0.0009
20121877	12/11/2012	12/18/2012	< 0.024	0.028	+/- 0.0010
20121884	12/18/2012	12/26/2012	< 0.021	0.024	+/- 0.0009

Average	0.0279
Maximum	0.0495
Minimum	0.0102

Table A 1.2
Sample Type: **Air Particulate Filter and Radioiodine Cartridge**
Analysis: Gross Beta and I-131
Units: pCi/m^3

AIR SAMPLE AS-3 61VA – Control

LLD (pCi/m^3)			0.07	0.01	
LAB ID	START DATE	END DATE	I-131	GROSS BETA	
20120014	12/27/2011	1/3/2012	< 0.019	0.035	+/- 0.0012
20120040	1/3/2012	1/10/2012	< 0.012	0.021	+/- 0.0009
20120063	1/10/2012	1/17/2012	< 0.022	0.023	+/- 0.0009
20120109	1/17/2012	1/24/2012	< 0.019	0.030	+/- 0.0010
20120126	1/24/2012	1/31/2012	< 0.020	0.017	+/- 0.0008
20120163	1/31/2012	2/7/2012	< 0.022	0.017	+/- 0.0008
20120229	2/7/2012	2/14/2012	< 0.019	0.027	+/- 0.0010
20120270	2/14/2012	2/21/2012	< 0.018	0.025	+/- 0.0009
20120305	2/21/2012	2/28/2012	< 0.022	0.018	+/- 0.0009
20120345	2/28/2012	3/6/2012	< 0.019	0.015	+/- 0.0008
20120366	3/6/2012	3/13/2012	< 0.026	0.016	+/- 0.0012
20120392	3/13/2012	3/20/2012	< 0.016	0.013	+/- 0.0008
20120416	3/20/2012	3/27/2012	< 0.018	0.017	+/- 0.0008
20120446	3/27/2012	4/3/2012	< 0.026	0.024	+/- 0.0009
20120459	4/3/2012	4/10/2012	< 0.023	0.020	+/- 0.0009
20120505	4/10/2012	4/17/2012	< 0.022	0.032	+/- 0.0010
20120555	4/17/2012	4/24/2012	< 0.022	0.022	+/- 0.0009
20120604	4/24/2012	5/1/2012	< 0.015	0.025	+/- 0.0009
20120649	5/1/2012	5/8/2012	< 0.018	0.013	+/- 0.0007
20120685	5/8/2012	5/15/2012	< 0.017	0.029	+/- 0.0010
20120733	5/15/2012	5/22/2012	< 0.025	0.037	+/- 0.0011
20120749	5/22/2012	5/29/2012	< 0.011	0.035	+/- 0.0011
20120798	5/29/2012	6/5/2012	< 0.018	0.023	+/- 0.0009
20120824	6/5/2012	6/12/2012	< 0.030	0.015	+/- 0.0008
20120879	6/12/2012	6/19/2012	< 0.022	0.019	+/- 0.0009

LLD (pCi/m^3)			0.07	0.01	
LAB ID	START DATE	END DATE	I-131	GROSS BETA	
20120906	6/19/2012	6/26/2012	< 0.015	0.029	+/- 0.0010
20120922	6/26/2012	7/3/2012	< 0.018	0.036	+/- 0.0011
20120941	7/3/2012	7/10/2012	< 0.024	0.021	+/-0.0009
20120982	7/10/2012	7/17/2012	< 0.039	0.013	+/-0.0011
20121034	7/17/2012	7/24/2012	< 0.024	0.013	+/- 0.0008
20121045	7/24/2012	7/31/2012	< 0.019	0.025	+/- 0.0010
20121081	7/31/2012	8/7/2012	< 0.020	0.026	+/- 0.0009
20121125	8/7/2012	8/14/2012	< 0.027	0.025	+/- 0.0010
20121208	8/14/2012	8/21/2012	< 0.021	0.026	+/- 0.0010
20121222	8/21/2012	8/28/2012	< 0.024	0.037	+/- 0.0011
20121236	8/28/2012	9/4/2012	< 0.023	0.017	+/- 0.0008
20121261	9/4/2012	9/11/2012	< 0.014	0.027	+/- 0.0010
20121289	9/11/2012	9/18/2012	< 0.027	0.028	+/- 0.0010
20121343	9/18/2012	9/25/2012	< 0.023	0.036	+/- 0.0011
20121392	9/25/2012	10/2/2012	< 0.026	0.034	+/- 0.0011
20121405	10/2/2012	10/9/2012	< 0.019	0.046	+/- 0.0012
20121497	10/9/2012	10/16/2012	< 0.028	0.051	+/- 0.0013
20121509	10/16/2012	10/23/2012	< 0.023	0.032	+/- 0.0010
20121590	10/23/2012	10/30/2012	< 0.026	0.024	+/- 0.0009
20121620	10/30/2012	11/6/2012	< 0.023	0.046	+/- 0.0012
20121647	11/6/2012	11/13/2012	< 0.025	0.029	+/- 0.0010
20121691	11/13/2012	11/20/2012	< 0.024	0.051	+/- 0.0013
20121734	11/20/2012	11/27/2012	< 0.033	0.051	+/- 0.0013
20121795	11/27/2012	12/4/2012	< 0.023	0.033	+/- 0.0011
20121862	12/4/2012	12/11/2012	< 0.027	0.023	+/-0.0009
20121878	12/11/2012	12/18/2012	< 0.026	0.033	+/- 0.0010
20121885	12/18/2012	12/25/2012	< 0.029	0.029	+/- 0.0010

Average	0.0271
Maximum	0.0512
Minimum	0.0128

Table A 1.3
Sample Type: **Air Particulate Filter and Radioiodine Cartridge**
Analysis: Gross Beta and I-131
Units: pCi/m^3

AIR SAMPLE AS-7 – Indicator

LLD (pCi/m^3) LAB ID	START DATE	END DATE	0.07 I-131	0.01 GROSS BETA	
20120015	12/27/2011	1/3/2012	< 0.016	0.036	+/- 0.0012
20120041	1/3/2012	1/10/2012	< 0.018	0.023	+/- 0.0009
20120064	1/10/2012	1/17/2012	< 0.017	0.023	+/- 0.0009
20120110	1/17/2012	1/24/2012	< 0.023	0.030	+/- 0.0010
20120127	1/24/2012	1/31/2012	< 0.018	0.017	+/- 0.0008
20120164	1/31/2012	2/7/2012	< 0.021	0.014	+/- 0.0008
20120230	2/7/2012	2/14/2012	< 0.014	0.027	+/- 0.0010
20120271	2/14/2012	2/21/2012	< 0.025	0.024	+/- 0.0010
20120306	2/21/2012	2/28/2012	< 0.020	0.019	+/- 0.0008
20120346	2/28/2012	3/6/2012	< 0.019	0.014	+/- 0.0007
20120367	3/6/2012	3/13/2012	< 0.022	0.017	+/- 0.0012
20120393	3/13/2012	3/20/2012	< 0.014	0.012	+/- 0.0008
20120417	3/20/2012	3/27/2012	< 0.016	0.018	+/- 0.0009
20120447	3/27/2012	4/3/2012	< 0.020	0.023	+/- 0.0009
20120460	4/3/2012	4/10/2012	< 0.024	0.018	+/- 0.0009
20120506	4/10/2012	4/17/2012	< 0.020	0.030	+/- 0.0010
20120556	4/17/2012	4/24/2012	< 0.023	0.021	+/- 0.0009
20120605	4/24/2012	5/1/2012	< 0.012	0.026	+/- 0.0009
20120650	5/1/2012	5/8/2012	< 0.016	0.013	+/- 0.0007
20120686	5/8/2012	5/15/2012	< 0.014	0.029	+/- 0.0010
20120734	5/15/2012	5/22/2012	< 0.020	0.038	+/- 0.0011
20120750	5/22/2012	5/29/2012	< 0.014	0.034	+/- 0.0011
20120799	5/29/2012	6/5/2012	< 0.013	0.022	+/- 0.0009
20120825	6/5/2012	6/12/2012	< 0.018	0.018	+/- 0.0008
20120880	6/12/2012	6/19/2012	< 0.021	0.019	+/- 0.0009
20120907	6/19/2012	6/26/2012	< 0.015	0.028	+/- 0.0010

LLD (pCi/m^3) LAB ID	START DATE	END DATE	0.07 I-131	0.01 GROSS BETA	
20120923	6/26/2012	7/3/2012	< 0.015	0.040	+/- 0.0011
20120942	7/3/2012	7/10/2012	< 0.023	0.022	+/-0.0009
20120983	7/10/2012	7/17/2012	< 0.023	0.010	+/-0.0007
20121035	7/17/2012	7/24/2012	< 0.019	0.013	+/- 0.0008
20121046	7/24/2012	7/31/2012	< 0.023	0.023	+/- 0.0009
20121082	7/31/2012	8/7/2012	< 0.019	0.029	+/- 0.0010
20121126	8/7/2012	8/14/2012	< 0.018	0.024	+/- 0.0010
20121209	8/14/2012	8/21/2012	< 0.029	0.024	+/- 0.0010
20121223	8/21/2012	8/28/2012	< 0.025	0.037	+/- 0.0011
20121237	8/28/2012	9/4/2012	< 0.026	0.017	+/- 0.0009
20121262	9/4/2012	9/11/2012	< 0.013	0.028	+/- 0.0010
20121290	9/11/2012	9/18/2012	< 0.019	0.028	+/- 0.0010
20121344	9/18/2012	9/25/2012	< 0.021	0.039	+/- 0.0011
20121393	9/25/2012	10/2/2012	< 0.030	0.034	+/- 0.0011
20121406	10/2/2012	10/9/2012	< 0.015	0.048	+/- 0.0012
20121498	10/9/2012	10/16/2012	< 0.026	0.053	+/- 0.0013
20121510	10/16/2012	10/23/2012	< 0.025	0.033	+/- 0.0011
20121591	10/23/2012	10/30/2012	< 0.022	0.026	+/- 0.0009
20121621	10/30/2012	11/6/2012	< 0.025	0.047	+/- 0.0012
20121648	11/6/2012	11/13/2012	< 0.022	0.029	+/- 0.0010
20121692	11/13/2012	11/20/2012	< 0.016	0.053	+/- 0.0013
20121735	11/20/2012	11/27/2012	< 0.020	0.055	+/- 0.0013
20121796	11/27/2012	12/4/2012	< 0.028	0.035	+/- 0.0011
20121863	12/4/2012	12/11/2012	< 0.023	0.024	+/-0.0009
20121879	12/11/2012	12/18/2012	< 0.029	0.034	+/- 0.0011
20121886	12/18/2012	12/25/2012	< 0.024	0.029	+/- 0.0010

Average	0.0274
Maximum	0.0548
Minimum	0.0095

Table A 1.4
Sample Type: **Air Particulate Filter**
Analysis: Gamma Isotopic
Units: pCi/m^3
AIR PARTICULATE FILTER QUARTERLY COMPOSITES (GAMMA)

LLD (pCi/m^3) LAB ID	LOCATION	DATE	0.05 CS-134	0.06 CS-137
20120468	AS-1PG	2/14/2012	< 0.001	< 0.001
20120469	AS-3 61VA	2/14/2012	< 0.001	< 0.001
20120470	AS-7 UH	2/14/2012	< 0.001	< 0.002
20120984	AS-1PG	5/11/2012	< 0.001	< 0.001
20120985	AS-3 61VA	5/11/2012	< 0.001	< 0.001
20120986	AS-7 UH	5/11/2012	< 0.001	< 0.001
20121596	AS-1PG	8/18/2012	< 0.001	< 0.001
20121597	AS-3 61VA	8/18/2012	< 0.001	< 0.001
20121598	AS-7 UH	8/18/2012	< 0.001	< 0.001
20121911	AS-1PG	11/13/2012	< 0.001	< 0.001
20121912	AS-3 61VA	11/13/2012	< 0.001	< 0.002
20121913	AS-7 UH	11/13/2012	< 0.001	< 0.001

Table A 2.1
Sample Type: **Thermoluminescent Dosimeters**
Analysis: Gamma Dose in 2012
Units: mrem/Qtr

Inner Ring - Within General Area of Site Boundary					
Station	**1st Qtr**	**2nd Qtr**	**3rd Qtr**	**4th Qtr**	**Annual Mean**
M-16	9.2	11.1	11.7	11.3	10.8
M-19	8.1	9.4	11.1	10.3	9.7
M-21	9.0	11.2	12.9	13.0	11.5
M-22	6.4	7.9	9.4	8.9	8.2
M-23	6.2	8.7	9.7	9.4	8.5
M-25	6.0	8.5	9.0	9.8	8.3
M-28	8.6	11.4	11.5	11.7	10.8
M-94	8.3	10.6	11.9	11.9	10.7
M-95	4.8	6.8	7.2	6.5	6.3
M-96	5.4	7.7	7.7	6.8	6.9
M-97	4.9	6.5	7.7	6.8	6.5
M-98	8.9	11.7	13.6	11.2	11.4
M-99*	9.9	12.6	13.6	12.0	12.0
M-100	9.1	11.9	12.5	12.0	11.4

*Location with highest annual mean
ND- No Data; TLD inaccessible due to river level

Outer Ring – Approximately Three (3) to Five (5) Miles from the Site					
Station	**1st Qtr**	**2nd Qtr**	**3rd Qtr**	**4th Qtr**	**Annual Mean**
M-36	7.0	8.8	10.0	9.9	8.9
M-40	4.4	6.6	5.5	6.4	5.7
M-48	7.9	10.1	11.0	10.5	9.9
M-49	9.3	11.4	12.3	12.2	11.3
M-50	7.9	9.4	10.3	9.8	9.3
M-55	9.6	12.0	11.5	11.1	11.1
M-57 *	9.3	11.7	11.9	13.0	11.5

*Location with highest annual mean

Table A 2.2
Sample Type: **Thermoluminescent Dosimeters**
Analysis: Gamma Dose in 2012
Units: mrem/Qtr

Special Interest Areas – Population Centers & Schools					
Station	**1st Qtr**	**2nd Qtr**	**3rd Qtr**	**4th Qtr**	**Annual Mean**
M-01*	9.0	11.8	12.4	12.5	11.4
M-07	8.5	10.7	11.6	11.6	10.6
M-09	7.8	9.8	11.0	11.2	10.0
M-10	6.8	8.4	8.9	9.4	8.4
M-33	6.5	8.4	9.0	8.9	8.2
M-38	7.5	10.0	10.3	10.4	9.5
M-39	7.0	9.5	9.5	9.6	8.9

*Location with highest annual mean

Table A 2.3
Sample Type: **Thermoluminescent Dosimeters**
Analysis: Gamma Dose in 2012
Units: mrem/Qtr

Special Interest Areas – Control					
Station	**1st Qtr**	**2nd Qtr**	**3rd Qtr**	**4th Qtr**	**Annual Mean**
M-14	9.0	11.4	12.0	11.7	11.0

Table A 3.1
Sample Type: **2012 Surface Water**
Analysis: Gamma Isotopic
Units: pCi/L

SURFACE WATER SAMPLES (GAMMA)

LLD/LIQUID LAB ID	LOCATION	DATE	15 MN-54	15 CO-58	30 FE-59	15 CO-60	30 ZN-65	15 NB-95	30 ZR-95	15 I-131	15 CS-134	18 CS-137	60 BA-140	15 LA-140
20120307	MRUP	2/27/2012	< 9.45	< 8.65	< 3.32	< 6.78	< 15.20	< 9.95	< 14.30	< 12.80	< 9.36	< 6.75	< 39.80	< 11.90
20120308	MR DOWN	2/27/2012	< 6.31	< 5.55	< 13.10	< 6.99	< 12.10	< 9.77	< 10.60	< 11.10	< 6.33	< 7.76	< 33.30	< 14.90
20120871	MRUP	6/18/2012	< 8.16	< 7.55	< 17.80	< 8.24	< 12.70	< 8.02	< 12.00	< 12.20	< 6.97	< 8.06	< 39.90	< 9.96
20120872	MR DOWN	6/18/2012	< 7.49	< 8.25	< 13.30	< 7.32	< 19.50	< 9.77	< 15.20	< 11.50	< 8.01	< 7.81	< 34.80	< 14.80
20121293	MRUP	9/19/2012	< 8.30	< 5.98	< 12.70	< 7.45	< 18.10	< 8.55	< 16.30	< 14.50	< 7.47	< 7.58	< 36.50	< 13.90
20121294	MRUP DUP	9/19/2012	< 6.44	< 7.38	< 13.20	< 6.96	< 15.40	< 9.05	< 14.80	< 11.40	< 7.71	< 8.00	< 36.60	< 13.20
20121295	MR DOWN	9/19/2012	< 4.80	< 4.64	< 10.10	< 4.85	< 8.65	< 5.39	< 7.08	< 8.48	< 4.41	< 5.01	< 25.90	< 8.78
20121296	GG MR DOWN	9/19/2012	< 7.14	< 7.19	< 10.20	< 4.05	< 16.70	< 7.73	< 13.90	< 13.20	< 5.36	< 8.31	< 37.00	< 12.60
20121708	MR DOWN*	11/21/2012	< 13.10	< 11.80	< 22.80	< 8.40	< 23.70	< 12.90	< 20.50	< 13.30	< 12.20	< 13.20	< 42.10	< 5.92
20121707	GG MRDOWN*	11/21/2012	< 6.26	< 7.30	< 12.00	< 6.45	< 13.40	< 7.68	< 11.20	< 10.10	< 6.08	< 7.23	< 35.90	< 14.20
20121727	MRUP	11/27/2012	< 8.83	< 7.05	< 16.70	< 6.40	< 13.80	< 9.63	< 10.70	< 12.70	< 7.07	< 9.93	< 32.50	< 12.60
20121728	MR DOWN	11/27/2012	< 7.87	< 8.15	< 17.10	< 9.17	< 17.70	< 8.74	< 14.20	< 14.10	< 8.89	< 9.24	< 44.10	< 11.90

"GG" – indicates duplicate sample.
* Annual Sample collected during liquid discharge

Table A 3.2
Sample Type: : **2012 Surface Water**
Analysis: Tritium
Units: pCi/L

SURFACE WATER SAMPLES (TRITIUM) – GGNS

LLD LAB ID	LOCATION	DATE	3000 TRITIUM
20120114	OUTFALL 007	1/24/2012	< 688.00
20120181	OUTFALL 007	2/14/2012	529.00 +/- 181.28
20120307	MRUP	2/27/2012	< 639.21
20120308	MR DOWN	2/27/2012	< 637.53
20120368	OUTFALL 007	3/10/2012	< 645.17
20120646	OUTFALL 007	4/16/2012	< 396.31
20120695	OUTFALL 007	5/17/2012	< 657.23
20120873	OUTFALL 007	6/13/2012	< 655.23
20120871	MRUP	6/18/2012	< 574.27
20120872	MR DOWN	6/18/2012	< 647.99
20121032	OUTFALL 007	7/19/2012	< 571.19
20121127	OUTFALL 007	8/08/2012	< 590.00
20121263	OUTFALL 007	9/11/2012	< 541.00
20121293	MRUP	9/19/2012	< 574.87
20121294	MRUP DUP	9/19/2012	< 573.39
20121295	MR DOWN	9/19/2012	< 574.93
20121296	MR DOWN DUP	9/19/2012	< 574.37
20121634*	MR DOWN	10/11/2012	< 614.06
20121635*	GG MRDOWN	10/11/2012	< 614.34
20121499	OUTFALL 007	10/17/2012	< 597.00
20121642	OUTFALL 007	11/12/2012	1,104.00 +/- 312.92
20121707*	MRDOWN	11/21/2012	<616.00
20121708*	MRDOWN GG	11/21/2012	< 611.00
20121727	MRUP	11/27/2012	< 637.10
20121728	MR DOWN	11/27/2012	< 635.61
20121864	OUTFALL 007	12/12/2012	< 611.00

* Annual Sample collected during liquid discharge
"GG" – indicates duplicate sample.

Table A 4.1
Sample Type: : **2012 Groundwater**
Analysis: Gamma Isotopic
Units: pCi/L

GROUND WATER SAMPLES (GAMMA)

LLD LAB ID	LOCATION	DATE	15 MN-54	15 CO-58	30 FE-59	15 CO-60	30 ZN-65	15 NB-95	30 ZR-95	15 I-131	15 CS-134	18 CS-137	60 BA-140	15 LA-140
20120436	CONSTWELL1	03/29/2012	< 9.47	< 9.65	< 16.20	< 9.81	< 18.80	< 10.50	< 16.80	< 11.10	< 9.42	< 9.48	< 34.90	< 12.20
20120437	CONSTWELL3	03/29/2012	< 4.94	< 6.00	< 14.00	< 5.75	< 9.32	< 6.82	< 11.10	< 8.60	< 5.79	< 6.18	< 29.20	< 11.80
20120438	CONSTWELL4	03/29/2012	<11.10	< 6.98	< 16.30	< 11.70	< 13.70	< 13.10	< 21.80	< 14.80	< 9.62	< 6.59	< 53.50	< 12.50
20120455	PGWELL	04/02/2012	< 4.95	< 5.30	< 11.30	< 4.06	< 8.35	< 5.68	< 8.90	< 14.50	< 4.66	< 5.26	< 34.20	< 11.60
307436001	CONSTWELL1	06/27/2012	<3.12	<2.95	<6.88	<3.13	<6.28	<3.72	<5.51	<11.80	<3.07	<3.14	<8.43	<8.43
307436001	CONSTWELL3	06/27/2012	<3.18	<3.62	<7.61	<3.49	<7.10	<3.82	<6.43	<13.80	<3.67	<3.58	<9.80	<9.80
307436002	CONSTWELL4	06/27/2012	<2.88	<3.19	<7.14	<3.39	<6.80	<3.65	<6.32	<11.90	<3.38	<3.40	<8.41	<8.41
307436003	PGWELL	07/02/2012	<2.73	<2.82	<6.36	<2.96	<5.77	<3.16	<5.43	<7.39	<3.16	<2.83	<5.73	<5.73
312096004	CONSTWELL1	09/14/2012	<3.74	<3.93	<7.01	<3.55	<6.58	<4.18	<7.11	<19.70	<3.69	<3.29	<1.13	<1.13
312096002	CONSTWELL3	09/14/2012	<2.59	<2.98	<6.40	<2.74	<5.46	<3.26	<4.76	<15.10	<2.82	<2.80	<9.75	<9.75
312096003	CONSTWELL4	09/14/2012	<2.83	<3.23	<7.01	<3.12	<6.38	<3.62	<6.08	<17.90	<3.14	<2.87	<10.00	<10.00
312096007	PGWELL	09/25/2012	<2.87	<3.10	<6.28	<3.18	<6.20	<3.29	<5.32	<7.22	<3.32	<3.27	<6.81	<6.8
20121760	CONSTWELL1	11/29/2012	< 5.04	< 5.51	< 11.20	< 4.98	< 13.10	< 5.91	< 12.20	< 8.69	< 5.66	< 6.26	< 26.30	< 11.80
20121763	CONSTWELL3	11/29/2012	< 4.39	< 5.52	< 9.86	< 4.69	< 15.00	< 6.63	< 9.02	< 0.79	< 5.30	< 6.17	< 27.20	< 8.08
20121761	CONSTWELL4	11/29/2012	< 8.91	< 12.20	< 21.80	< 10.50	< 17.40	< 14.20	< 20.10	< 14.90	< 7.67	< 11.80	< 48.80	< 14.00
20121762	PGWELL	12/03/2012	< 6.67	< 5.21	< 11.10	< 6.55	< 11.40	< 6.47	< 12.40	< 0.99	< 4.87	< 5.92	< 21.80	< 10.50

Table A 4.2
Sample Type: **2012 Groundwater**
Analysis: Tritium
Units: pCi/L

GROUND WATER SAMPLES (TRITIUM)

LLD LAB ID	LOCATION	DATE	2000 TRITIUM
20120436	CONSTWELL1	03/29/2012	<707.09
20120437	CONSTWELL3	03/29/2012	<708.72
20120438	CONSTWELL4	03/29/2012	<707.83
20120455	PGWELL	04/02/2012	<636.49
307436001	CONSTWELL1	06/27/2012	<368
307436002	CONSTWELL3	06/27/2012	<367
307436003	CONSTWELL4	06/27/2012	<372
307436004	PGWELL	07/02/2012	<370
312096001	CONSTWELL1	09/14/2012	<212
312096002	CONSTWELL3	09/14/2012	<215
312096003	CONSTWELL4	09/14/2012	<209
312096007	PGWELL	09/25/2012	<218
20121760	COSTWELL1	11/29/2012	<603.81
20121763	CONSTWELL3	11/29/2012	<605.11
20121761	COSTWELL4	11/29/2012	<601.65
20121762	PGWELL	12/03/2012	<602.81

Table A 4.3
Sample Type:**2012 Groundwater**
Analysis: Iodine
Units: pCi/L

GROUNDWATER SAMPLES (Iodine-131)

LLD LAB ID	LOCATION	DATE	1.0 1-131
20111752	PGWELL	12/03/2012	< 0.99
20111754	CONSTWELL3	11/29/2012	< 0.79

Table A 5.1
Sample Type: : **2012 Sediment**
Analysis: Gamma Isotopic
Units: pCi/kg

SEDIMENT SAMPLES (GAMMA)

LLD LAB ID	LOCATION	DATE	150 CS-134	180 CS-137
20121729	SEDHAM	11/27/2012	< 24.80	37.30 +/- 11.5
20121730	SEDCONT	11/27/2012	< 13.80	< 19.90
20121731	GG SEDHAM	11/27/2012	< 23.70	40.30 +/- 13.2
20121732	GG SEDCONT	11/27/2012	< 20.70	< 21.00

"GG" – indicates duplicate sample.

Table A 6.1
Sample Type: : **2012 Meat**
Analysis: Gamma Isotopic
Units: pCi/kg

FISH SAMPLES (GAMMA)

LLD LAB ID	LOCATION	DATE	130 MN-54	130 CO-58	260 FE-59	130 CO-60	260 ZN-65	130 CS-134	150 CS-137
20121407	FISHUP	10/08/2012	< 8.52	< 9.82	< 32.10	< 10.90	< 26.50	< 8.06	< 9.90
20121408	FISHDOWN	10/08/2012	< 11.00	< 10.10	< 26.90	< 16.20	< 26.30	< 9.30	< 10.90

Table A 7.1
Sample Type: **2012 Food Products**
Analysis: Iodine-131 and Gamma Isotopic
Units: pCi/kg

VEGETATION SAMPLES (GAMMA)

LLD LAB ID	LOCATION	DATE	60 I-131	60 CS-134	80 CS-137
20120378	VEG-CONT	3/14/2012	< 46.50	< 31.20	< 31.40
20120379	VEG-J	3/15/2012	< 36.10	< 24.70	< 27.00
20120869	VEG-CONT	6/14/2012	< 37.90	< 15.70	< 16.80
20120870	VEG-J	6/14/2012	< 59.70	< 21.80	< 26.10
20121291	VEG-CONT	9/19/2012	< 44.60	< 20.60	< 31.90
20121292	VEG-J	9/20/2012	< 39.40	< 19.90	< 29.70
20121802	VEG-CONT	12/3/2012	< 39.80	< 22.50	< 27.70
20121803	VEG-J	12/5/2012	< 38.10	< 27.10	< 30.10

Table A 8.1
Sample Type: **Special Samples**
Analysis: Gamma Isotopic
Units: pCi/L

SPECIAL SURFACE WATER SAMPLES (GAMMA)

LLD LAB ID	LOCATION	DATE	15 MN-54	15 CO-58	30 FE-59	15 CO-60	30 ZN-65	15 NB-95	30 ZR-95	15 I-131	15 CS-134	18 CS-137	60 BA-140	15 LA-140
20120181	OUTFALL 007	2/14/2012	<12.10	<9.13	<18.00	<12.30	<26.00	<12.20	<17.60	<12.20	<2.61	<9.96	<36.10	<14.90
20120368	OUTFALL 007	3/10/2012	< 7.01	< 5.45	< 12.00	< 5.85	< 13.70	< 6.76	< 14.20	< 13.90	< 4.66	< 5.34	< 32.30	< 12.00
20120695	OUTFALL 007	5/17/2012	<14.60	<11.80	<22.70	<7.03	<22.00	<12.40	<18.10	<12.10	<8.72	<10.40	<45.10	<12.50
20121263	OUTFALL 007	9/11/2012	<12.10	<4.75	<19.60	<9.13	<17.40	<11.00	<16.80	<9.42	<8.63	<9.26	<25.90	<14.50
20121642	OUTFALL 007	11/12/2012	<13.30	<13.10	<16.10	<12.50	<14.30	<12.60	<11.80	<14.70	<11.30	<10.50	<37.90	<14.60

"GG" – indicates duplicate sample

VENISON SAMPLES (GAMMA)

LLD LAB ID	SAMPLE ID	DATE	130 MN-54	130 CO-58	260 FE-59	130 CO-60	260 ZN-65	130 CS-134	150 CS-137
20121409	VENISON	10/01/2012	< 12.00	< 13.60	< 37.00	< 12.101	< 29.70	< 8.25	< 13.10

Table A 9.1
Sample Type: 2012 RBS Interlaboratory Comparison
Analysis: Gross Beta, Tritium, Iodine-131 and Gamma Isotopic

Analytics E7481-125 Nuclide	Gross Beta in Water					Range of 0.80 to 1.25	
	RBS Mean pCi/L	RBS 1-s pCi/L	Ref Lab Value pCi/L	Ref Lab uncertainty pCi/L	Resolution	RBS/Ref Lab Ratio	Pass/ Fail
Cs-137	227	1	273	4.57	60	0.83	Pass

Analytics E7480-125 Nuclide	Gamma in Water					Range of 0.80 to 1.25	
	RBS Mean pCi/L	RBS 1-s pCi/L	Ref Lab Value pCi/L	Ref Lab Uncertainty pCi/L	Resolution	RBS/Ref Lab Ratio	Pass/ Fail
I-131	102	27.0	99.4	1.66	60	1.03	Pass
Ce-141	112	9.00	112	1.87	60	1.00	Pass
Cr-51	538	67.0	548	9.14	60	0.98	Pass
Cs-134	219	11.0	238	3.97	60	0.92	Pass
Cs-137	279	9.00	289	4.82	60	0.97	Pass
Co-58	117	12.0	126	2.10	60	0.93	Pass
Mn-54	192	20.0	180	3.01	60	1.06	Pass
Fe-59	198	24.0	174	2.91	60	1.14	Pass
Zn-65	300	40.0	272	4.54	60	1.10	Pass
Co-60	485	25.0	484	8.09	60	1.00	Pass

Table A 9.1
Sample Type: 2012 RBS Interlaboratory Comparison
Analysis: Gross Beta, Tritium, Iodine-131 and Gamma Isotopic

Analytics E7483-125 Nuclide	Gamma in Milk					Range of 0.80 to 1.25	
	RBS Mean pCi/L	RBS 1-s pCi/L	Ref Lab Value pCi/L	Ref Lab uncertainty pCi/L	Resolution	RBS/Ref Lab Ratio	Pass/ Fail
I-131	67.0	25.0	99.7	1.66	60	0.67	Fail
Ce-141	85.0	13.0	82.2	1.37	60	1.03	Pass
Cr-51	399	82.0	402	6.71	60	0.99	Pass
Cs-134	150	7.00	174	2.91	60	0.86	Pass
Cs-137	197	11.0	212	3.54	60	0.93	Pass
Co-58	89.0	10.0	92.3	1.54	60	0.96	Pass
Mn-54	139	13.0	132	2.21	60	1.05	Pass
Fe-59	132	11.0	128	2.13	60	1.03	Pass
Zn-65	207	27.0	199	3.33	60	1.04	Pass
Co-60	346	9.00	355	5.93	60	0.97	Pass

Analytics E7482-125 Nuclide	I-131 cartridge					Range of 0.80 to 1.25	
	RBS Mean pCi/each	RBS 1-s pCi/each	Ref Lab Value pCi/each	Ref Lab uncertainty pCi/each	Resolution	RBS/Ref Lab Ratio	Pass/ Fail
I-131	94.0	6.00	96.4	1.61	60	0.97	Pass

Analytics E8137-125 Nuclide	Gross Beta filter					Range of 0.80 to 1.25	
	RBS Mean pCi/filter	RBS 1-s pCi/filter	Ref Lab Value pCi/filter	Ref Lab uncertainty pCi/filter	Resolution	RBS/Ref Lab Ratio	Pass/ Fail
Cs-137	88.3	0.210	90.5	1.51	60	0.98	Pass

Table A 9.1
Sample Type: 2012 RBS Interlaboratory Comparison
Analysis: Gross Beta, Tritium, Iodine-131 and Gamma Isotopic

Analytics E8136-125 Nuclide	H-3 in water					Range of 0.80 to 1.25	
	RBS Mean pCi/L	RBS 1-s pCi/L	Ref Lab Value pCi/L	Ref Lab uncertainty pCi/L	Resolution	RBS/Ref Lab Ratio	Pass/ Fail
H-3	13500	103	13000	217	60	1.03	Pass

Analytics E8138-125 Nuclide	Gamma Filter					Range of 0.80 to 1.25	
	RBS Mean pCi/filter	RBS 1-s pCi/filter	Ref Lab Value pCi/filter	Ref Lab Uncertainty pCi/filter	Resolution	RBS/Ref Lab Ratio	Pass/ Fail
Ce-141	134	8	134	2.23	60	1.00	Pass
Cs-134	78.9	1.6	88.3	1.47	60	0.89	Pass
Cs-137	143	2.0	142	2.37	60	1.01	Pass
Co-58	77.8	3.6	82.0	1.37	60	0.95	Pass
Mn-54	169	9.5	160	2.67	60	1.06	Pass
Fe-59	133	12.8	124	2.07	60	1.07	Pass
Zn-65	161	8.5	157	2.62	60	1.02	Pass
Co-60	127	2.6	124	2.07	60	1.03	Pass

Analytics E8139-125 Nuclide	Gamma Soil					Range of 0.80 to 1.25	
	RBS Mean pCi/g	RBS 1-s pCi/g	Ref Lab Value pCi/g	Ref Lab Uncertainty pCi/g	Resolution	RBS/Ref Lab Ratio	Pass/ Fail
Ce-141	0.471	0.108	0.419	0.00699	60	1.12	Pass
Cs-134	0.256	0.013	0.277	0.00462	60	0.92	Pass
Cs-137	0.529	0.022	0.536	0.00895	60	0.99	Pass
Co-58	0.240	0.030	0.257	0.00429	60	0.93	Pass
Mn-54	0.515	0.009	0.501	0.00836	60	1.03	Pass
Fe-59	0.444	0.035	0.389	0.00649	60	1.14	Pass
Zn-65	0.508	0.050	0.492	0.00822	60	1.03	Pass
Co-60	0.388	0.014	0.389	0.00649	60	1.00	Pass

Table A 9.1
Sample Type: 2012 RBS Interlaboratory Comparison
Analysis: Gross Beta, Tritium, Iodine-131 and Gamma Isotopic

Analytics E10513 Nuclide	Gamma in Milk					Range of 0.80 to 1.25	
	RBS Mean pCi/L	RBS 1-s pCi/L	Ref Lab Value pCi/L	Ref Lab uncertainty pCi/L	Resolution	RBS/Ref Lab Ratio	Pass/ Fail
I-131	105	9	100	1.67	60	1.05	Pass
Ce-141	196	13	187	3.13	60	1.05	Pass
Cr-51	495	74	472	7.88	60	1.05	Pass
Cs-134	215	17	214	3.57	60	1.01	Pass
Cs-137	272	17	266	4.44	60	1.02	Pass
Co-58	218	14	208	3.47	60	1.05	Pass
Mn-54	218	11	208	3.48	60	1.05	Pass
Fe-59	257	9	252	4.21	60	1.02	Pass
Zn-65	316	23	301	5.02	60	1.05	Pass
Co-60	396	8	400	6.68	60	0.99	Pass

One result was outside the control limits for accuracy in the 2012 Interlaboratory Comparison program studies. I-131 in milk had a River Bend (RBS) to Reference Lab (EZA) ratio of 0.67 versus an acceptable range of 0.80 – 1.25. The mean for RBS was 67 pCi/Lversus the reference mean of 99.7 pCi/L.

Review of the data results for I-131 in milk showed consistently low values. The vendor laboratory supplying the cross-check sample was contacted regarding the result for I-131 in milk. No systematic bias was indicated among participants.

A similar sample (gamma in water) analyzed in the same time period indicated an acceptable ratio of 1.03. A review of gamma spectroscopy quality control data revealed no anomalies. A second gamma in milk sample was analyzed with acceptable results.

Environmental samples are analyzed and reported with a ninety-five percent confidence level. A known standard is counted daily prior to any samples and must read within the control limits of the decay corrected activity; therefore, there is no impact on previously reported data due to these results.

Table A 9.2
Sample Type: EDC 2012 Annual Quality Assurance Status Report
Analysis: Environmental Dosimeters

ENVIRONMENTAL DOSIMETRY COMPANY
PERCENTAGE OF DOSIMETERS THAT PASSED INTERNAL BIAS AND PRECISION CRITERIA
JANUARY – DECEMBER 2012[1]

(1) Environmental dosimeter results are free in air.
(2) Bias criterion = ± 15%
(3) Precision criterion = ± 12.8%

Dosimeter Type	Number Tested	% Passed Bias Criterion[2]	% Passed Precision Criterion[3]
Panasonic Environmental	72	100	100

Table 9.3
Sample Type: GEL 2012 Environmental Quality Assurance Summary
Matrix: Milk, Solid, Filter, Liquid, Tissue, Vegetation, Air Charcoal, Drinking Water

GEL LABORATORIES LLC
INTRA-LABORATORY QA DATA SUMMARIES

Data Summary	Bias Criteria		Precision Criteria	
	Within Criteria	Outside Criteria	Within Criteria	Outside Criteria
REMP Test Results	2,941	2	3,242	0
All Radiological Test Results	22,305	6	27,436	29