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GNRO-2012/00034

April 30, 2012

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

Subject: Grand Gulf Nuclear Station (GGNS) 2011 Annual Radiological
Environmental Operating Report (AREOR)
Grand Gulf Nuclear Station (GGNS), Unit 1
Docket No. 50-416
License No. NPF-29

Dear Sir or Madam:

In accordance with the Grand Gulf Nuclear Station Unit 1 Technical Specification 5.6.2, attached is the Annual Radiological Environmental Operating Report for the period January 1, 2011 through December 31, 2011.

This letter does not contain any commitments.

If you have questions or require additional information concerning this report, please contact Charles Nash at (601) 437-6936 or Christina Perino at (601) 437-6299.

Sincerely,

A handwritten signature in black ink, appearing to read "Christina Perino".

CLP\rrj

Attachment: 2011 Annual Radiological Environmental Operating Report

cc: (See Next Page)

cc:

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Attachment

to

GNRO-2012/00034

2011 Annual Radiological Environmental Operating Report

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

**ANNUAL
RADIOLOGICAL ENVIRONMENTAL
OPERATING REPORT**

January 1, 2011-December 31, 2011

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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, 2011, through December 31, 2011. 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. Special samples collected to supplement the REMP included surface water.

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 had on the surrounding environment.

In the current year, GGNS personnel collected environmental samples for radiological analysis. The results of indicator locations when compared to control locations and previous studies, determined that no significant relationship exists between GGNS' operation and effect on the plant environs. The review of the current year's data, in many cases, showed undetectable radiation levels in the environment and near background levels in significant 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

GGNS' review indicates that no samples equaled or exceeded reporting levels for radioactivity concentration in environmental samples, as outlined in Offsite Dose Calculation Manual (ODCM) Specifications Table 6.12.1-2, when averaged over any calendar quarter, due to GGNS effluents. The analytical results did not trigger any Radiological Monitoring Program Special Reports.

Radioactivity Not Attributable to GGNS

In previous years, the GGNS REMP detected radioactivity attributable to other sources twice. These include the Chinese nuclear test explosion in 1980, and the radioactive release due to reactor core degradation at the Chernobyl Nuclear Power Plant in 1986. In 2011, the GGNS REMP detected radioactivity following the March 11, 2011, Tohoku earthquake affecting the Dai-ichi, Fukushima Nuclear Power Plant. Given that the radioactivity was detected following the Fukushima incident, the pre- and post-Fukushima radioactivity levels were at, or near, background levels with similar measurements detected in control and indicator locations, the detected radioactivity was determined not attributable to GGNS operations.

Comparison to Federal and State Programs

GGNS personnel compared REMP data to federal and state monitoring programs as the results became available. Historically, the programs used for comparison have 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.

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 results of MSDH's monitoring program for the reporting period compared favorably with the GGNS REMP. MSDH and GGNS reported detectable radioactivity in the same periods during the Dai-ichi, Fukushima Nuclear Power Plant incident.

Sample Deviations

- **Milk**

The REMP did not include milk sampling within 5 miles [8 kilometers (km)] of GGNS in the current year due to unavailability. The ODCM requires collection of milk samples if available commercially within 5 miles (8 km) of the plant. GGNS personnel collected vegetation samples to monitor the ingestion pathway, as specified in ODCM Specifications Table 6.12.1-1, because of milk unavailability.

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

Analytical LLDs during this reporting period were within the acceptable limits required by the ODCM specifications.

- **Thermoluminescent**

TLD, M-25 (Sector N, Radius 1.6 Miles), at Radial Well Number 1 was inaccessible for the 1st, 2nd and 3rd quarter, 2011, due to river level.

- **Air Samples**

The following air sample locations had reduced run times due to weather-related 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.

Sample Location	Date In	Date Out	Run Time Hours	Out-of-Service Hours	Comments
AS-7 UH	02/22/11	03/01/11	161.84	1.59	Power Outage
AS-7 UH	03/08/11	03/15/11	167.53	0.52	Power Outage
AS-1 PG	03/08/11	03/15/11	165.86	1.17	Power Outage
AS-7 UH	03/15/11	03/22/11	167.38	0.48	Power Outage
AS-7 UH	03/29/11	04/05/11	153.60	1.43	Power Outage
AS-3 61 VA	06/08/11	06/14/11	152.98	0.62	Equipment Malfunction
AS-7 UH	08/30/11	09/06/11	163.46	2.97	Power Outage
AS-3 61 VA	10/19/11	10/25/11	140.09	3.00	Power Outage
AS-3 61 VA	10/25/11	10/31/11	56.06	99.23	Equipment Malfunction
AS-3 61 VA	10/31/11	11/07/11	23.27	141.05	Equipment Malfunction
AS-3 61 VA	11/22/11	11/30/11	174.11	5.72	Equipment Malfunction
AS-3 61 VA	11/30/11	12/07/11	142.14	27.71	Equipment Malfunction

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

AS-1 PG	99.99%
AS-3 61VA	96.88%
AS-7 UH	99.92%

- **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. TLDs were analyzed by Environmental Dosimetry Company (EDC). All other samples were analyzed by the Entergy, River Bend Station (RBS), Environmental Laboratory. Attachment 1 also contains RBS' results from participation in the interlaboratory comparison program and Environmental Dosimetry Company's Annual Quality Assurance Status Report.

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 land use census biannually, as required by ODCM Specification 6.12.2. Data for the most recent land use census is included. The purpose of this census is to identify changes in uses of land within 5 miles of GGNS that would require modifications to the REMP or the ODCM. The most important criteria during this census are to determine the location in each sector of the nearest:

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

GGNS personnel conduct the land use census by:

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

**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
Airborne	<p><u>Radioiodine and Particulates</u> 1 sample close to the SITE BOUNDARY having the highest calculated annual average groundlevel D/Q.</p>	<p>AS-7 UH (Sector H, Radius 0.5 Miles) – South-southeast of GGNS at the IBEW Union Hall.</p>	Continuous sampler operation with sample collection per 7 days or as required by dust loading, whichever is more frequent	<p>Radioiodine Cannister – I-131; 7 days</p> <p>Particulate Sampler – Gross beta radioactivity following filter change, composite (by location) for gamma isotopic; 92 days</p>
	<p><u>Radioiodine and Particulates</u> 1 sample from the vicinity of a community having the highest calculated annual average groundlevel D/Q.</p>	<p>AS-1 PG (Sector G, Radius 5.5 Miles) – Southeast of GGNS at the Port Gibson City Barn.</p>		
	<p><u>Radioiodine and Particulates</u> 1 sample from a control location 15 -30 km (10 - 20 miles) distance.</p>	<p>AS-3 61VA (Sector B, Radius 18 Miles) – North-northeast of GGNS on Hwy 61, North of the Vicksburg Airport.</p>		
Direct Radiation	<p><u>TLDs</u> An inner ring of stations in the general areas of the SITE BOUNDARY.</p>	<p>M-16 (Sector A, Radius 0.9 Miles) – Meteorological Tower.</p> <p>M-19 (Sector E, Radius 0.5 Miles) – Eastern SITE BOUNDARY Property line, North-northeast of HWSA.</p>	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	<p><u>TLDs</u> An inner ring of stations in the general areas of the SITE BOUNDARY.</p>	<p>M-21 (Sector J, Radius 0.4 Miles) – Near Former Training Center Building on Bald Hill Road.</p> <p>M-22 (Sector G, Radius 0.5 Miles) – Former RR Entrance Crossing On Bald Hill Road.</p> <p>M-23 (Sector Q, Radius 0.5 Miles) – Gin Lake Road 50 Yards North of Heavy Haul Road on Power Pole.</p> <p>M-25 (Sector N, Radius 1.6 Miles) – Radial Well Number 1.</p> <p>M-28 (Sector L, Radius 0.9 Miles) – Bald Hill Road.</p> <p>M-94 (Sector R, Radius 0.8 Miles) – Sector R Near Meteorological Tower.</p>	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	<p><u>TLDs</u> An inner ring of stations in the general areas of the SITE BOUNDARY.</p>	<p>M-95 (Sector F, Radius 0.5 mi) – Spoils Area, fence of old storage area, near entrance gate</p> <p>M-96 (Sector B, Radius 0.7 mi.) – North Gate Fence</p> <p>M-97 (Sector D, Radius 0.8 mi.) – Grand Gulf Road entrance gate to spoils area</p> <p>M-98 (Sector H, Radius 0.5 mi.) – Bald Hill Road, across from Union Hall, in curve</p> <p>M-99 (Sector K, Radius 0.4 mi.) – North Fence of old Ball Field near utility pole</p> <p>M-100 (Sector C, Radius 0.6 mi.) – Grand Gulf Road</p>	92 days	Gamma dose; 92 days
	<p><u>TLDs</u> An outer ring approximately 3 to 5 miles from the site.</p>	<p>M-36 (Sector P, Radius 5.0 Miles) – Curve on HW 608, Point Nearest GGNS at Power Pole.</p> <p>M-40 (Sector M, Radius 2.3 Miles) – Headly Drive, Near River Port Entrance.</p>		

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

**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	<p>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</p>	<p>M-14 (Sector B, Radius 18.0 Miles) – AS-3-61VA, Hwy 61, North of Vicksburg Airport. (Control)</p> <p>M-33 (Sector P, Radius 12.5 Miles) – Newellton, Louisiana Water Tower. (Special Interest)</p> <p>M-38 (Sector M, Radius 9.5 Miles) – Lake Bruin State Park, Entrance Road. (Special Interest)</p> <p>M-39 (Sector M, Radius 13.0 Miles) – St. Joseph, Louisiana, Auxiliary Water Tank. (Special Interest)</p>	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.	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.	92 days	Gamma isotopic and tritium analyses; 92 days
	1 sample downstream.	MRDOWN (Sector N, Radius 1.6 Miles) - At least 5000 ft downstream of the GGNS discharge point into the Mississippi River near Radial Well No. 1.		
	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

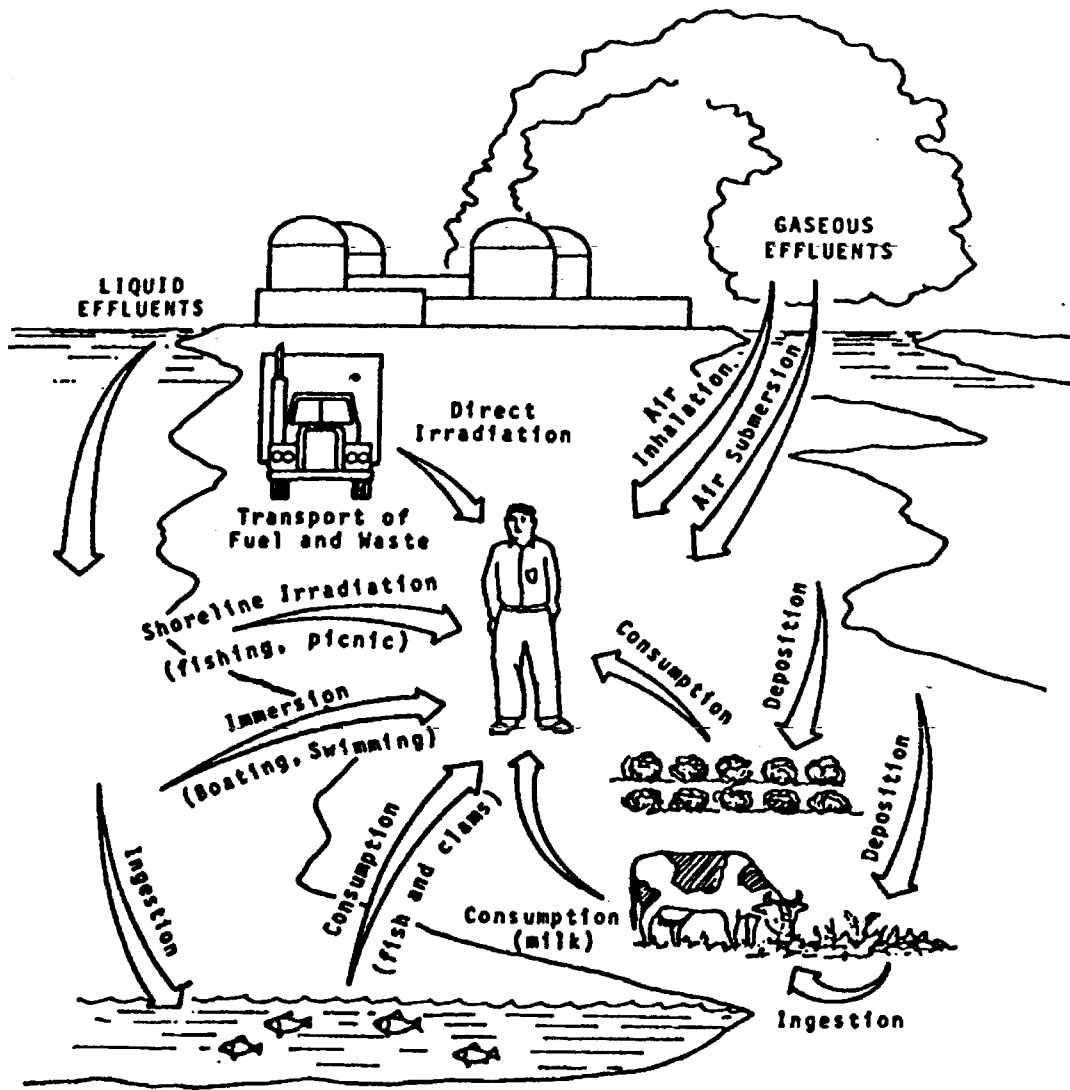
**Table 1.1
Radiological Environmental Sampling Program**

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

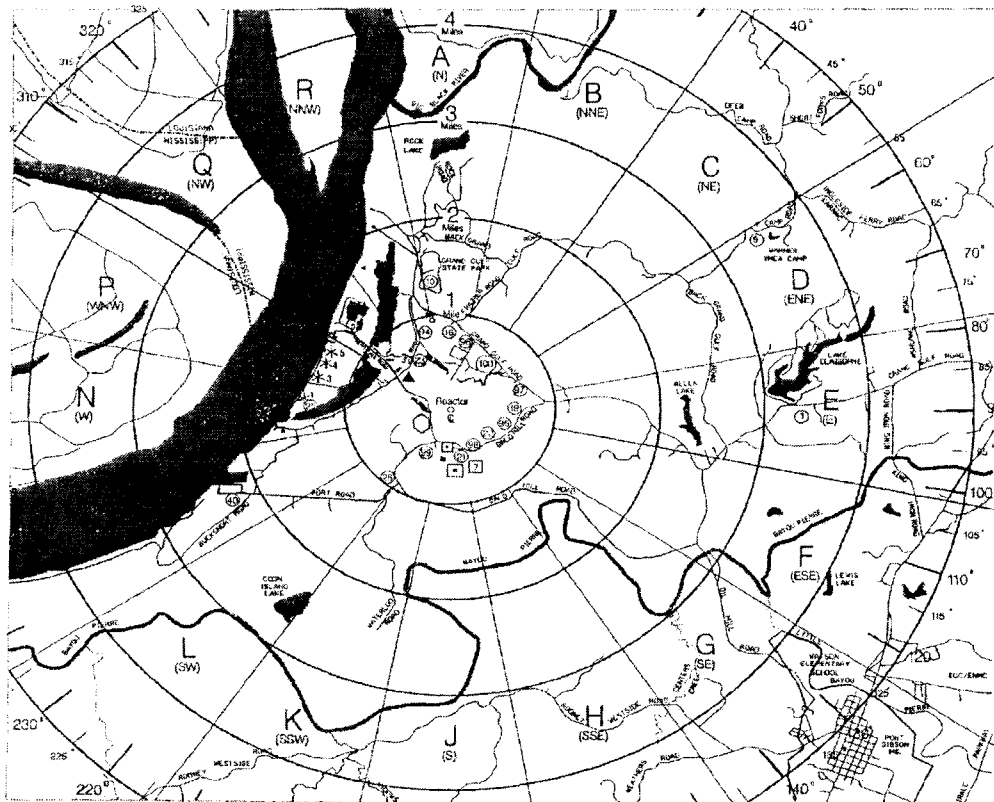
**Table 1.1
Radiological Environmental Sampling Program**

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

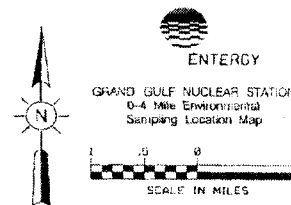
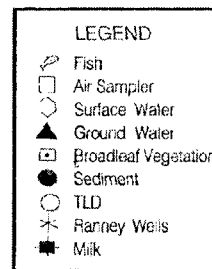
FIGURE 1-1
Exposure Pathways



**FIGURE 1-2
SAMPLE COLLECTION SITES – NEAR FIELD**



**FIGURE 3.0-1
Collection Site Locations
0-4 Mile Area Map**



Grand Gulf, Unit 1 3.0-7 Revision: 37 02/09

**FIGURE 1-3
SAMPLE COLLECTION SITES – FAR FIELD**

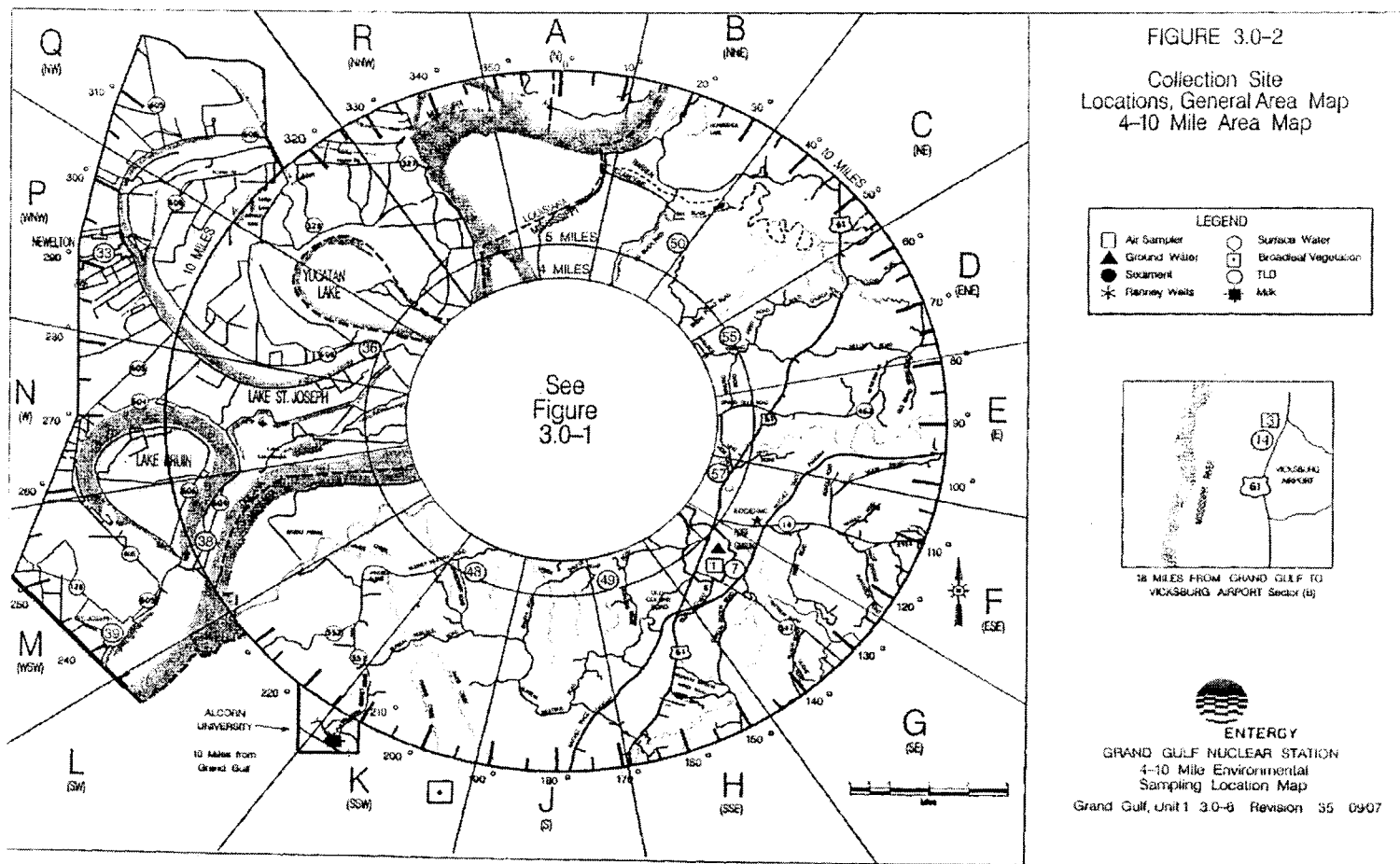
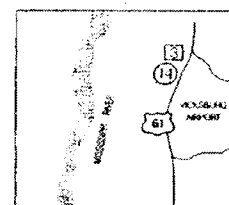
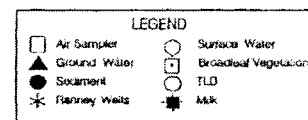


FIGURE 3.0-2

**Collection Site
Locations, General Area Map
4-10 Mile Area Map**



ENERGY
GRAND GULF NUCLEAR STATION
 4-10 Mile Environmental
 Sampling Location Map
 Grand Gulf, Unit 1 3.0-8 Revision 35 0907

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. Iodine-131 was detected in Air Sample locations (AS-1 PG, AS-3 61VA and AS-7) for two Air Sample collection periods (3/22/11 – 3/29/11 and 3/29/11 – 4/5/11) following the March 11, 2011 Tohoku earthquake and the Dai-ichi, Fukushima Nuclear Power Plant incident. Given the following facts, the detectable concentrations are not a result of GGNS operation:

- (1) The quantities of radioactive airborne effluents from GGNS during 2011, did not increase significantly compared to year 2010.
- (2) The radioactivity detected in the indicator samples were also identified in control samples far from GGNS.

The atypical detection of Iodine-131 in both indicator and control samples is credibly attributed to the trans-Pacific transport of airborne releases from the Dai-ichi, Fukushima incident and is not related to the operations of GGNS.

The REMP detected radioactivity attributable to other sources in this pathway twice before Fukushima. These include the Chinese nuclear test in 1980, and the radioactive release due to reactor core degradation from the Chernobyl Nuclear Power Plant in 1986. Therefore, the airborne exposure pathway has been unaffected by the operation of GGNS and airborne concentrations have returned to background levels.

Table 3.1, which 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 supports the presence of naturally occurring radioactivity.

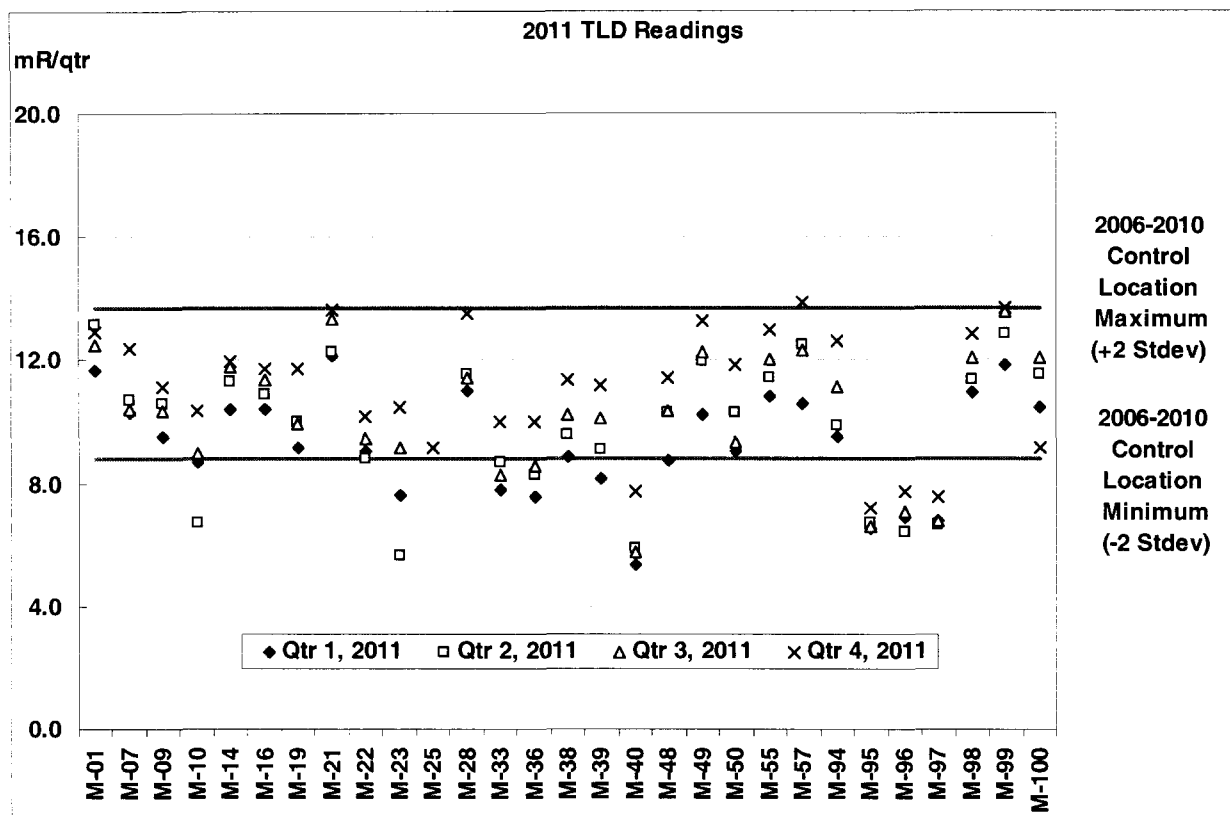
2.2 Thermoluminescent Dosimetry Sample Results

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 rate at these three locations was 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. In November 2010, the hydrogen injection rate was lowered, with the dose rates at TLD locations M-21, M-98 and M-99 returning to 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 2011, when detected, tritium was measured at an average concentration of 4606 ± 284 pCi/L in the Outfall 007 (indicator) location.

In addition to the tritium samples required by the REMP, six special surface water samples for gamma emitting radionuclides were collected at the Outfall 007 location. 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. 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 this reporting period, plant related gamma emitting radionuclides were below detectable concentrations in the upstream (control) location. Cesium-137 was detected at a concentration of 17.3 ± 8.2 pCi/kg in the downstream (indicator) location.

A review of REMP data collected at the downstream location from 1983 through 2010 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. Nuclides detected previously at the control and indicator locations are attributed to the Chernobyl release and atmospheric weapons testing. 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 October 5-12, 2010 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) location of occupied and unoccupied residence
- 2) location of dairy production
- 3) 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
Land Use Census**

Parameter		Sector A*	Sector B*	Sector C	Sector D
I. Nearest Occupied Residence	a. Distance (mile)	0.98	1.52	0.67	2.57
	b. Degrees from true north	354.0	21.9	42.1	60.5
II. Nearest Unoccupied Residence (closer than occupied residence)	a. Distance (mile)	0.94	0.83	None	None
	b. Degrees from true north	8	15.1		
III. Nearest Milk Animal	a. Distance	None	None	None	None
IV. Nearest Broadleaf Garden	a. Distance (mile)	1.80	1.52	0.67 ²	2.86
	b. Garden size (ft ²)	≈ 100	≈ 4050	≈ 1250	≈ 500
	c. Degrees from true north	353	21.9	42.1	59.7
V. Census Comparison	a. Is nearest occupied residence in same location as last census?	Yes	No	Yes	Yes
	b. Is nearest milk animal in same location as last census?	N/A	N/A	N/A	N/A
	c. Is nearest broadleaf garden in same location as last census?	No	Yes ¹	Yes	Yes

¹Property was inaccessible. Retained previous garden location. Located no other gardens in sector.

²Currently not planted. Retained due to potential to plant. Next nearest garden @4.53 mi, 49 degrees ≈200 ft²

* Change from last census, see Land Use Census Changes

**Table 2.1
Land Use Census**

Parameter		Sector E	Sector F*	Sector G*	Sector H*
I. Nearest Occupied Residence	a. Distance (mile)	0.83	2.25	3.71	1.11
	b. Degrees from true north	95.1	101.5	132	152.5
II. Nearest Unoccupied Residence (closer than occupied residence)	a. Distance (mile)	None	None	2.10	1.08
	b. Degrees from true north			129.7	152.5
III. Nearest Milk Animal	a. Distance	None	None	None	None
IV. Nearest Broadleaf Garden	a. Distance (mile)	0.89	4.53	3.39	4.39
	b. Garden size (ft ²)	≈1000	≈100	≈3.2E5 ¹	≈ 200
	c. Degrees from true north	86.9	113	129	155
V. Census Comparison	a. Is nearest occupied residence in same location as last census?	Yes	Yes	No	Yes
	b. Is nearest milk animal in same location as last census?	N/A	N/A	N/A	N/A
	c. Is nearest broadleaf garden in same location as last census?	Yes	No	No	No

¹ Melon and Tomato fields, not broadleaf.

* Change from last census, see Land Use Census Changes

**Table 2.1
Land Use Census**

Parameter		Sector J	Sector K	Sector L	Sector M
I. Nearest Occupied Residence	a. Distance (mile)	3.16	2.23	0.89	None
	b. Degrees from true north	174.3	196.9	219.7	
II. Nearest Unoccupied Residence (closer than occupied residence)	a. Distance (mile)	None	1.64 Hunting Lodge (Info Only)	None	None
III. Nearest Milk Animal	a. Distance	None	None	None	None
IV. Nearest Broadleaf Garden	a. Distance (mile)	3.16	2.23	0.89	None
	b. Garden size (ft ²)	≈ 500	≈ 2500	≈ 50	
	c. Degrees from true north	174.3	196.9	219.7	
V. Census Comparison	a. Is nearest occupied residence in same location as last census?	Yes	Yes	Yes	N/A
	b. Is nearest milk animal in same location as last census?	N/A	N/A	N/A	N/A
	c. Is nearest broadleaf garden in same location as last census?	Yes	Yes	Yes	N/A

**Table 2.1
Land Use Census**

Parameter		Sector N	Sector P*	Sector Q*	Sector R*
I. Nearest Occupied Residence	a. Distance (mile) b. Degrees from true north	None	None	None	1.11 346.1
II. Nearest Unoccupied Residence (closer than occupied residence)	a. Distance (mile)	1.61 Bucksnot Camp (Info Only)	None ¹	None ²	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	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 No

¹Previous [2008] residence @4.83 miles appeared uninhabitable

²Previous [2008] location not present

* Change from last census, see Land Use Census Changes

Land Use Census Changes

SECTOR	PARAMETER	Reason for Change
A	Nearest Broadleaf Garden	No Garden at 2008 location, new location listed
B	Nearest Unoccupied Residence	2008 Nearest Occupied Residence now Unoccupied
B	Nearest Occupied Residence	New Nearest Occupied residence
F	Nearest Broadleaf Garden	No Garden at 2008 location, new location listed
G	Nearest Unoccupied Residence	2008 Residence appeared uninhabitable, new location listed
G	Nearest Occupied Residence	2008 Nearest Occupied Residence now Unoccupied
G	Nearest Broadleaf Garden	No Garden at 2008 location, new location listed
H	Nearest Broadleaf Garden	No Garden at 2008 location, new location listed
P	Nearest Unoccupied Residence	2008 Residence appeared uninhabitable
Q	Nearest Unoccupied Residence	2008 Nearest Unoccupied Residence not present
R	Nearest Broadleaf Garden	No Garden at 2008 location

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. Attachment 1, Table 9.1, contains these results. 100% of results were within control limits for accuracy, and 100% of results were within control limits for precision.

Environmental Dosimetry Company analyzed interlaboratory comparison Thermoluminescent Dosimeters. 100% of the results passed precision and bias criteria.

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 2011**

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	0.027 (104/104) [0.012 - 0.045]	AS-1 PG (Sector G, 5.5 mi) AS-7 UH (Sector H, 0.5 mi)	0.027 (52/52) [0.014 - 0.045] 0.027 (52/52) [0.012 - 0.042]	0.027 (52/52) [0.014 - 0.047]	0
	GS 12						
	Cs-134 Cs-137	0.05 0.06	<LLD <LLD	N/A N/A	N/A N/A	<LLD <LLD	0 0
Airborne Iodine (pCi/m ³)	I-131 156	0.07	0.09 (4/104) [0.076 - 0.125]	AS-1 PG (Sector G, 5.5 mi)	0.101 (2/52) [0.076 - 0.125]	0.066 (2/52) [0.059 - 0.072]	0
Inner Ring TLDs (mR/Qtr)	Gamma 53	f	10.0 (53/53) [5.7 - 13.7]	M-99 (Sector J, 0.4 mi.)	13.0 (4/4) [11.8 - 13.7]	N/A	0
Outer Ring TLDs (mR/Qtr)	Gamma 28	f	10.2 (28/28)	M-57 (Sector F, 4.5 mi.)	12.3 (4/4) [10.6 - 13.9]	N/A	0
Special Interest TLDs (mR/Qtr)	Gamma 28	f	[5.4 - 13.9] 10.1 (28/28) [6.7 - 13.1]	M-01 (Sector E, 3.5 mi.)	12.6 (4/4) [11.7 - 13.1]	N/A	0
Control TLDs (mR/Qtr)	Gamma 4	f	N/A	N/A	N/A	11.4 (4/4) [10.4 - 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 2011

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 28	3000	4606 (3/23) [866 – 12025]	Outfall 007 (Sector N, Radius 0.2 mi.)	4606 (3/14) [866 – 12025]	<LLD	0
	GS 13						
	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 2011

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/l)	H-3 14	2000	<LLD	N/A	N/A	<LLD	0
	I-131 2	1	<LLD	N/A	N/A	<LLD	0
	GS 12						
	Mn-54 15	15	<LLD	N/A	N/A	<LLD	0
	Fe-59 30	30	<LLD	N/A	N/A	<LLD	0
	Co-58 15	15	<LLD	N/A	N/A	<LLD	0
	Co-60 15	15	<LLD	N/A	N/A	<LLD	0
	Zn-65 30	30	<LLD	N/A	N/A	<LLD	0
	Zr-95 30	30	<LLD	N/A	N/A	<LLD	0
	Nb-95 15	15	<LLD	N/A	N/A	<LLD	0
	Cs-134 15	15	<LLD	N/A	N/A	<LLD	0
	Cs-137 18	18	<LLD	N/A	N/A	<LLD	0
	Ba-140 60	60	<LLD	N/A	N/A	<LLD	0
La-140 15	15	<LLD	N/A	N/A	<LLD	0	
Sediment (pCi/kg)	GS 2						
	Cs-134 150	150	<LLD	N/A	N/A	<LLD	0
	Cs-137 180	180	17.30 (1/1) N/A	SEDHAM (Sector N, 1.6 Miles)	17.30 (1/1) 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 2011

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	<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 2011

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 6						
	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	<LLD	N/A	N/A	<LLD

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

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Table 1.1

Sample Type: Air Particulate Filter and Radioiodine Cartridge

Analysis: Gross Beta and I-131

Units: pCi/m³

AIR SAMPLE AS-1 PG - Nearest Community

LLD (pCi/m ³)			0.07	0.01
LAB ID	START DATE	END DATE	I-131	GROSS BETA
20110004	12/29/10	01/04/11	< 0.023	0.024 +/- 0.0011
20110028	01/04/11	01/11/11	< 0.017	0.036 +/- 0.0012
20110057	01/11/11	01/18/11	< 0.020	0.038 +/- 0.0011
20110125	01/18/11	01/26/11	< 0.016	0.030 +/- 0.0010
20110140	01/26/11	02/01/11	< 0.016	0.027 +/- 0.0011
20110167	02/01/11	02/08/11	< 0.018	0.025 +/- 0.0010
20110176	02/08/11	02/16/11	< 0.020	0.023 +/- 0.0008
20110219	02/16/11	02/22/11	< 0.028	0.020 +/- 0.0010
20110273	02/22/11	03/01/11	< 0.026	0.019 +/- 0.0008
20110299	03/01/11	03/08/11	< 0.018	0.021 +/- 0.0009
20110319	03/08/11	03/15/11	< 0.017	0.020 +/- 0.0009
20110371	03/15/11	03/22/11	< 0.014	0.024 +/- 0.0009
20110432	03/22/11	03/29/11	0.125 +/- 0.0157	0.028 +/- 0.0010
20110469	03/29/11	04/05/11	0.076 +/- 0.0122	0.026 +/- 0.0010
20110503	04/05/11	04/12/11	< 0.027	0.021 +/- 0.0009
20110547	04/12/11	04/19/11	< 0.024	0.025 +/- 0.0010
20110606	04/19/11	04/26/11	< 0.023	0.017 +/- 0.0008
20110642	04/26/11	05/03/11	< 0.026	0.020 +/- 0.0009
20110728	05/03/11	05/10/11	< 0.035	0.028 +/- 0.0010
20110753	05/10/11	05/17/11	< 0.031	0.018 +/- 0.0008

AS-1 PG**LLD (pCi/m³)****0.07****0.01****LAB ID****START DATE END DATE****I-131****GROSS BETA**

20110802	05/17/11	05/24/11	< 0.030	0.027 +/- 0.0010
20110825	05/24/11	05/31/11	< 0.033	0.019 +/- 0.0009
20110831	05/31/11	06/07/11	< 0.032	0.038 +/- 0.0011
20110880	06/07/11	06/15/11	< 0.018	0.033 +/- 0.0010
20110922	06/15/11	06/21/11	< 0.021	0.024 +/- 0.0010
20110964	06/21/11	06/28/11	< 0.022	0.015 +/- 0.0008
20110986	06/28/11	07/05/11	< 0.027	0.031 +/- 0.0010
20111013	07/05/11	07/12/11	< 0.026	0.025 +/- 0.0009
20111065	07/12/11	07/18/11	< 0.025	0.014 +/- 0.0009
20111087	07/18/11	07/26/11	< 0.024	0.016 +/- 0.0007
20111135	07/26/11	08/02/11	< 0.027	0.015 +/- 0.0008
20111158	08/02/11	08/09/11	< 0.028	0.025 +/- 0.0010
20111172	08/09/11	08/16/11	< 0.018	0.019 +/- 0.0009
20111200	08/16/11	08/23/11	< 0.017	0.036 +/- 0.0011
20111258	08/23/11	08/30/11	< 0.017	0.038 +/- 0.0011
20111275	08/30/11	09/06/11	< 0.020	0.024 +/- 0.0010
20111309	09/06/11	09/13/11	< 0.018	0.034 +/- 0.0011
20111368	09/13/11	09/20/11	< 0.014	0.031 +/- 0.0010
20111396	09/20/11	09/28/11	< 0.018	0.030 +/- 0.0010
20111436	09/28/11	10/04/11	< 0.016	0.030 +/- 0.0011
20111450	10/04/11	10/11/11	< 0.015	0.033 +/- 0.0010
20111477	10/11/11	10/19/11	< 0.016	0.035 +/- 0.0010

AS-1 PG

LLD (pCi/m³)

LAB ID	START DATE	END DATE	0.07 I-131	0.01 GROSS BETA
20111493	10/19/2011	10/25/2011	< 0.021	0.040 +/- 0.0012
20111518	10/25/2011	11/02/2011	< 0.025	0.045 +/- 0.0011
20111521	11/02/2011	11/08/2011	< 0.018	0.024 +/- 0.0010
20111569	11/08/2011	11/15/2011	< 0.022	0.027 +/- 0.0010
20111584	11/15/2011	11/22/2011	< 0.019	0.021 +/- 0.0009
20111636	11/22/2011	11/29/2011	< 0.031	0.025 +/- 0.0009
20111669	11/29/2011	12/06/2011	< 0.021	0.023 +/- 0.0009
20111744	12/06/2011	12/13/2011	< 0.023	0.038 +/- 0.0011
20111748	12/13/2011	12/20/2011	< 0.013	0.032 +/- 0.0011
20111791	12/20/2011	12/27/2011	< 0.016	0.030 +/- 0.0010
Average:			0.100	0.027
Maximum:			0.125	0.045
Minimum:			0.076	0.014

Table 1.1

Sample Type: Air Particulate Filter and Radioiodine Cartridge

Analysis: Gross Beta and I-131

Units: pCi/m³

AIR SAMPLE AS-3 61VA – Control

LLD (pCi/m ³)			0.07	0.01
LAB ID	START DATE	END DATE	I-131	GROSS BETA
20110005	12/27/2010	01/04/2011	< 0.015	0.022 +/- 0.0009
20110029	01/04/2011	01/11/2011	< 0.015	0.033 +/- 0.0011
20110058	01/11/2011	01/18/2011	< 0.015	0.034 +/- 0.0011
20110126	01/18/2011	01/25/2011	< 0.024	0.030 +/- 0.0010
20110141	01/25/2011	02/01/2011	< 0.017	0.030 +/- 0.0010
20110168	02/01/2011	02/08/2011	< 0.016	0.024 +/- 0.0009
20110177	02/08/2011	02/15/2011	< 0.023	0.024 +/- 0.0009
20110220	02/15/2011	02/22/2011	< 0.023	0.021 +/- 0.0009
20110274	02/22/2011	03/01/2011	< 0.025	0.019 +/- 0.0008
20110301	03/01/2011	03/08/2011	< 0.014	0.023 +/- 0.0009
20110320	03/08/2011	03/14/2011	< 0.015	0.021 +/- 0.0009
20110372	03/14/2011	03/21/2011	< 0.015	0.024 +/- 0.0009
20110433	03/21/2011	03/30/2011	0.072 +/- 0.0121	0.026 +/- 0.0008
20110470	03/30/2011	04/05/2011	0.059 +/- 0.0111	0.027 +/- 0.0010
20110504	04/05/2011	04/12/2011	< 0.026	0.022 +/- 0.0009
20110548	04/12/2011	04/19/2011	< 0.022	0.026 +/- 0.0010
20110607	04/19/2011	04/26/2011	< 0.024	0.017 +/- 0.0008
20110643	04/26/2011	05/02/2011	< 0.027	0.019 +/- 0.0009
20110729	05/02/2011	05/09/2011	< 0.029	0.023 +/- 0.0009
20110754	05/09/2011	05/16/2011	< 0.029	0.020 +/- 0.0009

AS-3 61VA**LLD (pCi/m³)****0.07****0.01**

LAB ID	START DATE	END DATE	I-131	GROSS BETA
20110803	05/16/2011	05/23/2011	< 0.036	0.028 +/-0.0010
20110826	05/23/2011	05/31/2011	< 0.023	0.019 +/-0.0008
20110832	05/31/2011	06/08/2011	< 0.030	0.039 +/-0.0010
20110881	06/08/2011	06/14/2011	< 0.019	0.030 +/-0.0011
20110923	06/14/2011	06/20/2011	< 0.026	0.023 +/-0.0010
20110965	06/20/2011	06/28/2011	< 0.024	0.014 +/-0.0007
20110987	06/28/2011	07/06/2011	< 0.022	0.028 +/-0.0009
20111014	07/06/2011	07/12/2011	< 0.024	0.020 +/-0.0010
20111066	07/12/2011	07/18/2011	< 0.031	0.014 +/-0.0008
20111088	07/18/2011	07/26/2011	< 0.022	0.017 +/- 0.0008
20111136	07/26/2011	08/02/2011	< 0.026	0.016 +/- 0.0008
20111159	08/02/2011	08/09/2011	< 0.025	0.023 +/- 0.0009
20111173	08/09/2011	08/16/2011	< 0.022	0.021 +/- 0.0009
20111201	08/16/2011	08/23/2011	< 0.016	0.035 +/- 0.0011
20111259	08/23/2011	08/30/2011	< 0.016	0.035 +/- 0.0011
20111276	08/30/2011	09/06/2011	< 0.019	0.025 +/- 0.0010
20111310	09/06/2011	09/13/2011	< 0.020	0.034 +/- 0.0011
20111369	09/13/2011	09/20/2011	< 0.013	0.033 +/- 0.0011
20111397	09/19/2011	09/27/2011	< 0.020	0.029 +/- 0.0009
20111437	09/27/2011	10/04/2011	< 0.019	0.028 +/- 0.0010
20111451	10/04/2011	10/11/2011	< 0.017	0.032 +/- 0.0010
20111478	10/11/2011	10/19/2011	< 0.012	0.035 +/- 0.0010

AS-3 61VA**LLD (pCi/m³)****0.07****0.01**

LAB ID	START DATE	END DATE	I-131	GROSS BETA
20111494	10/19/2011	10/25/2011	< 0.023	0.038 +/- 0.0012
20111519	10/25/2011	10/31/2011	< 0.065	0.047 +/- 0.0024
20111522	10/31/2011	11/07/2011	< 0.055	0.046 +/- 0.0045
20111570	11/07/2011	11/15/2011	< 0.015	0.025 +/- 0.0009
20111585	11/15/2011	11/22/2011	< 0.021	0.019 +/- 0.0009
20111637	11/22/2011	11/30/2011	< 0.039	0.027 +/- 0.0010
20111670	11/30/2011	12/07/2011	< 0.026	0.029 +/- 0.0011
20111745	12/07/2011	12/12/2011	< 0.036	0.044 +/- 0.0014
20111749	12/12/2011	12/20/2011	< 0.014	0.036 +/- 0.0011
20111792	12/20/2011	12/27/2011	< 0.018	0.033 +/- 0.0011
Average:			0.066	0.027
Maximum:			0.072	0.047
Minimum:			0.059	0.014

Table 1.1

Sample Type: Air Particulate Filter and Radioiodine Cartridge

Analysis: Gross Beta and I-131

Units: pCi/m³

AIR SAMPLE AS-7 – Indicator

LLD (pCi/m ³)			0.07	0.01
LAB ID	START DATE	END DATE	I-131	GROSS BETA
20110006	12/29/2010	01/04/2011	< 0.028	0.025 +/- 0.0011
20110030	01/04/2011	01/11/2011	< 0.020	0.041 +/- 0.0012
20110059	01/11/2011	01/18/2011	< 0.022	0.039 +/- 0.0011
20110127	01/18/2011	01/25/2011	< 0.027	0.032 +/- 0.0011
20110142	01/25/2011	02/01/2011	< 0.017	0.031 +/- 0.0010
20110169	02/01/2011	02/08/2011	< 0.013	0.026 +/- 0.0010
20110178	02/08/2011	02/15/2011	< 0.024	0.022 +/- 0.0009
20110221	02/15/2011	02/22/2011	< 0.024	0.023 +/- 0.0009
20110275	02/22/2011	03/01/2011	< 0.030	0.018 +/- 0.0009
20110302	03/01/2011	03/08/2011	< 0.019	0.023 +/- 0.0009
20110321	03/08/2011	03/15/2011	< 0.020	0.020 +/- 0.0009
20110373	03/15/2011	03/22/2011	< 0.016	0.022 +/- 0.0009
20110434	03/22/2011	03/29/2011	0.080 +/- 0.0186	0.032 +/- 0.0010
20110471	03/29/2011	04/05/2011	0.078 +/- 0.0099	0.026 +/- 0.0010
20110505	04/05/2011	04/12/2011	< 0.023	0.022 +/- 0.0009
20110549	04/12/2011	04/19/2011	< 0.020	0.024 +/- 0.0010
20110608	04/19/2011	04/26/2011	< 0.021	0.018 +/- 0.0008
20110644	04/26/2011	05/03/2011	< 0.028	0.019 +/- 0.0009
20110730	05/03/2011	05/10/2011	< 0.028	0.026 +/- 0.0010
20110755	05/10/2011	05/17/2011	< 0.030	0.019 +/- 0.0008

AS-7UH

LLD (pCi/m³)			0.07	0.01
LAB ID	START DATE	END DATE	I-131	GROSS BETA
20110804	05/17/2011	05/24/2011	< 0.029	0.029 +/- 0.0010
20110827	05/24/2011	05/31/2011	< 0.027	0.018 +/- 0.0008
20110833	05/31/2011	06/07/2011	< 0.031	0.037 +/- 0.0010
20110882	06/07/2011	06/14/2011	< 0.027	0.031 +/- 0.0010
20110924	06/14/2011	06/21/2011	< 0.024	0.020 +/- 0.0008
20110966	06/21/2011	06/28/2011	< 0.023	0.012 +/- 0.0008
20110988	06/28/2011	07/05/2011	< 0.023	0.026 +/- 0.0010
20111015	07/05/2011	07/12/2011	< 0.029	0.020 +/- 0.0009
20111067	07/12/2011	07/18/2011	< 0.031	0.012 +/- 0.0008
20111089	07/18/2011	07/26/2011	< 0.021	0.013 +/- 0.0007
20111137	07/26/2011	08/02/2011	< 0.025	0.014 +/- 0.0008
20111160	08/02/2011	08/09/2011	< 0.021	0.024 +/- 0.0009
20111174	08/09/2011	08/16/2011	< 0.018	0.021 +/- 0.0009
20111202	08/16/2011	08/23/2011	< 0.017	0.036 +/- 0.0011
20111260	08/23/2011	08/30/2011	< 0.017	0.038 +/- 0.0011
20111277	08/30/2011	09/06/2011	< 0.021	0.024 +/- 0.0010
20111311	09/06/2011	09/13/2011	< 0.021	0.034 +/- 0.0011
20111370	09/13/2011	09/20/2011	< 0.011	0.032 +/- 0.0010
20111398	09/20/2011	09/27/2011	< 0.022	0.032 +/- 0.0011
20111438	09/27/2011	10/04/2011	< 0.017	0.031 +/- 0.0011
20111452	10/04/2011	10/11/2011	< 0.013	0.035 +/- 0.0011
20111479	10/11/2011	10/19/2011	< 0.012	0.040 +/- 0.0011

AS-7UH**LLD (pCi/m³)****LAB ID****START DATE END DATE****0.07****0.01****I-131****GROSS BETA**

20111495	10/19/2011	10/25/2011	< 0.031	0.040 +/- 0.0012
20111520	10/25/2011	11/02/2011	< 0.029	0.042 +/- 0.0011
20111523	11/02/2011	11/08/2011	< 0.023	0.027 +/- 0.0011
20111571	11/08/2011	11/15/2011	< 0.024	0.029 +/- 0.0010
20111586	11/15/2011	11/22/2011	< 0.022	0.019 +/- 0.0009
20111638	11/22/2011	11/29/2011	< 0.040	0.025 +/- 0.0009
20111671	11/29/2011	12/06/2011	< 0.024	0.022 +/- 0.0009
20111746	12/06/2011	12/13/2011	< 0.021	0.041 +/- 0.0011
20111750	12/13/2011	12/20/2011	< 0.014	0.029 +/- 0.0011
20111793	12/20/2011	12/27/2011	< 0.016	0.028 +/- 0.0010
Average:			0.079	0.027
Maximum:			0.080	0.042
Minimum:			0.078	0.012

Table 1.2

Sample Type: **Air Particulate Filter**

Analysis: Gamma Isotopic

Units: pCi/m³**AIR PARTICULATE FILTER QUARTERLY COMPOSITES (GAMMA)**

LLD (pCi/m ³)			0.05	0.06
LAB ID	LOCATION	DATE	CS-134	CS-137
20110500	AS-1PG	02/12/2011	< 0.005	< 0.005
20110501	AS-3 61VA	02/11/2011	< 0.005	< 0.004
20110502	AS-7 UH	02/12/2011	< 0.006	< 0.005
20111035	AS-1PG	05/14/2011	< 0.006	< 0.004
20111036	AS-3 61VA	05/14/2011	< 0.005	< 0.006
20111037	AS-7 UH	05/14/2011	< 0.005	< 0.004
20111441	AS-1PG	08/13/2011	< 0.001	< 0.001
20111442	AS-3 61VA	08/13/2011	< 0.001	< 0.001
20111443	AS-7 UH	08/13/2011	< 0.001	< 0.001
20111816	AS-1PG	11/15/2011	< 0.001	< 0.001
20111817	AS-3 61VA	11/15/2011	< 0.001	< 0.001
20111818	AS-7 UH	11/15/2011	< 0.001	< 0.001

Table 2.1

Sample Type: Thermoluminescent Dosimeters

Analysis: Gamma Dose

Units: mrem/Qtr

Inner Ring - Within General Area of Site Boundary					
Station	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Annual Mean
M-16	10.4	10.9	11.4	11.7	11.1
M-19	9.2	10.0	9.9	11.7	10.2
M-21	12.1	12.3	13.3	13.6	12.8
M-22	9.1	8.8	9.5	10.2	9.4
M-23	7.6	5.7	9.2	10.5	8.2
M-25	ND	ND	ND	9.2	9.2
M-28	11.0	11.6	11.4	13.5	11.9
M-94	9.5	9.9	11.1	12.6	10.8
M-95	6.5	6.7	6.6	7.2	6.8
M-96	6.9	6.4	7.1	7.7	7.0
M-97	6.8	6.6	6.8	7.5	6.9
M-98	11.0	11.4	12.1	12.9	11.8
M-99*	11.8	12.9	13.6	13.7	13.0
M-100	10.5	11.5	12.1	9.1	10.8

*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	7.6	8.3	8.6	10.0	8.6
M-40	5.4	5.9	5.8	7.7	6.2
M-48	8.7	10.3	10.4	11.5	10.2
M-49	10.2	12.0	12.3	13.3	11.9
M-50	9.0	10.3	9.4	11.9	10.1
M-55	10.8	11.5	12.0	13.0	11.8
M-57*	10.6	12.5	12.3	13.9	12.3

*Location with highest annual mean

Table 2.2

Sample Type: **Thermoluminescent Dosimeters**

Analysis: Gamma Dose

Units: mrem/Qtr

Special Interest Areas – Population Centers & Schools					
Station	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Annual Mean
M-01*	11.7	13.1	12.5	12.9	12.6
M-07	10.3	10.7	10.4	12.4	11.0
M-09	9.5	10.6	10.4	11.2	10.4
M-10	8.7	6.7	9.0	10.4	8.7
M-33	7.8	8.7	8.3	10.0	8.7
M-38	8.9	9.6	10.2	11.4	10.0
M-39	8.2	9.1	10.1	11.2	9.6

*Location with highest annual mean

Table 2.3

Sample Type: **Thermoluminescent Dosimeters**

Analysis: Gamma Dose

Units: mrem/Qtr

Special Interest Areas – Control					
Station	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Annual Mean
M-14	10.4	11.3	11.8	12.0	11.4

Table 3.1

Sample Type: **Surface Water**

Analysis: Gamma Isotopic

Units: pCi/L

SURFACE WATER SAMPLES (GAMMA)

LLD/LIQUID			15	15	30	15	30	15	30	15	15	18	60	15
LAB ID	LOCATION	DATE	MN-54	CO-58	FE-59	CO-60	ZN-65	NB-95	ZR-95	I-131	CS-134	CS-137	BA-140	LA-140
20110143	MR DOWN	02/02/2011	< 10.44	< 7.06	< 15.90	< 9.64	< 14.35	< 10.66	< 12.24	< 10.21	< 9.20	< 9.37	< 45.01	< 14.10
20110144	MRUP	02/02/2011	< 7.08	< 7.36	< 14.59	< 9.95	< 12.74	< 10.42	< 7.26	< 14.34	< 8.22	< 11.34	< 39.48	< 6.64
20110725	MRUP	05/06/2011	< 9.43	< 11.15	< 17.29	< 7.75	< 12.88	< 11.16	< 16.77	< 14.88	< 12.14	< 12.62	< 37.67	< 11.92
20110740	MR DOWN	05/11/2011	< 6.20	< 6.75	< 14.14	< 5.25	< 11.81	< 6.72	< 11.16	< 11.97	< 6.43	< 6.52	< 26.41	< 14.34
20110756	MR DOWN	05/20/2011	< 8.83	< 12.53	< 19.38	< 9.84	< 21.85	< 5.36	< 13.54	< 13.84	< 10.73	< 11.99	< 38.60	< 11.32
20111161	MRUP	08/11/2011	< 9.51	< 8.38	< 12.00	< 9.73	< 16.47	< 7.44	< 11.36	< 11.84	< 8.28	< 7.55	< 34.11	< 14.57
20111162	MR DOWN	08/11/2011	< 8.72	< 8.89	< 20.20	< 8.83	< 18.73	< 11.30	< 14.75	< 12.17	< 7.71	< 11.23	< 45.65	< 7.46
20111534	MRUP	11/08/2011	< 5.99	< 6.55	< 18.40	< 7.88	< 16.10	< 7.67	< 14.80	< 10.50	< 8.25	< 7.64	< 32.20	< 14.60
20111535	MR DOWN	11/08/2011	< 10.40	< 11.40	< 23.40	< 11.60	< 13.70	< 9.21	< 19.80	< 13.00	< 7.58	< 11.80	< 38.10	< 4.86
20111536	MRUP GG	11/08/2011	< 5.18	< 6.18	< 11.50	< 4.66	< 15.20	< 8.42	< 11.20	< 7.95	< 5.90	< 7.05	< 32.60	< 12.60
20111537	MR DOWN GG	11/08/2011	< 7.56	< 9.99	< 17.00	< 8.41	< 19.10	< 5.99	< 13.50	< 13.30	< 7.84	< 7.25	< 38.30	< 14.80
20111538	MR DOWN DC	11/08/2011	< 6.95	< 9.35	< 17.10	< 11.30	< 28.40	< 11.70	< 18.30	< 13.80	< 6.68	< 4.53	< 42.00	< 11.60
20111539	MR DOWN DC GG	11/08/2011	< 7.42	< 8.92	< 12.90	< 8.49	< 14.70	< 9.02	< 13.30	< 11.10	< 6.06	< 6.41	< 37.50	< 13.10

"GG" – indicates duplicate sample.

* Annual Sample collected during liquid discharge

Table 3.2

Sample Type: **Surface Water**

Analysis: Tritium

Units: pCi/L

SURFACE WATER SAMPLES (TRITIUM) – GGNS

LLD			2000
LAB ID	LOCATION	DATE	TRITIUM
20110143	MR DOWN	02/02/2011	<504
20110144	MRUP	02/02/2011	<447
20110145	MRDOWN GG	02/02/2011	< 511
20110725	MRUP	05/06/2011	<419
20110740	MR DOWN	05/11/2011	<410
20110756	MR DOWN	05/20/2011	<399
20111161	MRUP	08/11/2011	<413
20111162	MR DOWN	08/11/2011	<452
20111534	MRUP	11/08/2011	<627
20111535	MR DOWN	11/08/2011	<620
20111536	MRUP GG	11/08/2011	<627
20111537	MR DOWN GG	11/08/2011	<623
20111538	MR DOWN DC*	11/08/2011	<626
20111539	MR DOWN DC* GG	11/08/2011	<626
20110099	OUTFALL 007	01/19/2011	926 +/- 195
20110218	OUTFALL 007	02/21/2011	<488
20110374	OUTFALL 007	03/21/2011	<414
20110546	OUTFALL 007	04/20/2011	<708
20110641	OUTFALL 007	05/02/2011	<693
20110811	OUTFALL 007	05/25/2011	<682
20110994	OUTFALL 007	06/27/2011	<426
20111104	OUTFALL 007	07/29/2011	866 +/- 230
20111245	OUTFALL 007	08/18/2011	<635
20111371	OUTFALL 007	09/20/2011	<649
20111496	OUTFALL 007	10/26/2011	<643
20111672	OUTFALL 007	11/28/2011	12025 +/- 428
20111765	OUTFALL 007	12/20/2011	<694
20111766	OUTFALL 007 GG	12/20/2011	<692

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

Table 4.1
 Sample Type: **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
20110459	CONSTWELL1	03/31/2011	< 7.60	< 10.57	< 14.43	< 7.93	< 8.35	< 11.26	< 14.39	< 14.10	< 9.86	< 9.99	< 30.13	< 14.47
20110460	CONSTWELL3	03/31/2011	< 10.69	< 9.11	< 13.19	< 9.42	< 18.53	< 7.52	< 13.58	< 13.86	< 8.87	< 10.40	< 48.89	< 17.07
20110461	CONSTWELL4	03/31/2011	< 11.36	< 8.66	< 10.63	< 10.05	< 18.05	< 11.17	< 16.43	< 14.96	< 9.60	< 12.15	< 41.77	< 10.60
20110462	PGWELL	04/04/2011	< 12.18	< 9.22	< 18.65	< 10.15	< 27.87	< 11.93	< 17.80	< 10.84	< 10.30	< 8.46	< 38.46	< 7.93
20110991	CONSTWELL1	07/06/2011	< 6.74	< 7.46	< 13.84	< 7.53	< 20.03	< 8.03	< 12.47	< 11.63	< 7.87	< 5.88	< 22.02	< 13.37
20110992	CONSTWELL3	07/06/2011	< 8.79	< 8.46	< 15.52	< 11.45	< 20.67	< 9.68	< 19.38	< 14.60	< 5.48	< 10.07	< 47.77	< 11.60
20110993	PGWELL	07/06/2011	< 6.20	< 7.23	< 11.16	< 6.90	< 15.30	< 9.36	< 14.56	< 13.45	< 8.43	< 7.99	< 35.84	< 13.10
20111404	CONSTWELL1	09/29/2011	< 9.39	< 7.60	< 19.30	< 8.49	< 22.30	< 8.84	< 17.40	< 11.60	< 7.73	< 11.30	< 31.00	< 12.80
20111405	CONSTWELL3	09/29/2011	< 10.50	< 8.99	< 16.20	< 7.70	< 29.80	< 9.48	< 15.60	< 11.30	< 7.41	< 9.11	< 50.10	< 12.80
20111406	PGWELL	09/30/2011	< 10.80	< 8.96	< 16.60	< 8.06	< 18.00	< 7.69	< 16.40	< 12.70	< 6.56	< 11.50	< 28.50	< 13.50
20111751	PGWELL	12/19/2011	< 13.50	< 11.10	< 26.80	< 8.26	< 15.70	< 14.20	< 22.70	< 12.70	< 11.40	< 11.50	< 40.00	< 12.30
20111753	CONSTWELL3	12/19/2011	< 8.46	< 7.84	< 18.00	< 11.50	< 18.20	< 10.10	< 18.80	< 10.80	< 9.42	< 10.90	< 37.00	< 12.80

Table 4.2

Sample Type: Groundwater

Analysis: Tritium

Units: pCi/L

GROUND WATER SAMPLES (TRITIUM)

LLD LAB ID	LOCATION	DATE	2000 TRITIUM
20110455	CONSTWELL1	03/31/2011	< 387.87
20110456	CONSTWELL3	03/31/2011	< 389.46
20110457	CONSTWELL4	03/31/2011	< 392.08
20110458	PGWELL	04/04/2011	< 350.68
20110991	CONSTWELL1	07/06/2011	< 423.23
20110992	CONSTWELL3	07/06/2011	< 423.06
20110993	PGWELL	07/06/2011	< 420.00
20111404	CONSTWELL1	09/29/2011	< 637.47
20111405	CONSTWELL3	09/29/2011	< 636.80
20111406	PGWELL	09/30/2011	< 642.27
20111751	PGWELL	12/19/2011	< 691.55
20111753	CONSTWELL3	12/19/2011	< 691.85
20111755	CONSTWELL3 GG	12/19/2011	< 692.24
20111756	PGWELL GG	12/19/2011	< 694.83

“GG” – indicates duplicate sample.

Table 4.3

Sample Type: **Groundwater**

Analysis: Iodine

Units: pCi/L

GROUNDWATER SAMPLES (Iodine-131)

LLD			1.0
LAB ID	LOCATION	DATE	I-131
20111752	PGWELL	12/19/2011	< 0.98
20111754	CONSTWELL3	12/19/2011	< 0.85

Table 5.1

Sample Type: **Sediment**

Analysis: Gamma Isotopic

Units: pCi/kg

SEDIMENT SAMPLES (GAMMA)

LLD			150	180
LAB ID	LOCATION	DATE	CS-134	CS-137
20111808	SEDHAM	12/29/2011	< 12.40	17.30 +/- 8.15
20111809	SEDCONT	12/29/2011	< 10.70	< 18.60

Table 6.1

Sample Type: **Fish**

Analysis: Gamma Isotopic

Units: pCi/kg

FISH SAMPLES (GAMMA)

LLD			130	130	260	130	260	130	150
LAB ID	LOCATION	DATE	MN-54	CO-58	FE-59	CO-60	ZN-65	CS-134	CS-137
20111782	FISHUP	12/14/2011	< 12.70	< 10.40	< 29.10	< 13.10	< 17.60	< 10.50	< 11.80
20111783	FISHDOWN	12/14/2011	< 79.60	< 58.70	<123.00	< 65.70	<128.00	< 45.60	< 56.10

Table 7.1

Sample Type: **Food Products**

Analysis: Iodine-131 and Gamma Isotopic

Units: pCi/kg

VEGETATION SAMPLES (GAMMA)

LLD			60	60	80
LAB ID	LOCATION	DATE	I-131	CS-134	CS-137
20110276	VEG-CONT	03/02/2011	< 34.90	< 32.86	< 21.20
20110277	VEG-J	03/02/2011	< 59.89	< 29.27	< 36.07
20110828	VEG-CONT	15/31/2011	< 59.80	< 46.65	< 44.91
20110829	VEG-J	15/31/2011	< 55.72	< 41.71	< 38.45
20111122	VEG-J	18/17/2011	< 51.30	< 35.57	< 40.96
20111199	VEG-CONT	18/17/2011	< 55.95	< 32.60	< 23.07
20111763	VEG-CONT	12/12/2011	< 55.90	< 19.00	< 18.80
20111764	VEG-J	12/14/2011	< 56.80	< 26.20	< 26.30

Table 8.1

Sample Type: **Special Samples**

Analysis: Gamma Isotopic

Units: pCi/L

SPECIAL SURFACE WATER SAMPLES (GAMMA)

LLD			15	15	30	15	30	15	30	15	15	18	60	15
LAB ID	LOCATION	DATE	MN-54	CO-58	FE-59	CO-60	ZN-65	NB-95	ZR-95	I-131	CS-134	CS-137	BA-140	LA-140
20110218	OUTFALL 007	02/21/2011	<0 7.47	< 7.90	< 20.02	< 8.14	< 10.46	< 9.00	< 9.45	< 14.57	< 9.19	< 8.47	< 38.73	< 12.80
20110374	OUTFALL 007	03/21/2011	<0 7.34	< 5.25	< 12.03	< 5.67	< 14.91	< 7.82	< 12.10	< 12.43	< 7.51	< 6.92	< 35.31	< 14.07
20110998	OUTFALL 007	070/6/2011	<0 7.53	< 7.19	< 14.79	< 9.17	< 19.10	< 8.08	< 14.32	< 14.98	< 6.44	< 7.72	< 41.35	< 12.64
20111371	OUTFALL 007	09/20/2011	< 05.28	< 7.56	< 16.40	< 5.25	< 14.90	< 10.20	< 15.20	< 12.00	< 7.22	< 7.85	< 41.80	< 14.20
20111765	OUTFALL 007	12/20/2011	<0 6.13	< 6.34	< 13.80	< 7.54	< 13.50	< 7.51	< 12.30	< 12.10	< 7.15	< 6.51	< 34.00	< 13.70
20111766	OUTFALL 007GG	12/20/2011	< 10.70	< 7.94	< 16.20	< 9.62	< 23.60	< 9.04	< 18.10	< 14.90	< 6.68	< 8.93	< 51.60	< 13.50

"GG" – indicates duplicate sample.

Table 9.1

Sample Type: **Interlaboratory Comparison**

Analysis: Gross Beta, Tritium, Iodine-131 and Gamma Isotopic

Analytics E7481-125	Gross Beta in Water					Range of 0.80 to 1.25	
Nuclide	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	199	19	247	4.13	59.8	0.80	Pass

Analytics E8137-125	Gross Beta filter					Range of 0.80 to 1.25	
Nuclide	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	84.2	1.41	82.1	1.37	59.9	1.03	Pass

Analytics E8136-125	H-3 in water					Range of 0.80 to 1.25	
Nuclide	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	9060	419	9010	151	59.7	1.01	Pass

Analytics E8138-125	Gamma Filter					Range of 0.80 to 1.25	
Nuclide	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	58.2	2.80	59.6	0.995	59.7	0.98	Pass
Cr-51	188	11.9	202	3.38	59.8	0.93	Pass
Cs-134	94.3	4.20	115	1.91	60.2	0.82	Pass
Cs-137	101	4.20	102	1.70	60	0.99	Pass
Co-58	83.9	3.90	87.1	1.45	60.1	0.96	Pass
Mn-54	134	4.00	135	2.25	60	0.99	Pass
Fe-59	52.1	2.60	49.0	0.818	59.9	1.06	Pass
Zn-65	157	6.40	161	2.69	59.9	0.97	Pass
Co-60	134	4.50	140	2.34	59.8	0.95	Pass

Analytics E8139-125	Gamma Soil					Range of 0.80 to 1.25	
Nuclide	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	0.174	.0110	0.168	.00280	60	1.04	Pass
Cr-51	0.556	.0450	0.569	.00950	59.9	0.98	Pass
Cs-134	0.271	.0110	0.322	.00580	55.5	0.84	Pass
Cs-137	0.347	.0170	0.375	.00625	60	0.93	Pass
Co-58	0.221	.0110	0.245	.00409	59.9	0.90	Pass
Mn-54	0.357	.0100	0.379	.00633	59.9	0.94	Pass
Fe-59	0.142	.00100	0.138	.00230	60	1.03	Pass
Zn-65	0.423	.0350	0.454	.00758	59.9	0.93	Pass
Co-60	0.361	.0180	0.395	.00659	59.9	0.91	Pass

Analytics E7480-125	Gamma in Water					Range of 0.80 to 1.25	
Nuclide	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	94.0	17.0	88.7	1.48	59.9	1.06	Pass
Ce-141	n/a	n/a	n/a	n/a	n/a	n/a	n/a (1)
Cr-51	599	91.0	566	9.45	59.9	1.06	Pass
Cs-134	164	11.0	171	2.86	59.8	0.96	Pass
Cs-137	223	17.0	210	3.50	60	1.06	Pass
Co-58	216	15.0	221	3.69	59.9	0.98	Pass
Mn-54	255	13.0	241	4.02	60.0	1.06	Pass
Fe-59	188	20.0	183	3.06	59.8	1.03	Pass
Zn-65	309	29.0	291	4.87	59.8	1.06	Pass
Co-60	284	16.0	270	4.51	59.9	1.05	Pass

Analytics E7483-125	Gamma in Milk					Range of 0.80 to 1.25	
Nuclide	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	91.0	16.0	90.2	1.51	59.7	1.01	Pass
Ce-141	n/a	n/a	n/a	n/a	n/a	n/a	n/a (1)
Cr-51	532	76.0	566	9.45	59.9	0.94	Pass
Cs-134	160	11.0	171	2.86	59.8	0.93	Pass
Cs-137	216	10.0	210	3.50	60	1.03	Pass
Co-58	206	13.0	221	3.69	59.9	0.93	Pass
Mn-54	237	12.0	241	4.02	60.0	0.98	Pass
Fe-59	192	18.0	183	3.06	59.8	1.05	Pass
Zn-65	304	22.0	291	4.87	59.8	1.04	Pass
Co-60	265	16.0	270	4.51	59.9	0.98	Pass

Analytics E7482-125	I-131 cartridge					Range of 0.80 to 1.25	
Nuclide	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	90.0	8.00	89.7	1.50	59.8	1.00	Pass

(1) Ce-141 was unavailable at the reference lab for the mixed gamma matrix for the 4th quarter milk and water.

100% of interlaboratory crosscheck results were within control limits for accuracy and 100% were within control limits for precision.

Ref Lab values are the "true" values used for comparison.

Table 9.1

Sample Type: **Interlaboratory Comparison**

Analysis: Environmental Dosimeters

**PERCENTAGE OF INDIVIDUAL DOSIMETERS THAT PASSED EDC INTERNAL CRITERIA
JANUARY – DECEMBER 2011 (1)**

Dosimeter Type	Number Tested	% Passed Bias Criteria	%Passed Precision Criteria
Panasonic Environmental	72	100	100

(1) Environmental dosimeter results are free in air.

Bias Limit - $\pm 15\%$

Precision Limit - $\pm 12.8\%$