



Entergy Operations, Inc.  
River Bend Station  
5485 U.S. Highway 61N  
St. Francisville, LA 70775  
Tel 225-381-4177

Joseph A. Clark  
Manager-Licensing

April 30, 2012

U. S. Nuclear Regulatory Commission  
Document Control Desk  
11555 Rockville Pike  
Rockville, MD 20852-2738

RBG-47238  
RBF1-12-0061

Subject: Radiological Environmental Operating Report for 2011  
River Bend Station – Unit 1  
Docket No. 50-458  
License No. NPF-47

Enclosed is the River Bend Station (RBS) Annual Radioactive Annual Radiological Environmental Operating Report for the period January 1, 2011, through December 31, 2011. This report is submitted in accordance with the RBS Technical Specifications, Section 5.6.2.

No commitments are contained in this letter. Should you have any questions regarding the enclosed information, please contact Mr. Joseph A. Clark, at (225) 381-4177.

A handwritten signature in black ink, appearing to read "JAC", written over a horizontal line.

JAC/wjf

Enclosure

IE25  
NPR2

Radiological Environmental Operating Report for 2011

RBG-47238

Page 2 of 2

cc: U.S. Nuclear Regulatory Commission (w/o Enclosure)  
Region IV  
1600 E. Lamar Blvd.  
Arlington, TX 76011-4511

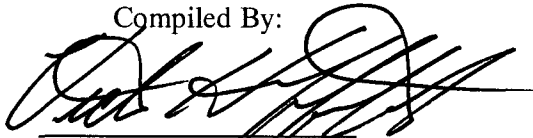
NRC Resident Inspector (w/o Enclosure)  
PO Box 1050  
St. Francisville, LA 70775

Ms. Tracie Lowrey  
Public Utility Commission of Texas  
1701 N. Congress Ave.  
Austin, TX 78711-3326

Mr. Alan Wang, Project Manager  
U.S. Nuclear Regulatory Commission  
MS O-8B1  
11555 Rockville Pike  
Rockville, MD 20852-2738


**RIVER BEND STATION**  
**ANNUAL RADIOLOGICAL ENVIRONMENTAL**  
**OPERATING REPORT FOR 2011**

Compiled By:

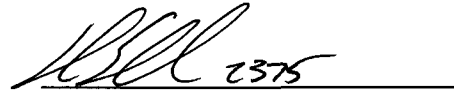


Victor A. Haffstatter  
Sr. HP/Chemistry Specialist

Reviewed By:




Gregory Hackett 1289  
Manager – Radiation Protection



Kenneth S. Hallaran III  
Manager – Chemistry

Approved By:



Richard Gadbois 3051  
General Manager, Plant Operations

## Table of Contents

<b>Summary</b>	<b>1</b>
<b>1. Introduction</b>	<b>5</b>
1.1. Radiological Environmental Monitoring Program	5
1.2. Pathways Monitored	5
1.3. Land Use Census	5
<b>2. Interpretation and Trends of Results</b>	<b>15</b>
2.1. Air Particulate and Radioiodine Sample Results	15
2.2. Thermoluminescent Dosimetry Sample Results	15
2.3. Water Sample Results	16
2.4. Shoreline Sediment Sample Results	16
2.5. Milk Sample Results	16
2.6. Fish and Invertebrate Sample Results	17
2.7. Food Product Sample Results	17
2.8. Land Use Census Results	17
2.9. Interlaboratory Comparison Results	18
<b>3. Radiological Environmental Monitoring Program Summary</b>	<b>21</b>
3.1. 2011 Program Results Summary	21

## List of Tables

<b>Table 1.1 Radiological Environmental Sampling Program</b>	<b>6</b>
<b>Table 2-1 Land Use Census Results</b>	<b>19</b>
<b>Table 3.1 Radiological Environmental Monitoring Program Summary</b>	<b>22</b>

## **List of Figures**

<b>Figure 1-1 Exposure Pathways</b>	<b>12</b>
<b>Figure 1-2 Sample Collection Sites - Near Field</b>	<b>13</b>
<b>Figure 1-3 Sample Collection Sites - Far Field</b>	<b>14</b>
<b>Figure 2-1 TLD Indicator vs Control Data</b>	<b>20</b>
<b>Figure 2-2 Gross Beta Indicator vs Control Data</b>	<b>20</b>

## **List of Attachments**

<b>Attachment 1.1 Air Sample Location AN1</b>	<b>27</b>
<b>Attachment 1.2 Air Sample Location AP1</b>	<b>28</b>
<b>Attachment 1.3 Air Sample Location AQS2</b>	<b>29</b>
<b>Attachment 1.4 Air Sample Location AGC</b>	<b>30</b>
<b>Attachment 2.1 Thermoluminescent Dosimeters</b>	<b>31</b>
<b>Attachment 3.1 Surface Water</b>	<b>32</b>
<b>Attachment 4.1 Groundwater</b>	<b>34</b>
<b>Attachment 5.1 Shoreline Sediment</b>	<b>35</b>
<b>Attachment 6.1 Food Products</b>	<b>36</b>
<b>Attachment 7.1 Fish</b>	<b>37</b>
<b>Attachment 8.1 Interlaboratory Comparison</b>	<b>38</b>

## **Summary**

The Annual Radiological Environmental Operating Report presents data obtained through analyses of environmental samples collected for the River Bend Station (RBS) Radiological Environmental Monitoring Program (REMP) for the period January 1, 2011 through December 31, 2011. This report fulfills a requirement specified in RBS Technical Requirements Manual (TRM) 5.6.2 as required by Technical Specification 5.6.2 of Appendix A to RBS License Number NPF-47. During 2011, REMP results remained at background levels, as has been the case in previous years.

All required lower limit of detection (LLD) capabilities were achieved in all sample analyses during 2011. No measurable levels of radiation above baseline levels attributable to River Bend Station operation were detected in the vicinity of RBS. The 2011 Radiological Environmental Monitoring Program thus substantiated the adequacy of source control and effluent monitoring at River Bend Station with no observed impact of plant operations on the environment.

### **Radiological Environmental Monitoring Program**

RBS established the REMP prior to the station's becoming operational (1985) to provide data on background radiation and radioactivity normally present in the area. RBS has continued to monitor the environment by sampling air, water, sediment, fish and food products, as well as measuring direct radiation. RBS also samples milk if milk-producing animals used for human consumption are present within five miles (8 km) of the plant.

The REMP includes sampling indicator and control locations within an approximate 20-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 the presence of only naturally occurring radioactivity. RBS personnel compare indicator results with control and preoperational results to assess any impact RBS operation might have had on the surrounding environment.

In 2011, environmental samples were collected for radiological analysis. The results of indicator locations were compared with control locations and previous studies. It was concluded that overall, no significant relationship exists between RBS operation and effect on the area around the plant. The review of 2011 data, in many cases, showed radioactivity levels in the environment were undetectable in many locations and near background levels in significant pathways.

### **Harmful Effects or Irreversible Damage**

The REMP monitoring did not detect any harmful effects or evidence of irreversible damage in 2011. Therefore, no analysis or planned course of action to alleviate problems was necessary.

## **Reporting Levels**

River Bend Station reviews indicate that no REMP sample equaled or exceeded reporting levels for radioactivity concentration in environmental samples, as outlined in RBS Technical Requirements Manual Table 3.12.1-2, when averaged over any calendar quarter. Therefore, 2011 results did not require any Radiological Monitoring Program Special Reports.

## **Radioactivity Not Attributable to RBS**

The RBS REMP has detected radioactivity attributable to other sources not associated with the operation of RBS. These instances are summarized as follows:

- ◆ In 2011, I-131 was detected in a control vegetation sample, and indicator and control air sample media, which was credibly attributed to the trans-Pacific transport of airborne releases from Dai-Ichi, Fukushima following the March 11, 2011 Tohoku earthquake.
- ◆ In 1986, following the radioactive plume release due to reactor core degradation at the Chernobyl Nuclear Power Plant, RBS REMP detected I-131 in water, vegetation, and air samples.
- ◆ I-131 was also detected during 1998 in the wastewater treatment plant effluent, which was attributed to the medical treatment of a RBS employee.
- ◆ In 2006, Cs-137 was detected in upstream and downstream Mississippi River sediment samples. This activity was not present in the 2011 samples.

## **Comparison to Federal and State Programs**

RBS personnel compared REMP data to federal and state monitoring programs as results became available. Historically, the programs used for comparison have included the U.S. Nuclear Regulatory Commission (NRC) TLD (Thermoluminescent Dosimeter) Direct Radiation Monitoring Network and the Environmental Radiological Laboratory – Department of Environmental Quality Laboratory Services Division (ERL-DEQLSD).

The NRC TLD Network Program was discontinued in 1998. Historically these results have compared to those from the RBS REMP. RBS TLD results continue to remain similar to the historical average and continue to verify that plant operation is not affecting the ambient radiation levels in the environment.

The ERL-DEQLSD and the RBS REMP entail similar radiological environmental monitoring program requirements. These programs include co-located air sample locations, and splitting or sharing sample media such as water, fish and food products. Both programs have obtained similar results over previous years.

## Sample Deviations

### ◆ Milk

The REMP did not include milk sampling within five miles (8 km) of RBS in 2011 due to unavailability of milk-producing animals used for human consumption. The RBS Technical Requirements Manual requires collection of milk samples if available commercially within 8 km (5 miles) of the plant. RBS personnel collected vegetation samples to monitor the ingestion pathway, as specified in RBS Technical Requirements Manual Table 3.12.1-1, because of milk unavailability.

### ◆ Required Lower Limit of Detection (LLD) Values

All LLD values during this reporting period were within the acceptable limits required by the RBS Technical Requirement Manual (TRM).

### ◆ Sampling Deviations

Listed below are sampling deviations that occurred during 2011. No LLD values were exceeded in the air sampling deviations. As described in footnote (a) to RBS Technical Requirements Manual Table 3.12.1-1, deviations are permitted from the required sampling schedule due to malfunction of equipment or other legitimate reasons.

Station	Sampling Period	Problem Description	Comment
AGC	03/22/11 to 04/05/11	Power Outage	Air sampler location AGC was short for period 03/22/11 to 04/05/11. (CR-RBS-2011-3310)
AN1	06/23/11 to 07/06/11	Power Outage & Damaged Media	Air sampler location AN1 filter was damaged and indicated 26 hours missing for period 06/23/11 to 07/06/11. (CR-RBS-2011-5250)
TN1	2 <sup>nd</sup> Quarter	TLD Missing	TLD TN1 was missing (CR-RBS-2011-5445)
AQS2	09/13/2011 to 09/27/11	Damaged Timer	Air sampler location AQS2 timer was damaged for period 9/13/2011 to 9/27/11. (CR-RBS-2011-7023)
AN1	10/11/2011 to 10/26/11	Damaged Timer	Air sampler location AN1 timer was damaged for period 10/11/2011 to 10/26/11. (CR-RBS-2011-7719)
AP1	11/22/11 to 12/06/11	Power Outage	Air sampler location AP1 was short for period 11/22/11 to 12/06/11. (CR-RBS-2011-8679)



◆ **Missed Samples**

No samples were missed during 2011.

◆ **Unavailable Results**

Results of one TLD from the second quarter 2011 from location TN1 was unavailable due to the TLD being missing at change out. This deviation is noted above.

**Program Modifications**

RBS made no modifications to the REMP during the year 2011.

**Attachments**

Attachment 1 contains results of air, TLD, water, sediment, fish, food products and special samples collected in 2011. River Bend's REMP TLDs were analyzed by Stanford Dosimetry. The River Bend Station Environmental Laboratory analyzed all remaining samples. Attachment 1 also contains River Bend Station's participation in the Interlaboratory Comparison Program during the year 2011.

## **1. Introduction**

### **1.1. Radiological Environmental Monitoring Program**

River Bend Station established the REMP to ensure that plant operating controls properly function to minimize any associated radiation endangerment to human health or the environment. The REMP is designed for the following:

- Analyzing important pathways for anticipated types and quantities of radionuclides released into the environment.
- Considering the possibility of a buildup of long-lived radionuclides in the environment and identifying physical and biological accumulations that may contribute to human exposures.
- Considering the potential radiation exposure to plant and animal life in the environment surrounding RBS.
- Correlating levels of radiation and radioactivity in the environment with radioactive releases from station operation.

### **1.2. Pathways Monitored**

The airborne, direct radiation, waterborne and ingestion pathways, as seen in Figure 1-1, are monitored as required by the RBS Technical Requirements Manual 3.12.1. A description of the RBS REMP sample locations utilized to monitor exposure pathways are described in Table 1.1 and shown in Figures 1-2 and 1-3. RBS may occasionally 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 2011 sampling results with Section 3.0 providing a summary of results for the monitored exposure pathways.

### **1.3. Land Use Census**

RBS personnel conduct a land use census biannually as required by RBS Technical Requirements Manual 3.12.2. The last land use census was performed in 2010. The next scheduled Land Use Census will be performed in 2012. Section 2.8 of this report contains a narrative on the results of the 2010 land use census.

**Table 1.1**  
**Radiological Environmental Sampling Program**

<b>Exposure Pathway</b>	<b>Requirement</b>	<b>Sample Point Description, Distance and Direction</b>	<b>Sampling and Collection Frequency</b>	<b>Type and Frequency Of Analyses</b>
Airborne	<b><u>Radioiodine and Particulates</u></b> 2 samples from close to the 2 SITE BOUNDARY locations, in different sectors, of the highest calculated annual average ground level D/Q.	AN1 (0.9 km W) - RBS site Hwy 965; 0.4 km south of Activity Center.  AP1 (0.9 km WNW) – Behind River Bend Station Activity Center.	Continuous sampler operation with sample collection every two weeks, or more frequently if required by dust loading.	Radioiodine Canisters – I-131 analysis every two weeks.  Air Particulate – Gross beta radioactivity analysis following filter change.
	<b><u>Radioiodine and Particulates</u></b> 1 sample from the vicinity of a community having the highest calculated annual average ground level D/Q.	AQS2 (5.8 km NW) - St. Francis Substation on US Hwy. (Bus.) 61 in St. Francisville.		
	<b><u>Radioiodine and Particulates</u></b> 1 sample from a control location, as for example 15 - 30 km distance and in the least prevalent wind direction.	AGC (17.0 km SE) – Entergy Service Center compound in Zachary. (Control)		
Direct Radiation	<b><u>TLDs</u></b> One ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY.	TA1 (1.7 km N) - River Bend Training Center.  TB1 (0.5 km NNE) - Utility pole near River Bend Station cooling tower yard area.  TC1 (1.7 km NE) - Telephone pole at Jct. US Hwy. 61 and Old Highway 61.	Quarterly	mR exposure quarterly.

**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><b>TLDs</b> One ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY.</p>	<p><b>TD1 (1.6 km ENE)</b> – Stub pole along WF7, 150m S of Jct. WF7 and US Hwy. 61.</p> <p><b>TE1 (1.3 km E)</b> – Stub pole along WF7, 1 km S of Jct. WF7 and US Hwy. 61.</p> <p><b>TF1 (1.3 km ESE)</b> – Stub pole along WF7, 1.6 km S of Jct. WF7 and US Hwy. 61.</p> <p><b>TG1 (1.6 km SE)</b> – Stub pole along WF7, 2 km S of Jct. WF7 and US Hwy. 61.</p> <p><b>TH1 (1.7 km SSE)</b> – Stub pole at power line crossing of WF7 (near Grants Bayou).</p> <p><b>TJ1 (1.5 km S)</b> – Stub pole near River Bend Station Gate #23 on Powell Station Road (LA Hwy. 965).</p> <p><b>TK1 (0.9 km SSW)</b> – Utility pole on Powell Station Road (LA Hwy. 965), 20 m S of River Bend Station River Access Road.</p> <p><b>TL1 (1.0 km SW)</b> – First utility pole on Powell Station Road (LA Hwy. 965) S of former Illinois Central Gulf RR crossing.</p>	Quarterly	mR exposure quarterly.

**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><b>TLDs</b> One ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY.</p>	<p><b>TM1 (0.9 km WSW)</b> - Third utility pole on Powell Station Road (LA Hwy. 965) N of former Illinois Central Gulf RR crossing.</p> <p><b>TN1 (0.9 km W)</b> – Utility pole along Powell Station Road (LA Hwy. 965), near garden and AN1 air sampler location.</p> <p><b>TP1 (0.9 km WNW)</b> - Behind River Bend Station Activity Center at AP1 air sampler location.</p> <p><b>TQ1 (0.6 km NW)</b> – Across from MA-1 on RBS North Access Road.</p> <p><b>TR1 (0.8 km NNW)</b> – River Bend Station North Access Road across from Main Plant entrance.</p>	Quarterly	mR exposure quarterly.
	<p><b>TLDs</b> The balance of the stations (8) to be placed in special interest areas such as population centers, nearby residences, schools, and in 1 or 2 areas to serve as control locations.</p>	<p><b>TAC (15.8 km N)</b> – Utility pole at Jct. of US Hwy. 61 and LA Hwy. 421, 7.9 km north of Bains. (Control)</p> <p><b>TCS (12.3 km NE)</b> – Utility pole at gate to East Louisiana State Hospital in Jackson. (Special)</p> <p><b>TEC (16.0 km E)</b> – Stub pole at jct. of Hwy. 955 and Greenbrier Road, 4.8 km North of Jct. of Hwys 955 and 964. (Control)</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><b>TLDs</b> The balance of the stations (8) to be placed in special interest areas such as population centers, nearby residences, schools, and in 1 or 2 areas to serve as control locations.</p>	<p><b>TGS (17.0 km SE)</b> – Entergy Service Center compound in Zachary. (Special)</p> <p><b>TNS (6.0 km W)</b> – Utility pole with electrical meter at west bank ferry landing (LA Hwy. 10). (Special)</p> <p><b>TQS1 (4.0 km NW)</b> – Utility pole front of Pentecostal church (opposite West Feliciana Parish Hospital) near Jct. US Hwy. 61 and Commerce Street. (Special)</p> <p><b>TQS2 (5.8 km NW)</b> – St. Francis Substation on business US Hwy..61 in St. Francisville. (Special)</p> <p><b>TRS (9.2 km NNW)</b> - Stub pole at Jct. of US Hwy. 61 and WF2 near Bains (West Feliciana High School). (Special)</p>	Quarterly	mR exposure quarterly.
Waterborne	<p><b>Surface Water</b> 1 sample upstream and 1 sample downstream.</p>	<p><b>SWU (5.0 km W)</b> - Mississippi River about 4 km upstream from the plant liquid discharge outfall, near LA Hwy. 10 ferry crossing.</p> <p><b>SWD (7.75 km S)</b> - Mississippi River about 4 km downstream from plant liquid discharge outfall, near paper mill.</p>	Grab samples quarterly	Gamma isotopic analysis, and tritium analysis quarterly.

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	<b>Groundwater</b> Samples from 1 or 2 sources only if likely to be affected.	<b>WU (~470 m NNE)</b> - Upland Terrace Aquifer well upgradient from plant.  <b>WD (~470 m SW)</b> - Upland Terrace Aquifer well downgradient from plant.	Semiannually	Gamma isotopic and tritium analysis semiannually.
	<b>Sediment From Shoreline</b> 1 sample from downstream area with existing or potential recreational value.	<b>SEDD (7.75 km S)</b> - Mississippi River about 4 km downstream from plant liquid discharge outfall, near paper mill.	Annually	Gamma isotopic analysis annually.
Ingestion	<b>Milk</b> If commercially available, 1 sample from milking animals within 8 km distant where doses are calculated to be greater than 1 mrem per year.  1 sample from milking animals at a control location 15 - 30 km distant when an indicator location exists.	Currently, no available milking animals within 8 km of RBS.	Quarterly when animals are on pasture.	Gamma isotopic and I-131 analysis quarterly when animals are on pasture.
	<b>Fish and Invertebrates</b> 1 sample of a commercially and/or recreationally important species in vicinity of plant discharge area.  1 sample of similar species in area not influenced by plant discharge.	<b>FD (7.75 km S)</b> - One sample of a commercially and/or recreationally important species from downstream area influenced by plant discharge.  <b>FU (4.0 km WSW)</b> - One sample of a commercially and/or recreationally important species from upstream area not influenced by plant discharge.	Annually	Gamma isotopic analysis on edible portions annually

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><b>Food Products</b>                      1 sample of one type of broadleaf vegetation grown near the SITE BOUNDARY location of highest predicted annual average ground level D/Q if milk sampling is not performed.</p> <p>1 sample of similar broadleaf vegetation grown 15 – 30 km distant, if milk sampling is not performed.</p>	<p><b>GN1 (0.9 km W)</b> – Sampling will be performed in accordance with Table 3.12.1-1 Section 4.a of the Technical Requirements Manual.</p> <p><b>GQC (32.0 km NW)</b> - One sample of similar vegetables from LA State Penitentiary at Angola. (Control)</p>	Quarterly during the growing season.	Gamma isotopic and I-131 analysis quarterly.



Figure 1-1  
Exposure Pathways

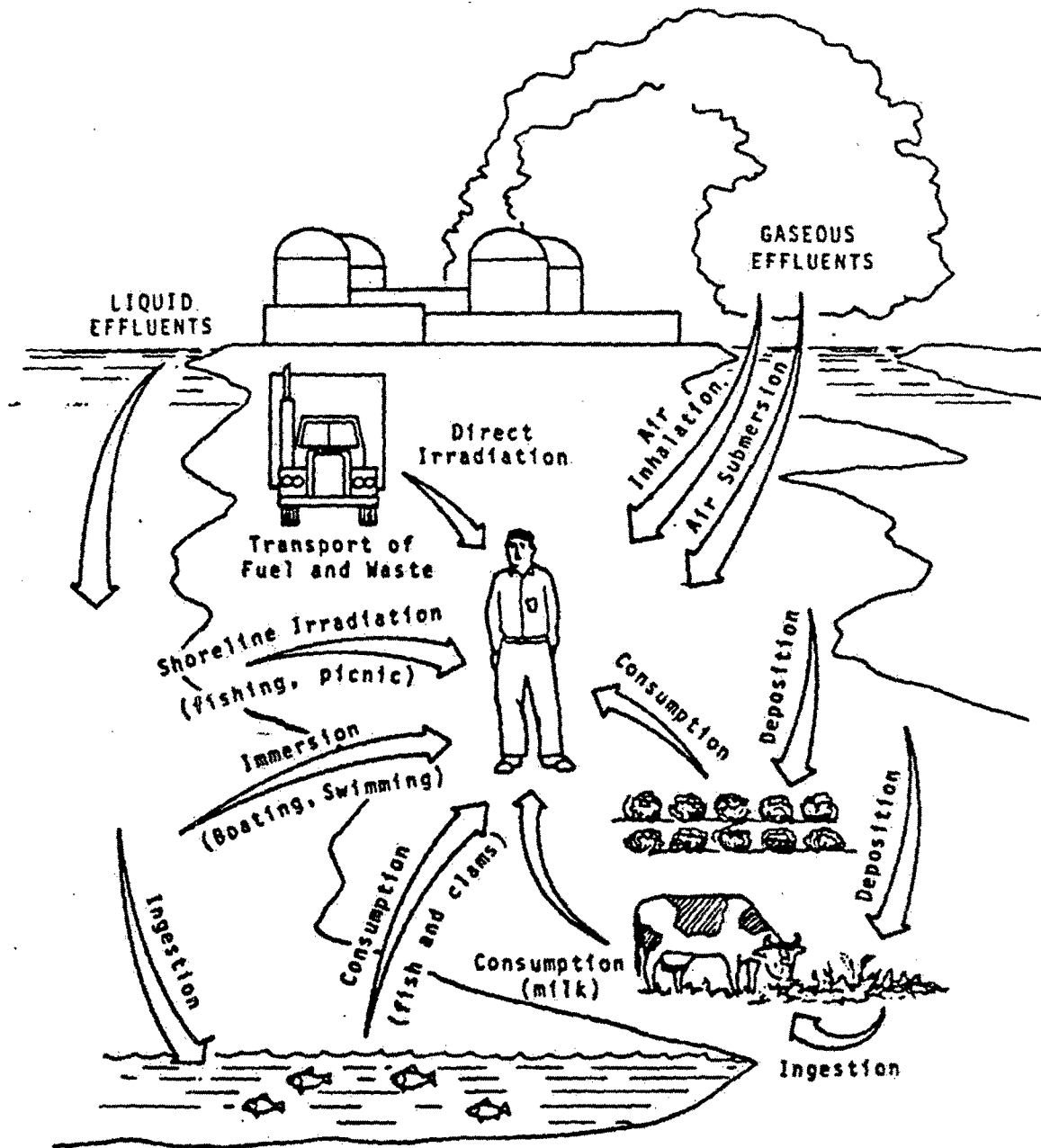


Figure 1-2  
Sample Collection Sites – Near Field

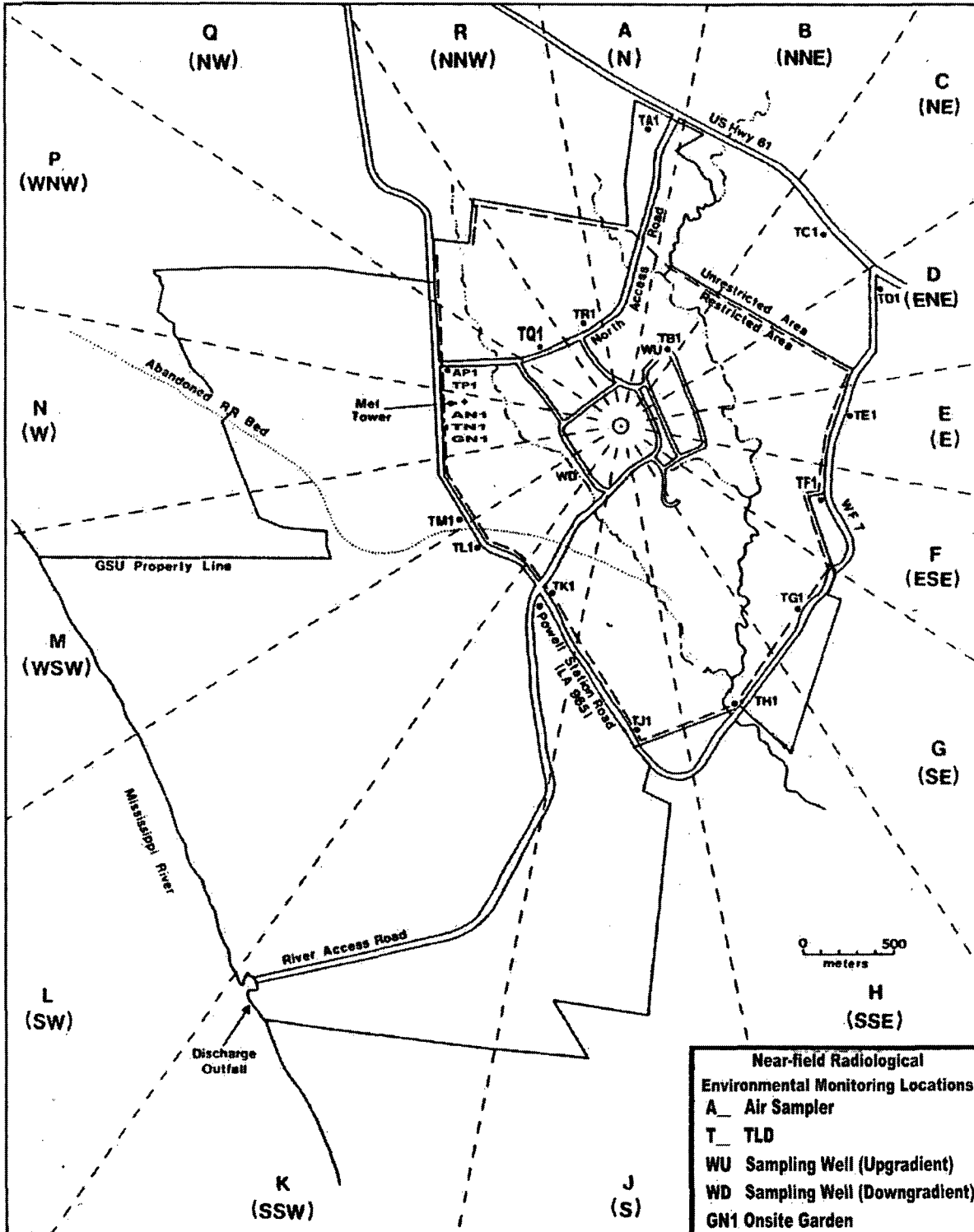
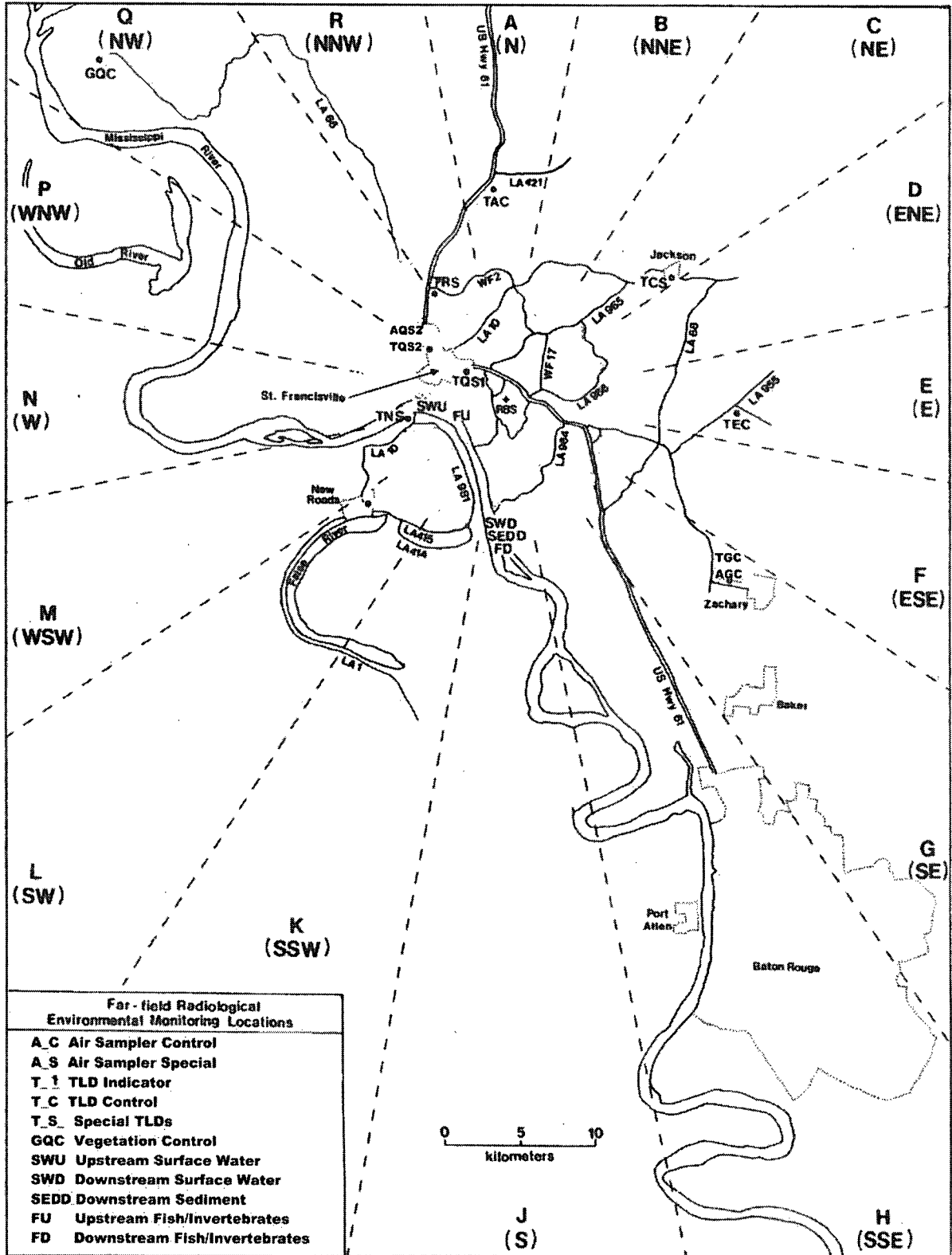


Figure 1-3  
Sample Collection Sites – Far Field



## 2. Interpretation and Trends of Results

### 2.1. Air Particulate and Radioiodine Sample Results

Iodine-131 attributable to RBS was not detected in the radioiodine cartridges during 2011 as has been the case in previous years. Indicator gross beta air particulate results for 2011 were similar to preoperational and operational levels as seen below. Results are reported as annual average pCi/m<sup>3</sup> (picocuries per cubic meter).

<u>Monitoring Period</u>	<u>Result</u>
Preoperational	0.030
2011	0.026
2010	0.024
2009	0.023
2008	0.023
2007	0.024

Table 3.1 provides a comparison of the indicator and control location mean values which further emphasizes that the airborne pathway continues to remain at background levels. Figure 2-2 shows a comparison of indicator results from 2011.

### 2.2. Thermoluminescent Dosimetry Sample Results

Gamma radiation exposure in the reporting period compares to previous years. Figure 2-1 compares quarterly indicator results for 2011 with control location data from 1986 to 2010. All indicator results were within three-sigma of the control data.

RBS normalizes measured exposure to 90 days and relies on comparison of the indicator locations to the control as a measure of plant impact. RBS's comparison of the indicator and special interest area TLD results to the controls, as seen in Table 3.1, indicates that the ambient radiation levels are unaffected by plant operations. Therefore, levels continue to remain at or near background.

The result of one 2<sup>nd</sup> quarter 2011 indicator TLD (TN1) was unavailable due to that TLD being missing at change out.

### 2.3. Water Sample Results

Analytical results for 2011 surface water and groundwater samples were similar to those reported in previous years.

**Surface water** samples were collected from two locations (indicator and control) and analyzed for gamma radionuclides and tritium. Gamma radionuclides were below detectable limits at the indicator and control locations. Tritium was also below detectable limits at all locations. Listed below is a comparison of 2011 results from the indicator location as compared to the preoperational and previous operational years. Results are reported as annual average pCi/l (picocuries per liter).

<u>Radionuclide</u>	<u>2011</u>	<u>2003 – 2010</u>	<u>Preoperational</u>
Gammas	<LLD	<LLD	<LLD
Tritium	<LLD	<LLD	<LLD

**Groundwater** samples were collected from two locations (indicator and control) and analyzed for gamma radionuclides and tritium. Gamma radionuclides and tritium were below detectable limits at the indicator and control locations. Listed below is a comparison of 2011 results from the indicator location as compared to the preoperational and previous operational years. Results are reported as annual average pCi/l.

<u>Radionuclide</u>	<u>2011</u>	<u>2003 – 2010</u>	<u>Preoperational</u>
Gammas	<LLD	<LLD	<LLD
Tritium	<LLD	<LLD	<LLD

Based on these comparisons, the operation of RBS had no impact on this pathway during 2011, and levels of radionuclides monitored for this pathway continue to remain similar to those obtained in operational and preoperational years.

### 2.4. Shoreline Sediment Sample Results

A shoreline sediment sample was collected from the indicator location in 2011 and analyzed for gamma radionuclides. RBS also samples a non-REMP upstream control sediment sample. A review of historical indicator and upstream sediment samples periodically shows Cs-137. No Cs-137 was indicated on the samples in 2011. Therefore, based on these measurements, RBS operations had no significant radiological impact upon the environment or public via this pathway.

### 2.5. Milk Sample Results

Milk samples were not collected during 2011 due to the unavailability of indicator locations within 5 miles (8 km) of RBS. Since there are no dairies within five miles of the RBS site, it is concluded RBS's operation had no impact on this pathway in 2011.

## **2.6. Fish and Invertebrate Sample Results**

Fish samples were collected from two locations (indicator and control) and analyzed for gamma radionuclides. In 2011, gamma radionuclides were below detectable limits that were consistent with the preoperational and operational monitoring periods. Therefore, based on these measurements, RBS operations had no significant radiological impact upon the environment or public by this pathway.

## **2.7. Food Product Sample Results**

Food product samples were collected when available from two locations (indicator and control) in 2011 and analyzed for gamma radionuclides in accordance with Table TRM 3.12.1-1. The 2011 levels attributable to RBS remained undetectable, which is consistent with previous operational years. Therefore, since levels continue to remain at background, it can be concluded that plant operations is not impacting this pathway.

## **2.8. Land Use Census Results**

The Land Use Census was conducted in accordance with procedure ESP-8-051, as required by Technical Requirements Manual (TRM) (TR 3.12.2).

A garden census is not conducted pursuant to the note in the TRM (TLCO 3.12.2) that allows the sampling of broadleaf vegetation in the highest calculated average ground-level D/Q sector near site boundary in lieu of the garden census.

The milk animal census identified no milk animals within 8 km (5 miles) of River Bend site. This information was verified by the County Agents from West Feliciana, East Feliciana, and Pointe Coupee parishes.

The resident census changes are noted in Table 2.1. One resident was added to account of the Point Coupee Parish Detention Center. See the comments in Table 2.1 for specific information regarding changes.

No locations were identified in 2011 that would yield a calculated dose or dose commitment greater than those contained in the TRM (TR 3.11).

Table 2.1 contains data from the most recently completed Land Use Census.

## **2.9. Interlaboratory Comparison Results**

The River Bend Station Environmental Laboratory analyzed interlaboratory comparison samples to fulfill the requirements of Technical Requirements Manual 3.12.3. Attachment 8.1 contains these results. The interlaboratory comparison results indicated that 100% of the sample results for accuracy and precision were within the acceptable control limits.

**Table 2-1**  
**Land Use Census Results**

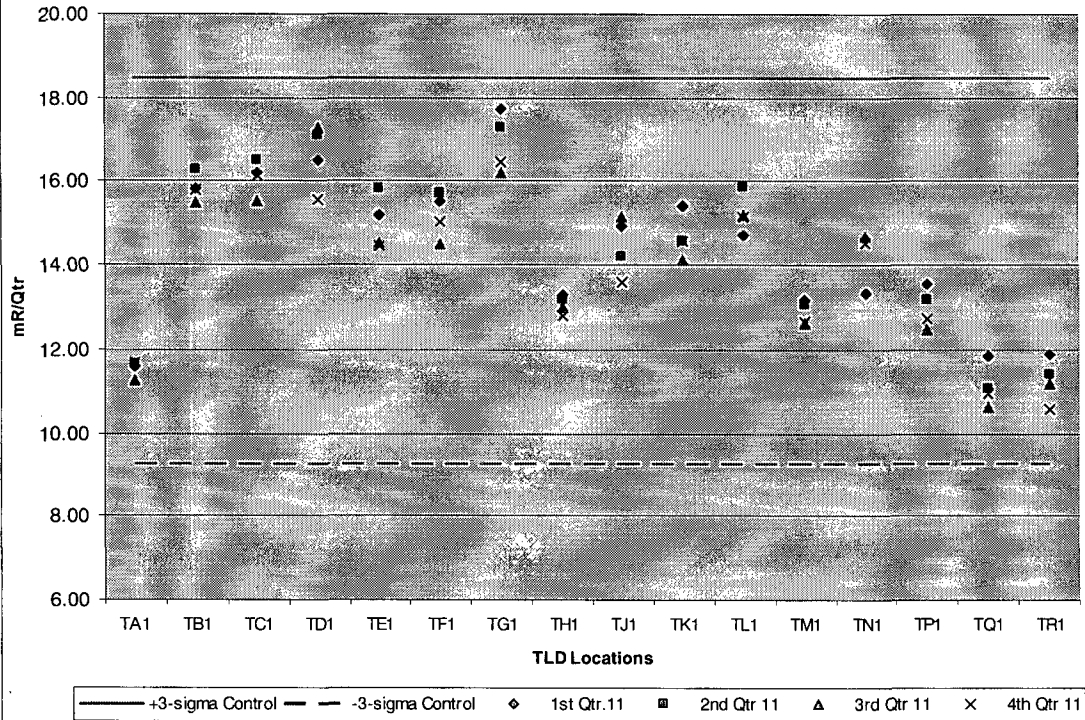
**2010**

<b>Item #</b>	<b>Sector</b>	<b>Nearest Residence</b>	<b>Range (km)</b>	<b>Nearest Milk Animal</b>	<b>Range (km)</b>	<b>Comment #</b>
1	<b>A (N)</b>	5498 Hwy 61 St.Francisville, LA 70775	1.9	-	-	
2	<b>B (NNE)</b>	4549 Old Hwy 61 St.Francisville, LA 70775	1.4	-	-	
3	<b>C (NE)</b>	4553 Old Hwy 61 St.Francisville, LA 70775	1.5	-	-	
4	<b>D (ENE)</b>	12657 Powell Station Rd. St.Francisville, LA 70775	1.4	-	-	
5	<b>E (E)</b>	4635 Hwy 61 St.Francisville, LA 70775	2.6	-	-	
6	<b>F (ESE)</b>	12019 Fairview Way Jackson, LA 7748	2.6	-	-	
7	<b>G (SE)</b>	3319 Hwy 964 Jackson, LA 70748	3.7	-	-	
8	<b>H (SSE)</b>	11813 Powell Station Rd. St.Francisville, LA 70775	1.7	-	-	
9	<b>J (S)</b>	11649 Powell Station Rd. St.Francisville, LA 70775	1.9	-	-	
10	<b>K (SSW)</b>	8909 Hwy 981 New Roads, LA 70760	6.5	-	-	
11	<b>L (SW)</b>			-	-	<b>1</b>
12	<b>M (WSW)</b>	10933 Cajun 2 Rd. New Roads, LA 70760	5.1	-	-	<b>2</b>
13	<b>N (W)</b>			-	-	<b>1</b>
14	<b>P (WNW)</b>	10426 Old Field Rd. St.Francisville, LA 70775	3.7	-	-	
15	<b>Q (NW)</b>	9537 Hwy 965 St.Francisville, LA 70775	1.3	-	-	
16	<b>R (NNW)</b>	9794 Hwy 965 St.Francisville, LA 70775	1.6	-	-	

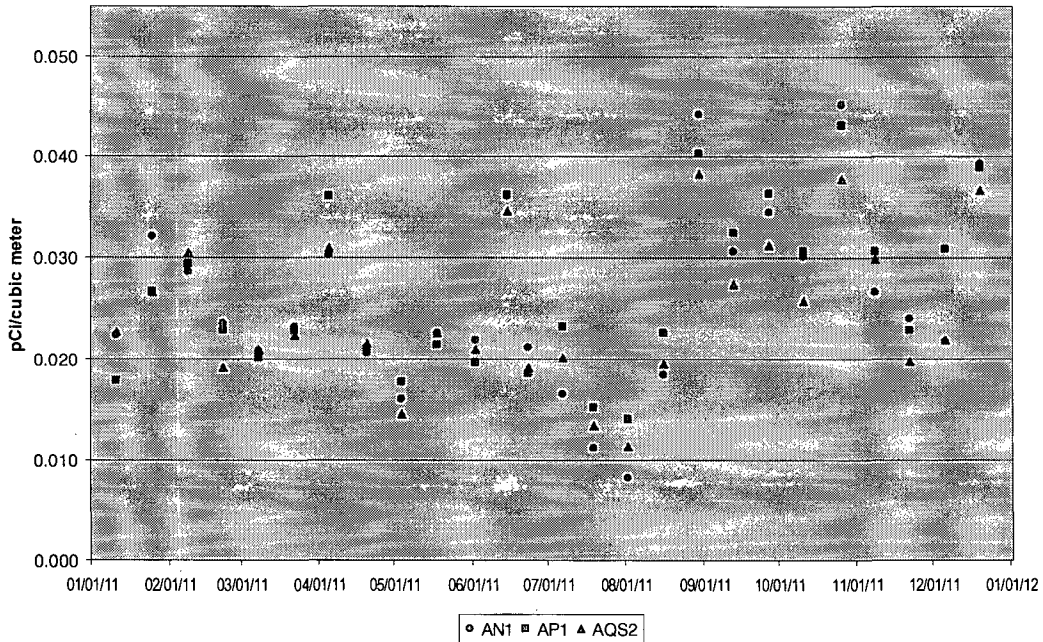
<b>#</b>	<b>Comment</b>
<b>1</b>	No residence located within 8 km.
<b>2</b>	New residence added for Pointe Coupee Parish Detention Center.



**FIGURE 2-1**  
**TLD Indicator Results (2011) Versus Control Data (1986-2010)**



**FIGURE 2-2**  
**Gross Beta Indicator Results (2011)**



### **3. Radiological Environmental Monitoring Program Summary**

#### **3.1. 2011 Program Results Summary**

Table 3.1 summarizes the 2011 REMP results. RBS personnel did not use values reported as less than the lower limit of detection (<LLD) when determining ranges and means for indicator and control locations.

Table 3.1

**Radiological Environmental Monitoring Program Summary**Name of Facility: **River Bend Station**Docket No: **50-458**Location of Facility: **West Feliciana Parish, Louisiana**Reporting Period: **January - December 2011**

Sample Type ( Units )	Type & Number of Analyses	LLD <sup>a</sup>	Indicator Locations Mean ( F ) <sup>b</sup> [ Range ]	Location with Highest Annual Mean		Control Locations Mean ( F ) <sup>b</sup> [ Range ]	Number of Nonroutine Results <sup>d</sup>
				Location <sup>c</sup>	Mean ( F ) <sup>b</sup> [ Range ]		
<b>Air Particulates</b> ( pCi/m <sup>3</sup> )	Gross Beta 104	0.01	0.026 ( 78 / 78 ) [ 0.008 - 0.045 ]	API ( 0.9 km WNW )	0.027 ( 26 / 26 ) [ 0.014 - 0.043 ]	0.025 ( 26 / 26 ) [ 0.012 - 0.040 ]	0
<b>Airborne Iodine</b> ( pCi/m <sup>3</sup> )	I-131 104	0.07	0.057 ( 5 / 5 ) <sup>g</sup> [ 0.010 - 0.095 ]	N/A <sup>g</sup>	N/A <sup>g</sup>	0.096 ( 1 / 1 ) <sup>g</sup> [ 0.096 ]	0
<b>Indicators TLDs</b> ( mR/Qtr )	Gamma 63	(e)	14.19 ( 63 / 63 ) [ 10.59 - 17.74 ]	TG1 ( 1.6 km SE )	16.93 ( 4 / 4 ) [ 16.21 - 17.74 ]	N/A	0
<b>Special Interest TLDs</b> ( mR/Qtr )	Gamma 24	(e)	14.82 ( 24 / 24 ) [ 12.81 - 17.11 ]	TGS ( 17.0 km SE )	16.51 ( 4 / 4 ) [ 15.46 - 17.11 ]	N/A	0
<b>Control TLDs</b> ( mR/Qtr )	Gamma 8	(e)	N/A	N/A	N/A	15.75 ( 8 / 8 ) [ 14.65 - 16.75 ]	0

TABLE 3.1

Radiological Environmental Monitoring Program Summary

Name of Facility: River Bend Station

Docket No: 50-458

Location of Facility: West Feliciana Parish, Louisiana

Reporting Period: January - December 2011

Sample Type (Units)	Type & Number of Analyses	LLD <sup>a</sup>	Indicator Location Mean (F) <sup>b</sup> [ Range ]	Location with Highest Annual Mean		Control Locations Mean (F) <sup>b</sup> [ Range ]	Number of Nonroutine Results <sup>d</sup>
				Location <sup>c</sup>	Mean (F) <sup>b</sup> [ Range ]		
Surface Water (pCi/L)	H-3 10	3000	<LLD	N/A	N/A	<LLD	0
	Gamma 10						
	Mn-54	15	<LLD	N/A	N/A	<LLD	0
	Co-58	15	<LLD	N/A	N/A	<LLD	0
	Fe-59	30	<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
	I-131	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	0

TABLE 3.1

Radiological Environmental Monitoring Program Summary

Name of Facility: River Bend Station

Docket No: 50-458

Location of Facility: West Feliciana Parish, Louisiana

Reporting Period: January - December 2011

Sample Type (Units)	Type & Number of Analyses <sup>a</sup>	LLD <sup>a</sup>	Indicator Locations Mean (F) <sup>b</sup>   Range	Location with Highest Annual Mean		Control Locations Mean (F) <sup>b</sup>   Range	Number of Nonroutine Results <sup>d</sup>
				Location <sup>c</sup>	Mean (F) <sup>b</sup>   Range		
Groundwater (pCi/L)	H-3 6	3000	<LLD	N/A	N/A	<LLD	0
	Gamma 6						
	Mn-54	15	<LLD	N/A	N/A	<LLD	0
	Co-58	15	<LLD	N/A	N/A	<LLD	0
	Fe-59	30	<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
	I-131	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	
Shoreline Sediment (pCi/kg) <sup>f</sup>	Gamma 2						
	Cs-134	150	<LLD	N/A	N/A	<LLD	0
	Cs-137	180	<LLD	N/A	N/A	<LLD	0

TABLE 3.1

Radiological Environmental Monitoring Program Summary

Name of Facility: River Bend Station

Docket No: 50-458

Location of Facility: West Feliciana Parish, Louisiana

Reporting Period: January - December 2011

Sample Type (Units)	Type & Number of Analyses	LLD <sup>a</sup>	Indicator Location Mean ( F ) <sup>b</sup> [ Range ]	Location with Highest Annual Mean		Control Locations Mean ( F ) <sup>b</sup> [ Range ]	Number of Nonroutine Results <sup>d</sup>
				Location <sup>c</sup>	Mean ( F ) <sup>b</sup> [ Range ]		
Fish ( pCi/kg )	Gamma 4						
	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 ( pCi/kg )	I-131 8	60	<LLD	N/A	N/A	70.26 ( 1 / 1 ) <sup>g</sup> [ 70.26 ]	0
	Gamma 8						
	Cs-134	60	<LLD	N/A	N/A	<LLD	0
	Cs-137	80	<LLD	N/A	N/A	<LLD	0

a LLD = Required lower limit of detection based on RBS Technical Requirements Manual Table 3.12.1-3.

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

c Locations are specified (1) by name and (2) direction and distance relative to reactor site.

d 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.

e LLD is not defined in RBS Technical Requirements Manual Table 3.12.1-3.

f Control location for sediment is upstream surface water sample.

g REMP samples obtained from this location during 2011 identified detectable concentrations of isotopes that could be related to operation of River Bend Station (RBS). Given the following facts, the detectable concentrations are not a result of RBS operation:

- o The quantities of radioactive airborne effluents from RBS during 2011 did not increase significantly compared to year 2010.
- o Prior REMP sample results have not detected the presence of these isotopes in samples which could be attributed to RBS.
- o The concentrations detected in indicator samples were also identified in the associated control samples.

As such, the atypical detection of these radionuclides in both indicator and control samples is credibly attributed to the trans-Pacific transport of airborne releases from Dai-Ichi, Fukushima following the March 11, 2011 Tohoku earthquake and is not related to the operations of RBS.

**2011 Radiological Monitoring Report**  
**Summary of Monitoring Results**

**Attachment 1.1**

Sample Type: Air Particulate and Charcoal Cartridge – Indicator Location AN1  
 Analysis: Gross Beta and Iodine  
 Units: pCi/m<sup>3</sup>

LLD (pCi/m <sup>3</sup> ) LAB ID	START DATE	END DATE	0.07 I-131	0.01 GROSS BETA
20110014	12/28/2010	1/11/2011	< 0.008	0.022 +/- 0.0007
20110101	1/11/2011	1/25/2011	< 0.010	0.032 +/- 0.0007
20110154	1/25/2011	2/8/2011	< 0.009	0.029 +/- 0.0006
20110193	2/8/2011	2/22/2011	< 0.009	0.024 +/- 0.0006
20110282	2/22/2011	3/8/2011	< 0.006	0.021 +/- 0.0006
20110333	3/8/2011	3/22/2011	< 0.007	0.023 +/- 0.0006
20110438	3/22/2011	4/5/2011	0.084 +/- 0.00759	0.030 +/- 0.0006
20110530	4/5/2011	4/20/2011	0.010 +/- 0.00297	0.021 +/- 0.0005
20110632	4/20/2011	5/4/2011	< 0.009	0.016 +/- 0.0005
20110737	5/4/2011	5/18/2011	< 0.007	0.023 +/- 0.0006
20110821	5/18/2011	6/2/2011	< 0.009	0.022 +/- 0.0005
20110873	6/2/2011	6/15/2011	< 0.010	0.036 +/- 0.0007
20110906	6/15/2011	6/23/2011	< 0.013	0.021 +/- 0.0008
20110976	6/23/2011	7/6/2011	< 0.010	0.017 +/- 0.0005
20111044	7/6/2011	7/19/2011	< 0.010	0.011 +/- 0.0005
20111094	7/19/2011	8/2/2011	< 0.009	0.008 +/- 0.0004
20111166	8/2/2011	8/16/2011	< 0.009	0.018 +/- 0.0005
20111233	8/16/2011	8/30/2011	< 0.009	0.044 +/- 0.0008
20111280	8/30/2011	9/13/2011	< 0.008	0.031 +/- 0.0007
20111376	9/13/2011	9/13/2011	< 0.007	0.035 +/- 0.0007
20111445	9/27/2011	10/11/2011	< 0.009	0.030 +/- 0.0007
20111484	10/11/2011	10/26/2011	< 0.007	0.045 +/- 0.0007
20111513	10/26/2011	11/8/2011	< 0.009	0.027 +/- 0.0006
20111565	11/8/2011	11/22/2011	< 0.009	0.024 +/- 0.0006
20111594	11/22/2011	12/6/2011	< 0.008	0.028 +/- 0.0006
20111738	12/6/2011	12/20/2011	< 0.007	0.039 +/- 0.0007

**Totals:**

**Average:** 0.026  
**Maximum:** 0.045  
**Minimum:** 0.008



**Attachment 1.2**

Sample Type: **Air Particulate and Charcoal Cartridge – Indicator Location AP1**  
 Analysis: Gross Beta and Iodine  
 Units: pCi/m<sup>3</sup>

<b>LLD (pCi/m<sup>3</sup>)</b>			<b>0.07</b>	<b>0.01</b>
<b>LAB ID</b>	<b>START DATE</b>	<b>END DATE</b>	<b>I-131</b>	<b>GROSS BETA</b>
20110013	12/28/2010	1/11/2011	<0.008	0.018 +/- 0.0006
20110100	1/11/2011	1/25/2011	<0.008	0.027 +/- 0.0007
20110153	1/25/2011	2/8/2011	<0.008	0.029 +/- 0.0006
20110192	2/8/2011	2/22/2011	<0.009	0.023 +/- 0.0006
20110281	2/22/2011	3/8/2011	<0.010	0.020 +/- 0.0005
20110332	3/8/2011	3/22/2011	<0.008	0.023 +/- 0.0006
20110437	3/22/2011	4/5/2011	0.079 +/- 0.00653	0.036 +/- 0.0007
20110529	4/5/2011	4/20/2011	<0.010	0.021 +/- 0.0005
20110631	4/20/2011	5/4/2011	<0.008	0.018 +/- 0.0005
20110736	5/4/2011	5/18/2011	<0.009	0.022 +/- 0.0005
20110820	5/18/2011	6/2/2011	<0.008	0.020 +/- 0.0005
20110872	6/2/2011	6/15/2011	<0.008	0.036 +/- 0.0007
20110905	6/15/2011	6/23/2011	<0.011	0.019 +/- 0.0007
20110975	6/23/2011	7/9/2011	<0.010	0.023 +/- 0.0006
20111043	7/6/2011	7/19/2011	<0.007	0.015 +/- 0.0005
20111093	7/19/2011	8/2/2011	<0.009	0.014 +/- 0.0005
20111165	8/2/2011	8/16/2011	<0.009	0.023 +/- 0.0006
20111232	8/16/2011	8/30/2011	<0.009	0.040 +/- 0.0008
20111279	8/30/2011	9/13/2011	<0.010	0.032 +/- 0.0007
20111375	9/13/2011	9/13/2011	<0.007	0.036 +/- 0.0008
20111444	9/27/2011	10/11/2011	<0.008	0.031 +/- 0.0007
20111483	10/11/2011	10/26/2011	<0.011	0.043 +/- 0.0008
20111512	10/26/2011	11/8/2011	<0.008	0.031 +/- 0.0007
20111564	11/8/2011	11/22/2011	<0.009	0.023 +/- 0.0006
20111593	11/22/2011	12/6/2011	<0.010	0.032 +/- 0.0008
20111737	12/6/2011	12/20/2011	<0.006	0.039 +/- 0.0007

**Totals:**

**Average:** 0.027  
**Maximum:** 0.043  
**Minimum:** 0.014

**Attachment 1.3**

Sample Type: **Air Particulate and Charcoal Cartridge – Indicator Location AQS2**  
 Analysis: Gross Beta and Iodine  
 Units: pCi/m<sup>3</sup>

<b>LLD (pCi/m<sup>3</sup>)</b>			<b>0.07</b>	<b>0.01</b>
<b>LAB ID</b>	<b>START DATE</b>	<b>END DATE</b>	<b>I-131</b>	<b>GROSS BETA</b>
20110015	12/28/2010	1/11/2011	<0.009	0.023 +/- 0.0007
20110102	1/11/2011	1/25/2011	<0.009	0.027 +/- 0.0006
20110155	1/25/2011	2/8/2011	<0.010	0.031 +/- 0.0007
20110194	2/8/2011	2/22/2011	<0.009	0.019 +/- 0.0005
20110283	2/22/2011	3/8/2011	<0.010	0.021 +/- 0.0006
20110334	3/8/2011	3/22/2011	<0.009	0.022 +/- 0.0006
20110439	3/22/2011	4/5/2011	0.095 +/- 0.0740	0.031 +/- 0.0007
20110531	4/5/2011	4/20/2011	0.015 +/- 0.0035	0.022 +/- 0.0005
20110633	4/20/2011	5/4/2011	<0.010	0.026 +/- 0.0005
20110738	5/4/2011	5/18/2011	<0.010	0.023 +/- 0.0006
20110822	5/18/2011	6/2/2011	<0.008	0.021 +/- 0.0005
20110874	6/2/2011	6/15/2011	<0.008	0.035 +/- 0.0007
20110907	6/15/2011	6/23/2011	<0.010	0.019 +/- 0.0007
20110977	6/23/2011	7/7/2011	<0.008	0.020 +/- 0.0005
20111045	7/7/2011	7/19/2011	<0.009	0.013 +/- 0.0005
20111095	7/19/2011	8/2/2011	<0.010	0.011 +/- 0.0004
20111167	8/2/2011	8/16/2011	<0.010	0.020 +/- 0.0005
20111234	8/16/2011	8/30/2011	<0.009	0.038 +/- 0.0007
20111281	8/30/2011	9/13/2011	<0.006	0.027 +/- 0.0006
20111377	9/13/2011	9/13/2011	<0.006	0.032 +/- 0.0007
20111446	9/27/2011	10/11/2011	<0.009	0.026 +/- 0.0006
20111485	10/11/2011	10/26/2011	<0.009	0.038 +/- 0.0007
20111514	10/26/2011	11/8/2011	<0.008	0.030 +/- 0.0007
20111566	11/8/2011	11/22/2011	<0.007	0.020 +/- 0.0005
20111595	11/22/2011	12/6/2011	<0.008	0.022 +/- 0.0005
20111739	12/6/2011	12/20/2011	<0.008	0.037 +/- 0.0007

**Totals:**

**Average:** **0.025**  
**Maximum:** **0.038**  
**Minimum:** **0.011**

**Attachment 1.4**

Sample Type: **Air Particulate and Charcoal Cartridge – Control Location AGC**  
 Analysis: Gross Beta and Iodine  
 Units: pCi/m<sup>3</sup>

<b>LLD (pCi/m<sup>3</sup>)</b>			<b>0.07</b>	<b>0.01</b>
<b>LAB ID</b>	<b>START DATE</b>	<b>END DATE</b>	<b>I-131</b>	<b>GROSS BETA</b>
20110016	12/28/2010	1/11/2011	<0.007	0.025 +/- 0.0007
20110103	1/11/2011	1/25/2011	<0.008	0.033 +/- 0.0007
20110156	1/25/2011	2/8/2011	<0.006	0.033 +/- 0.0007
20110195	2/8/2011	2/22/2011	<0.008	0.019 +/- 0.0005
20110284	2/22/2011	3/8/2011	<0.008	0.023 +/- 0.0006
20110335	3/8/2011	3/22/2011	<0.007	0.025 +/- 0.0006
20110440	3/22/2011	4/5/2011	0.096 +/- 0.00811	0.030 +/- 0.0006
20110532	4/5/2011	4/20/2011	<0.012	0.020 +/- 0.0005
20110634	4/20/2011	5/4/2011	<0.008	0.026 +/- 0.0005
20110739	5/4/2011	5/18/2011	<0.007	0.022 +/- 0.0005
20110823	5/18/2011	6/2/2011	<0.007	0.021 +/- 0.0005
20110875	6/2/2011	6/15/2011	<0.010	0.033 +/-0.0007
20110908	6/15/2011	6/23/2011	<0.011	0.020 +/-0.0007
20110978	6/23/2011	7/7/2011	<0.009	0.021 +/- 0.0006
20111046	7/7/2011	7/19/2011	<0.009	0.014 +/-0.0005
20111096	7/19/2011	8/2/2011	<0.008	0.012 +/- 0.0004
20111168	8/2/2011	8/16/2011	<0.009	0.021 +/- 0.0005
20111235	8/16/2011	8/30/2011	<0.007	0.040 +/- 0.0007
20111282	8/30/2011	9/13/2011	<0.007	0.029 +/- 0.0006
20111378	9/13/2011	9/13/2011	<0.009	0.033 +/- 0.0007
20111447	9/27/2011	10/11/2011	<0.006	0.026 +/- 0.0006
20111486	10/11/2011	10/26/2011	<0.007	0.036 +/- 0.0006
20111515	10/26/2011	11/8/2011	<0.007	0.031 +/- 0.0007
20111567	11/8/2011	11/22/2011	<0.007	0.020 +/- 0.0005
20111596	11/22/2011	12/6/2011	<0.006	0.024 +/- 0.0006
20111740	12/6/2011	12/20/2011	<0.008	0.031 +/- 0.0007

**Totals:**

**Average:** **0.026**  
**Maximum:** **0.040**  
**Minimum:** **0.012**

**Attachment 2.1**

Sample Type: Thermoluminescent Dosimeters (TLD)

Analysis: mR Exposure

Units: mR/Qtr

<u>INDICATORS</u>	<u>1ST QTR</u>	<u>2ND QTR</u>	<u>3RD QTR</u>	<u>4TH QTR</u>	<u>MEAN</u>
TA1	11.60	11.65	11.26	11.68	11.55
TB1	15.84	16.27	15.48	15.79	15.85
TC1	16.20	16.49	15.52	16.12	16.08
TD1	16.48	17.08	17.30	15.56	16.60
TE1	15.21	15.85	14.54	14.45	15.01
TF1	15.51	15.71	14.50	15.04	15.19
TG1	17.74	17.29	16.21	16.48	16.93
TH1	13.30	13.17	12.99	12.80	13.06
TJ1	14.94	14.19	15.14	13.58	14.46
TK1	15.44	14.57	14.12	14.55	14.67
TL1	14.70	15.86	15.18	15.15	15.23
TM1	13.17	13.07	12.65	12.66	12.89
TN1	13.33		14.67	14.51	14.17
TP1	13.57	13.17	12.50	12.74	12.99
TQ1	11.84	11.05	10.60	10.94	11.11
TR1	11.88	11.41	11.19	10.59	11.27
MAX	17.74	17.29	17.30	16.48	16.93
AVG	14.42	14.46	13.99	13.92	14.19
MIN	11.60	11.05	10.60	10.59	11.11

<u>SPECIAL INTEREST</u>	<u>1ST QTR</u>	<u>2ND QTR</u>	<u>3RD QTR</u>	<u>4TH QTR</u>	<u>MEAN</u>
TCS	14.00	13.53	13.12	12.98	13.40
TGS	16.53	17.11	15.46	16.94	16.51
TNS	14.51	14.38	13.83	13.50	14.06
TRS	15.45	15.85	15.37	15.00	15.42
TQS1	16.19	16.35	16.17	15.88	16.15
TQS2	14.42	13.18	13.14	12.81	13.39
MAX	16.53	17.11	16.17	16.94	16.51
AVG	15.18	15.07	14.52	14.52	14.82
MIN	14.00	13.18	13.12	12.81	13.39

<u>CONTROLS</u>	<u>1ST QTR</u>	<u>2ND QTR</u>	<u>3RD QTR</u>	<u>4TH QTR</u>	<u>MEAN</u>
TAC	16.75	16.74	15.68	16.08	16.31
TEC	15.21	16.12	14.80	14.65	15.20
MAX	16.75	16.74	15.68	16.08	16.31
AVG	15.98	16.43	15.24	15.37	15.75
MIN	15.21	16.12	14.80	14.65	15.20

	<u>INDICATOR</u>	<u>CONTROL</u>	<u>SPECIAL</u>
MAX	17.74	16.75	17.11
AVG	14.19	15.75	14.82
MIN	10.59	14.65	12.81

**Attachment 3.1**

Sample Type: Surface Water  
 Analysis: Gamma Isotopic  
 Units: pCi/l

LLD (pCi/l)			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
20110172	SWD	2/14/2011	< 5.68	< 5.42	< 11.90	< 4.45	< 14.80	< 5.10	< 7.61	< 4.80	< 6.52	< 5.61	< 15.15	< 5.39
20110173	SWD dup	2/14/2011	< 4.22	< 3.80	< 8.08	< 4.00	< 9.27	< 5.83	< 8.07	< 4.23	< 4.33	< 5.94	< 15.94	< 4.42
20110174	SWU	2/14/2011	< 7.11	< 6.78	< 15.01	< 6.68	< 15.66	< 7.35	< 11.36	< 7.56	< 6.23	< 7.74	< 26.01	< 8.69
20110175	SWU dup	2/14/2011	< 4.84	< 5.54	< 10.27	< 4.71	< 11.92	< 6.61	< 9.44	< 6.12	< 5.94	< 6.08	< 17.51	< 7.05
20110604	SWU	4/28/2011	< 4.32	< 4.61	< 8.83	< 4.26	< 11.46	< 5.23	< 5.65	< 6.67	< 4.26	< 3.92	< 14.37	< 6.74
20110605	SWD	4/28/2011	< 5.61	< 4.74	< 11.99	< 2.54	< 11.22	< 6.00	< 8.09	< 7.09	< 3.68	< 3.93	< 21.27	< 4.95
20111099	SWD	8/2/2011	< 4.97	< 6.43	< 9.19	< 4.68	< 16.03	< 5.13	< 10.65	< 5.69	< 5.01	< 4.79	< 19.53	< 9.44
20111100	SWU	8/2/2011	< 5.62	< 5.28	< 7.38	< 5.64	< 10.69	< 6.77	< 8.39	< 4.70	< 5.37	< 4.88	< 21.19	< 6.81
20111497	SWU	10/31/2011	< 3.24	< 5.71	< 7.09	< 3.70	< 11.30	< 6.38	< 8.40	< 4.51	< 4.48	< 5.48	< 17.40	< 5.68
20111498	SWD	10/31/2011	< 4.66	< 4.88	< 10.10	< 4.32	< 9.68	< 5.64	< 6.79	< 4.59	< 4.66	< 4.92	< 11.80	< 6.73

**Attachment 3.1**

Sample Type: Surface Water  
Analysis: Tritium  
Units: pCi/l

LLD (pCi/l) LAB ID	LOCATION	DATE	3000 TRITIUM
20110172	SWD	2/14/2011	< 437.95
20110173	SWD dup	2/14/2011	< 445.15
20110174	SWU	2/14/2011	< 502.83
20110175	SWU dup	2/14/2011	< 513.11
20110604	SWU	4/28/2011	< 416.78
20110605	SWD	4/28/2011	< 423.95
20111099	SWD	8/2/2011	< 1,042.5
20111100	SWU	8/2/2011	< 1,035.5
20111497	SWU	10/31/2011	< 602.64
20111498	SWD	10/31/2011	< 610.84

**Attachment 4.1**

Sample Type: **Groundwater**  
 Analysis: **Gamma Isotopic and Tritium**  
 Units: **pCi/l**

LLD (pCi/l)		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
20111004	GWD	7/12/2011	< 8.97	< 6.25	< 10.84	< 6.80	< 11.79	< 8.48	< 10.77	< 8.32	< 6.81	< 5.95	< 24.59	< 7.77
20111005	GWU	7/12/2011	< 6.56	< 6.99	< 13.32	< 6.30	< 15.97	< 9.87	< 10.06	< 7.73	< 8.64	< 7.39	< 26.53	< 10.91
20111347	GWU	9/21/2011	< 8.79	< 7.43	< 11.70	< 5.25	< 13.10	< 7.14	< 12.50	< 7.47	< 7.59	< 6.63	< 27.30	< 8.80
20111348	GWD	9/21/2011	< 3.56	< 6.38	< 8.68	< 6.99	< 11.40	< 6.15	< 10.70	< 6.27	< 4.46	< 5.46	< 20.60	< 8.25
20111598	GWU	12/7/2011	< 5.80	< 4.86	< 12.70	< 6.70	< 12.00	< 7.08	< 10.90	< 5.97	< 5.30	< 7.35	< 22.30	< 7.37
20111599	GWD	12/7/2011	< 5.52	< 5.12	< 9.76	< 3.52	< 10.90	< 4.93	< 13.10	< 6.14	< 5.60	< 6.05	< 19.80	< 8.75

LLD (pCi/l)	LAB ID	LOCATION	DATE	3000 TRITIUM
	20111004	GWD	7/12/2011	< 398
	20111005	GWU	7/12/2011	< 396
	20111347	GWU	9/21/2011	< 413
	20111348	GWD	9/21/2011	< 420
	20111598	GWU	12/7/2011	< 673
	20111599	GWD	12/7/2011	< 671

**Attachment 5.1**

Sample Type: Shoreline Sediment SEDD  
Analysis: Gamma Isotopic  
Units: pCi/kg, dry

LLD (pCi/kg)		150	180
<u>LAB ID</u>	<u>DATE</u>	<u>CS-134</u>	<u>CS-137</u>
20111098	8/2/2011	< 26.91	< 25.70

Sample Type: Shoreline Sediment SEDU  
Analysis: Gamma Isotopic  
Units: pCi/kg, dry

LLD (pCi/kg)		150	180
<u>LAB ID</u>	<u>DATE</u>	<u>CS-134</u>	<u>CS-137</u>
20111097	8/2/2011	< 27.01	< 26.91



**Attachment 6.1**

Sample Type: **Food Products**  
Analysis: Gamma Isotopic  
Units: pCi/kg, wet

LLD (pCi/kg, wet)			60		60	80
LAB ID	LOCATION	DATE	I-131		CS-134	CS-137
20110128	GN1	2/1/2011	<39.55		<46.67	<40.87
20110408	GQC	3/31/2011	70.26	+/- 17.43	<54.85	<39.72
20110409	GQC	3/31/2011	<41.69		<36.99	<36.92
20110436	GN1	4/5/2011	<59.66		<48.87	<55.04
20111010	GQC	7/13/2011	<32.06		<28.71	<27.02
20111011	GN1	7/13/2011	<37.52		<36.54	<41.68
20111448	GN1	10/11/2011	<27.30		<31.70	<39.20
20111463	GQC	10/18/2011	<30.90		<34.20	<34.80

**Attachment 7.1**

Sample Type: **Fish**  
Analysis: Gamma Isotopic  
Units: pCi/kg, wet

LLD (pCi/kg)			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
20111545	FD Catfish	11/10/2011	< 16.80	< 11.60	< 23.50	< 18.20	< 27.30	< 12.70	< 14.90
20111546	FD Drum	11/10/2011	< 14.90	< 11.70	< 25.70	< 12.30	< 27.60	< 11.40	< 14.60
20111767	FU GOO	12/21/2011	< 16.20	< 15.30	< 28.30	< 22.00	< 44.50	< 14.90	< 12.50
20111768	FU DRUM	12/21/2011	< 17.80	< 20.40	< 31.80	< 18.60	< 39.40	< 12.00	< 20.40

**Attachment 8.1**

Sample Type: **Interlaboratory Comparison**  
 Analysis: Gross Beta, Iodine-131, Tritium, and Gamma Isotopic

Calendar Year: 2011

1<sup>st</sup> Quarter dated Mar 17, 2011

<b>Analytcs E7481-125</b>	<b>Gross Beta in Water</b>					<b>Range of 0.80 to 1.25</b>	
<b>Nuclide</b>	<b>RBS Mean pCi/L</b>	<b>RBS 1-s pCi/L</b>	<b>Ref Lab Value pCi/L</b>	<b>Ref Lab uncertainty pCi/L</b>	<b>Resolution</b>	<b>RBS/Ref Lab Ratio</b>	<b>Pass/ Fail</b>
<b>Cs-137</b>	199	19	247	4.13	59.8	0.80	Pass

3<sup>rd</sup> Quarter dated Sept. 15, 2011

<b>Analytcs E8137-125</b>	<b>Gross Beta filter</b>					<b>Range of 0.80 to 1.25</b>	
<b>Nuclide</b>	<b>RBS Mean pCi/filter</b>	<b>RBS 1-s pCi/filter</b>	<b>Ref Lab Value pCi/filter</b>	<b>Ref Lab uncertainty pCi/filter</b>	<b>Resolution</b>	<b>RBS/Ref Lab Ratio</b>	<b>Pass/ Fail</b>
<b>Cs-137</b>	84.2	1.41	82.1	1.37	59.9	1.03	Pass

<b>Analytcs E8136-125</b>	<b>H-3 in water</b>					<b>Range of 0.80 to 1.25</b>	
<b>Nuclide</b>	<b>RBS Mean pCi/L</b>	<b>RBS 1-s pCi/L</b>	<b>Ref Lab Value pCi/L</b>	<b>Ref Lab uncertainty pCi/L</b>	<b>Resolution</b>	<b>RBS/Ref Lab Ratio</b>	<b>Pass/ Fail</b>
<b>H-3</b>	9060	419	9010	151	59.7	1.01	Pass

<b>Analytcs E8138-125</b>	<b>Gamma Filter</b>					<b>Range of 0.80 to 1.25</b>	
<b>Nuclide</b>	<b>RBS Mean pCi/filter</b>	<b>RBS 1-s pCi/filter</b>	<b>Ref Lab Value pCi/filter</b>	<b>Ref Lab Uncertainty pCi/filter</b>	<b>Resolution</b>	<b>RBS/Ref Lab Ratio</b>	<b>Pass/ Fail</b>
<b>Ce-141</b>	58.2	2.80	59.6	0.995	59.7	0.98	Pass
<b>Cr-51</b>	188	11.9	202	3.38	59.8	0.93	Pass
<b>Cs-134</b>	94.3	4.20	115	1.91	60.2	0.82	Pass
<b>Cs-137</b>	101	4.20	102	1.70	60	0.99	Pass
<b>Co-58</b>	83.9	3.90	87.1	1.45	60.1	0.96	Pass
<b>Mn-54</b>	134	4.00	135	2.25	60	0.99	Pass
<b>Fe-59</b>	52.1	2.60	49.0	0.818	59.9	1.06	Pass
<b>Zn-65</b>	157	6.40	161	2.69	59.9	0.97	Pass
<b>Co-60</b>	134	4.50	140	2.34	59.8	0.95	Pass

Attachment 8.1

Sample Type: Interlaboratory Comparison  
 Analysis: Gross Beta, Iodine-131, Tritium, and Gamma Isotopic

<b>Analytics E8139-125</b>	<b>Gamma Soil</b>					<b>Range of 0.80 to 1.25</b>	
<b>Nuclide</b>	<b>RBS Mean pCi/g</b>	<b>RBS 1-s pCi/g</b>	<b>Ref Lab Value pCi/g</b>	<b>Ref Lab Uncertainty pCi/g</b>	<b>Resolution</b>	<b>RBS/Ref Lab Ratio</b>	<b>Pass/Fail</b>
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

4<sup>th</sup> Quarter dated Dec. 8, 2011

<b>Analytics E7480-125</b>	<b>Gamma in Water</b>					<b>Range of 0.80 to 1.25</b>	
<b>Nuclide</b>	<b>RBS Mean pCi/L</b>	<b>RBS 1-s pCi/L</b>	<b>Ref Lab Value pCi/L</b>	<b>Ref Lab Uncertainty pCi/L</b>	<b>Resolution</b>	<b>RBS/Ref Lab Ratio</b>	<b>Pass/Fail</b>
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
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

<b>Analytics E7483-125</b>	<b>Gamma in Milk</b>					<b>Range of 0.80 to 1.25</b>	
<b>Nuclide</b>	<b>RBS Mean pCi/L</b>	<b>RBS 1-s pCi/L</b>	<b>Ref Lab Value pCi/L</b>	<b>Ref Lab uncertainty pCi/L</b>	<b>Resolution</b>	<b>RBS/Ref Lab Ratio</b>	<b>Pass/Fail</b>
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
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

**Attachment 8.1**

Sample Type: **Interlaboratory Comparison**

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

<b>Analytics E7482-125</b>	<b>I-131 cartridge</b>					<b>Range of 0.80 to 1.25</b>	
<b>Nuclide</b>	<b>RBS Mean pCi/each</b>	<b>RBS 1-s pCi/each</b>	<b>Ref Lab Value pCi/each</b>	<b>Ref Lab uncertainty pCi/each</b>	<b>Resolution</b>	<b>RBS/Ref Lab Ratio</b>	<b>Pass/ Fail</b>
<b>I-131</b>	90.0	8.00	89.7	1.50	59.8	1.00	Pass

Note: Ce-141 was unavailable at the reference lab for the mixed gamma matrix for the 4<sup>th</sup> quarter milk and water.