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May 1, 2014

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RBG-47466
RBF1 -14-0067

Subject: Annual Radiological Environmental Operating Report for 2013
River Bend Station – Unit 1
License No. NPF-47
Docket No. 50-458

Dear Sir or Madam,

Enclosed is the River Bend Station (RBS) Annual Radiological Environmental Operating Report for the period January 1, 2013 through December 31, 2013. This report is submitted in accordance with the RBS Technical Specifications, Section 5.6.2

Should you have any questions regarding the enclosed, please contact Mr. Joseph Clark, at (225) 381-4177.

Sincerely,

BM Bennett
FOL

JAC/tjb
enclosure

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RIVER BEND STATION

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 2013

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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, 2013 through December 31, 2013. 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 2013, 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 2013, as required by the RBS Technical Requirement Manual (TRM). No measurable levels of radiation above baseline levels attributable to River Bend Station operation were detected in the vicinity of RBS. The 2013 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 2013, 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 2013 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 2013. 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, 2013 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 2013 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 Louisiana Department of Environmental Quality – Office of Environmental Compliance (LDEQ-OEC).

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 LDEQ-OEC and the RBS REMP entail similar radiological environmental monitoring program elements. These programs include co-located air samplers, and similar locations for 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 2013 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.

- **Sampling Deviations**

Listed below are sampling deviations that occurred during 2013. 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
ACG AN1	12/18/12 to 01/02/13	Timer Malfunction	Air sampler locations ACG & ANI run time meters were short for period 12/18/12 to 01/02/13. (CR-RBS-2013-00056)
AP1	06/18/13	Pump Failure	Air sample location AP1 flow rate was found to be zero. The pump motor recently failed. 06/18/13 (CR-RBS-2013-04350)
AQS2	07/30/13 to 08/13/13	Power Outage	Air sampler location AQS2 run time meter was short for period 07/30/13 to 08/13/13. (CR-RBS-2013-05443)
AN1	09/20/13	Power Outage	Air sample location AN1 air sampler was found not running and could not be reset. 09/20/13 (CR-RBS-2013-06157)
AGC	09/24/13 to 10/08/13	Power Outage	Air sampler location AGC run time meter was short for period 09/24/13 to 10/08/13. (CR-RBS-2013-06466)
AN1	10/22/13	Power Outage	Air sampler location AN1 air sampler was found not running and could not be reset. 10/22/13 (CR-RBS-2013-06653)

Station	Sampling Period	Problem Description	Comment
AQS2 AN1	10/22/13 to 11/05/13	Power Outage	Air sampler location AQS2 run time meter was short for period 10/22/13 to 11/05/13. Air sample location AN1 air sampler was found not running and could not be reset. (CR-RBS-2013-06953)
AN1	11/12/13 to 11/19/13	Timer Malfunction	Air sample location AN1 run timer was running backwards for period 11/12/13 to 11/19/13. (CR-RBS-2013-07205)
AQS2	11/05/13 to 11/19/13	Timer Malfunction	Air sample location AQS2 run time meter had stopped for period 11/05/13 to 11/19/13. (CR-RBS-2013-07205)
AQS2	11/19/13 to 12/03/13	Timer Malfunction	Air sampler location AQS2 run time meter was short for period 11/19/13 to 12/03/13. (CR-RBS-2013-07396)
TAC	4th Quarter 2013	TLD Missing	TLD location TAC was missing during the quarterly exchange. (CR-RBS-2014-00090)

- **Missed Samples**

  No samples were missed during 2013.

- **Unavailable Results**

  Results of one TLD from the fourth quarter 2013 from location TAC 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 2013.

Attachments

Attachments 1 through 7 contain results of air, TLD, water, sediment, fish, food products and special samples collected in 2013. River Bend's REMP TLDs were analyzed by Stanford Dosimetry. The Teledyne Brown Engineering Environmental Laboratory analyzed all remaining samples. Attachment 8 contains Teledyne Brown Engineering's participation in the Interlaboratory Comparison Program during the year 2013.

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 2013 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 2012. The next scheduled Land Use Census will be performed in 2014. Section 2.8 of this report contains a narrative on the results of the 2012 land use census.

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	**Radioiodine and Particulates** 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.
	Radioiodine and Particulates 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.		
	Radioiodine and Particulates 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	**TLDs** 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	**TLDs** One ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY.	**TD1 (1.6 km ENE)** – Stub pole along WF7, 150m S of Jct. WF7 and US Hwy. 61. **TE1 (1.3 km E)** – Stub pole along WF7, 1 km S of Jct. WF7 and US Hwy. 61. **TF1 (1.3 km ESE)** – Stub pole along WF7, 1.6 km S of Jct. WF7 and US Hwy. 61. **TG1 (1.6 km SE)** – Stub pole along WF7, 2 km S of Jct. WF7 and US Hwy. 61. **TH1 (1.7 km SSE)** – Stub pole at power line crossing of WF7 (near Grants Bayou). **TJ1 (1.5 km S)** – Stub pole near River Bend Station Gate #23 on Powell Station Road (LA Hwy. 965). **TK1 (0.9 km SSW)** – Utility pole on Powell Station Road (LA Hwy. 965), 20 m S of River Bend Station River Access Road. **TL1 (1.0 km SW)** – First utility pole on Powell Station Road (LA Hwy. 965) S of former Illinois Central Gulf RR crossing.	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	**TLDs** One ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY.	**TM1 (0.9 km WSW)** - Third utility pole on Powell Station Road (LA Hwy. 965) N of former Illinois Central Gulf RR crossing. **TN1 (0.9 km W)** – Utility pole along Powell Station Road (LA Hwy. 965), near garden and AN1 air sampler location. **TP1 (0.9 km WNW)** - Behind River Bend Station Activity Center at AP1 air sampler location. **TQ1 (0.6 km NW)** – Across from MA-1 on RBS North Access Road. **TR1 (0.8 km NNW)** – River Bend Station North Access Road across from Main Plant entrance.	Quarterly	mR exposure quarterly.
	TLDs 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.	**TAC (15.8 km N)** – Utility pole at Jct. of US Hwy. 61 and LA Hwy. 421, 7.9 km north of Bains. (Control) **TCS (12.3 km NE)** – Utility pole at gate to East Louisiana State Hospital in Jackson. (Special) **TEC (16.0 km E)** – Stub pole at jct. of Hwy. 955 and Greenbrier Road, 4.8 km North of Jct. of Hwys 955 and 964. (Control)		

Table 1.1

Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Direct Radiation	**TLDs** 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.	**TGS (17.0 km SE)** – Entergy Service Center compound in Zachary. (Special) **TNS (6.0 km W)** – Utility pole with electrical meter at west bank ferry landing (LA Hwy. 10). (Special) **TQS1 (4.0 km NW)** – Utility pole front of Pentecostal church (opposite West Feliciana Parish Hospital) near Jct. US Hwy. 61 and Commerce Street. (Special) **TQS2 (5.8 km NW)** – St. Francis Substation on business US Hwy. 61 in St. Francisville. (Special) **TRS (9.2 km NNW)** - Stub pole at Jct. of US Hwy. 61 and WF2 near Bains (West Feliciana High School). (Special)	Quarterly	mR exposure quarterly.
Waterborne	**Surface Water** 1 sample upstream and 1 sample downstream.	**SWU (5.0 km W)** - Mississippi River about 4 km upstream from the plant liquid discharge outfall, near LA Hwy. 10 ferry crossing. **SWD (7.75 km S)** - Mississippi River about 4 km downstream from plant liquid discharge outfall, near paper mill.	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	**Groundwater** Samples from 1 or 2 sources only if likely to be affected.	**WU (~470 m NNE)** - Upland Terrace Aquifer well upgradient from plant. **WD (~470 m SW)** – Upland Terrace Aquifer well downgradient from plant.	Semiannually	Gamma isotopic and tritium analysis semiannually.
	Sediment From Shoreline 1 sample from downstream area with existing or potential recreational value.	**SEDD (7.75 km S)** – Mississippi River about 4 km downstream from plant liquid discharge outfall, near paper mill.	Annually	Gamma isotopic analysis annually.
Ingestion	**Milk** 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.
	Fish and Invertebrates 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.	**FD (7.75 km S)** - One sample of a commercially and/or recreationally important species from downstream area influenced by plant discharge. **FU (4.0 km WSW)** - 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	**Food Products** 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. 1 sample of similar broadleaf vegetation grown 15 – 30 km distant, if milk sampling is not performed.	**GN1 (0.9 km W)** – Sampling will be performed in accordance with Table 3.12.1-1 Section 4.a of the Technical Requirements Manual. **GQC (32.0 km NW)** - One sample of similar vegetables from LA State Penitentiary at Angola. (Control)	Quarterly during the growing season.	Gamma isotopic and I-131 analysis quarterly.

Figure 1-1
Exposure Pathways

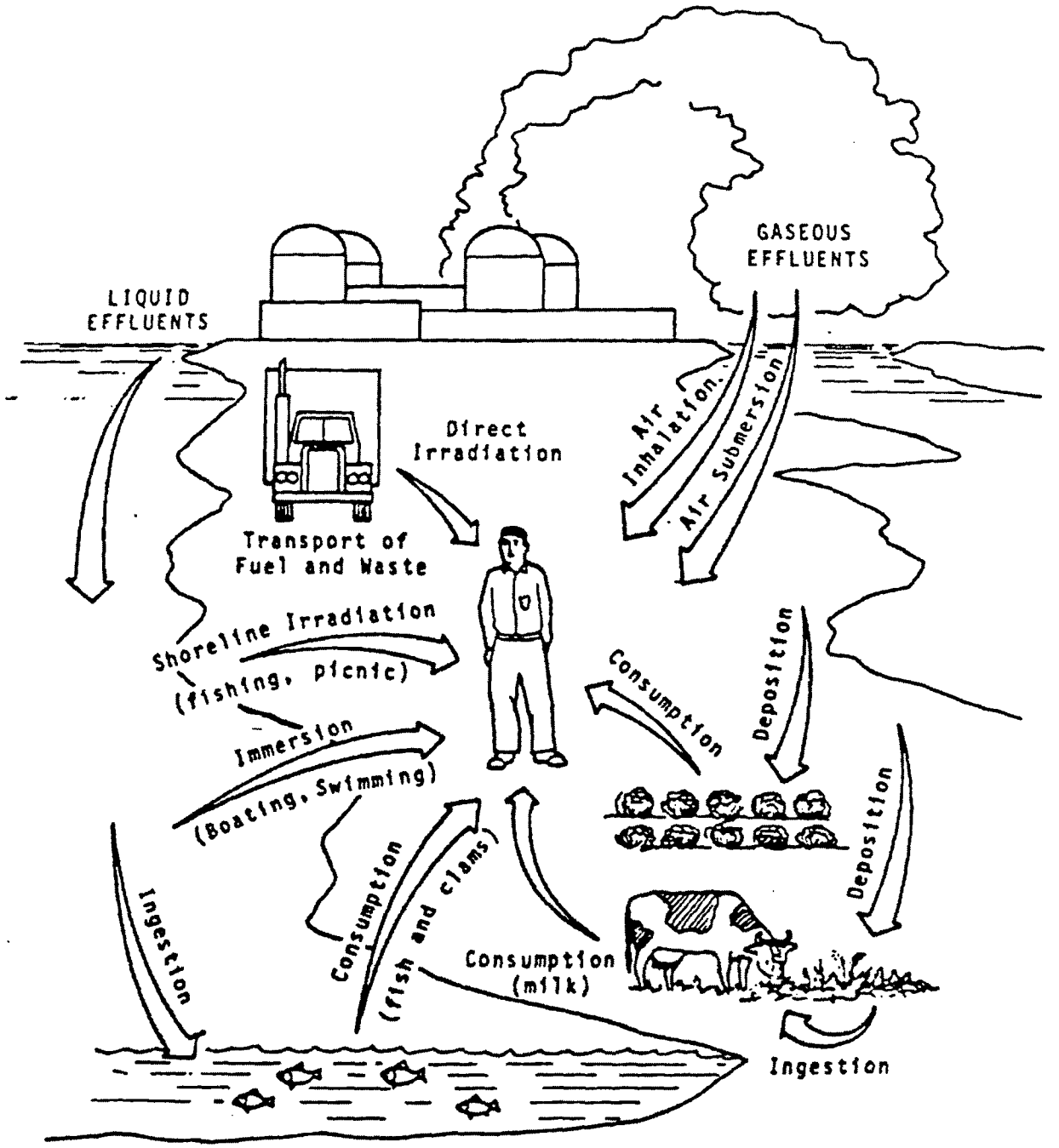


Figure 1-2
Sample Collection Sites – Near Field

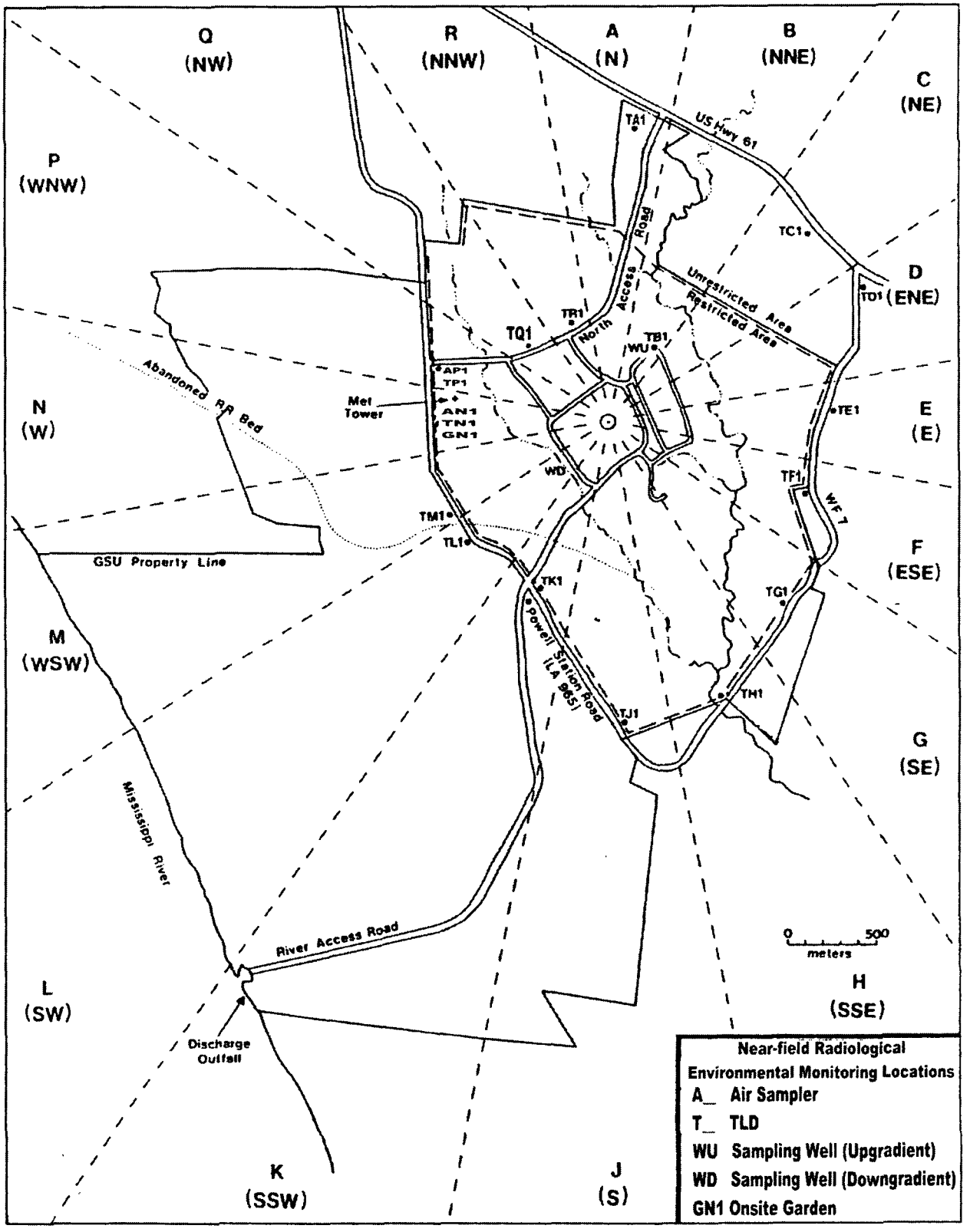
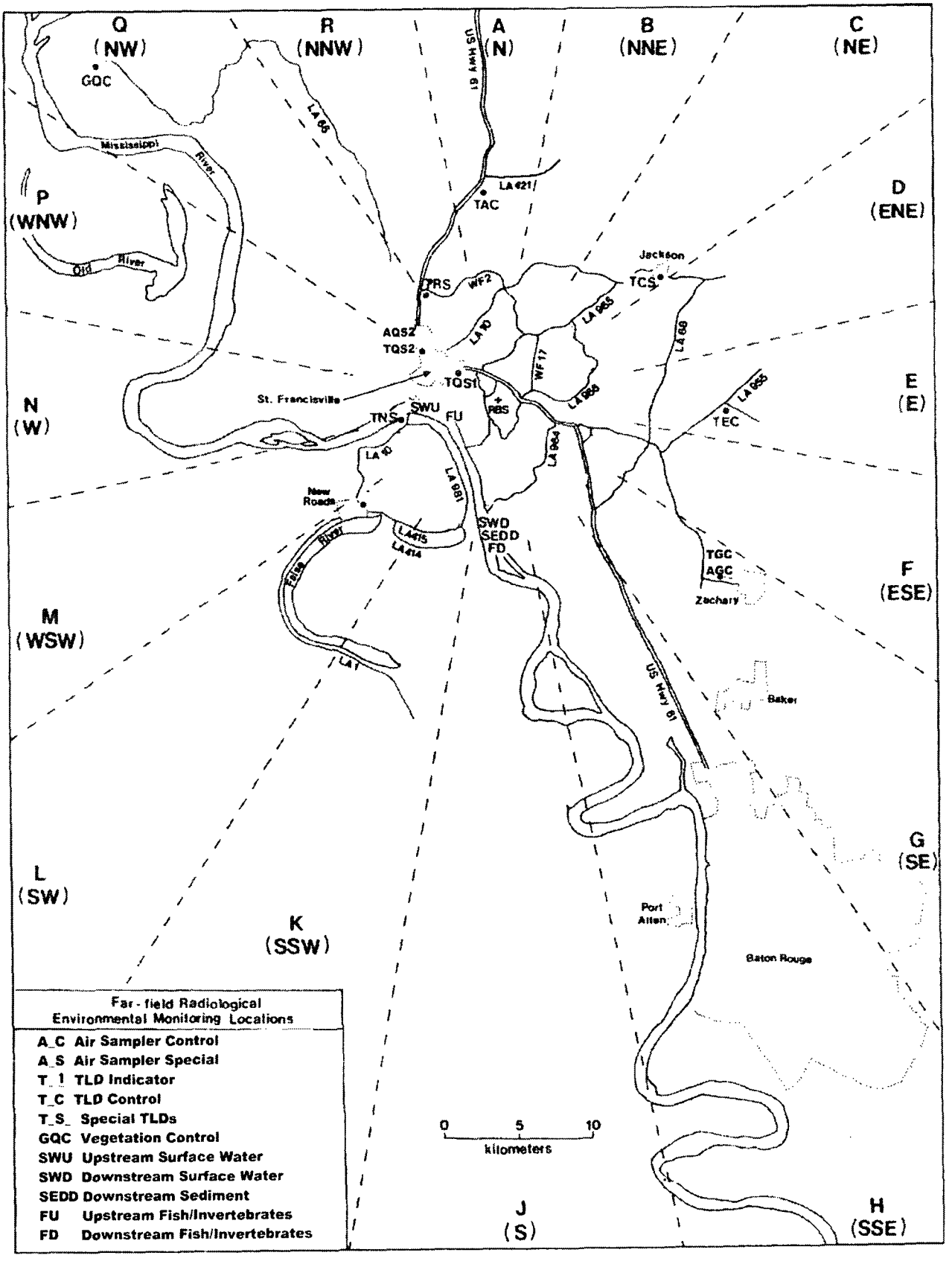


Figure 1-3
Sample Collection Sites – Far Field



2. Interpretation and Trends of Results

Table 3.1 provides a comparison of the indicator and control location mean values for the 2013 data, and indicates that the environment around the plant is unaffected by plant operations.

2.1. Air Particulate and Radioiodine Sample Results

Iodine-131 attributable to RBS was not detected in the radioiodine cartridges during 2013 as has been the case in previous years. Indicator gross beta air particulate results for 2013 were similar to preoperational and operational levels as seen below. Results are reported as annual average pCi/m^3 (picocuries per cubic meter). (Attachment 1.1)

Monitoring Period	Result
Preoperational	0.030
2013	0.019
2012	0.025
2011	0.026
2010	0.024
2009	0.023
2008	0.023

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 2013 with control location data from 1986 to 2013. 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. (Attachment 2.1)

2.3. Water Sample Results

Analytical results for 2013 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 2013 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). (Attachment 3.1)

Radionuclide	2013	2003 – 2012	Preoperational
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 2013 results from the indicator location as compared to the preoperational and previous operational years. Results are reported as annual average pCi/l. (Attachment 4.1)

Radionuclide	2013	2003 – 2012	Preoperational
Gammas	<LLD	<LLD	<LLD
Tritium	<LLD	<LLD	<LLD

Based on these comparisons, the operation of RBS had no impact on this pathway during 2013, 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 2013 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 2013. Therefore, based on these measurements, RBS operations had no significant radiological impact upon the environment or public via this pathway. (Attachment 5.1)

2.5. Milk Sample Results

The REMP did not include milk sampling within five miles (8 km) of RBS in 2013 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.

2.6. Food Product Sample Results

Food product samples were collected when available from two locations (indicator and control) in 2013 and analyzed for gamma radionuclides in accordance with Table TRM 3.12.1-1. The 2013 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. (Attachment 6.1)

2.7. Fish and Invertebrate Sample Results

Fish samples were collected from two locations (indicator and control) and analyzed for gamma radionuclides. In 2013, 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. (Attachment 7.1)

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.

No resident census changes were noted, as indicated in Table 2.1.

No locations were identified in 2013 that would yield a calculated dose or dose commitment greater than those contained in the TRM (TR 3.11).

An evaluation of ground water usage down gradient of River Bend Station was conducted. It verified that no residents down gradient of RBS utilize ground water as a significant source of drinking water, confirming that there is no drinking water pathway between River Bend Station and the Mississippi River.

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

2.9. Interlaboratory Comparison Results

The purpose of the Interlaboratory Comparison Program (ICP) is to confirm the accuracy of results produced by Teledyne Brown Engineering. Samples of various matrices (i.e. soil, water, vegetation, air filters, and milk) are spiked with known amounts of radioactivity by commercial vendors of this service and by departments within the government. TBE participates in three programs. Two are commercial, Analytics Inc. and Environmental Resource Associates (ERA) and one is a government sponsored program, the Department of Energy's (DOE) Mixed Analyte Performance Evaluation Program (MAPEP). The DOE's Idaho National Engineering Laboratory administers the MAPEP. All three programs are blind performance evaluation studies in which samples with known activities are sent to TBE for analysis. Once analyzed, TBE submits the results to the respective agency for evaluation. The results of these evaluations are published in TBE's quarterly and annual QA reports.

The 2013 Interlaboratory Comparison Program includes all contractually required matrices and analyses TBE supplies to customers and specifically RBS's Technical Requirements Manual 3.12.3. Attachment 8 contains these results.

For the TBE laboratory, 178 out of 185 analyses performed met the specified acceptance criteria. Seven analyses (Sr-89 and Sr-90 in milk, Co-57, Zn-65 and Sr-90 in soil, Cs-134 in air particulate and Sr-90 in vegetation [two low warning in a row]) did not meet the specified acceptance criteria or internal QA requirements for the following reason:

1. Teledyne Brown Engineering's Analytics September 2013 Sr-89 in milk result of 63.9 pCi/L was lower than the known value of 96.0 pCi/L. The failure was a result of analyst error and was specific to the Analytics sample. Client samples for the associated time period were evaluated and no client samples were affected by this failure. NCR 13-15

2. Teledyne Brown Engineering's Analytics September 2013 Sr-90 in milk result of 8.88 pCi/L was lower than the known value of 13.2 pCi/L. The failure was a result of analyst error and was specific to the Analytics sample. Client samples for the associated time period were evaluated and no client samples were affected by this failure. NCR 13-15

3. & 4. Teledyne Brown Engineering's MAPEP September 2013 Co-57 and Zn-65 in soil were evaluated as failing the false positive test. While MAPEP evaluated the results as failures, the gamma software listed the results as non identified nuclides. The two nuclides would never have been reported as detected nuclides to a client. MAPEP does not allow laboratories to put in qualifiers for the submitted data nor "less than" results. MAPEP evaluates results based on the relationship between the activity and the uncertainty. MAPEP spiked the soil sample with an extremely large concentration of Eu-152, which was identified by the gamma software as an interfering nuclide, resulting in forced activity results that were evaluated by MAPEP as detected Co-57 and Zn-65. No client samples were affected by these failures. NCR 13-14

5. Teledyne Brown Engineering's MAPEP September 2013 Sr-90 in soil result of 664 Bq/kg was higher than the known value of 460 Bq/kg, exceeding the upper

control limit of 598 Bq/kg. An incorrect Sr-90 result was entered into the MAPEP database. The correct Sr-90 activity of 322 Bq/kg would have been evaluated as acceptable with warning. No client samples were affected by this failure. NCR 13-14

6. Teledyne Brown Engineering's MAPEP September 2013 Cs-134 in air particulate activity of -0.570 Bq/sample was evaluated as a failed false positive test, based on MAPEP's evaluation of the result as a significant negative value at 3 standard deviations. A negative number would never have been reported as a detected nuclide to a client, therefore no client samples were affected by this failure. NCR 13-14

7. Teledyne Brown Engineering's MAPEP September 2013 Sr-90 in vegetation result was investigated due to two low warnings in a row. It appears the September sample was double spiked with carrier, resulting in a low activity. With a recovery of around 50% lower, the Sr-90 result would have fallen within the acceptance range. No client samples were affected by this issue. NCR 13-14

Table 2-1

Land Use Census Results

2012

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

#	Comment
1	No residence located within 8 km.

FIGURE 2-1
TLD Indicator Results (2013) Versus Control Data (1986-2013)

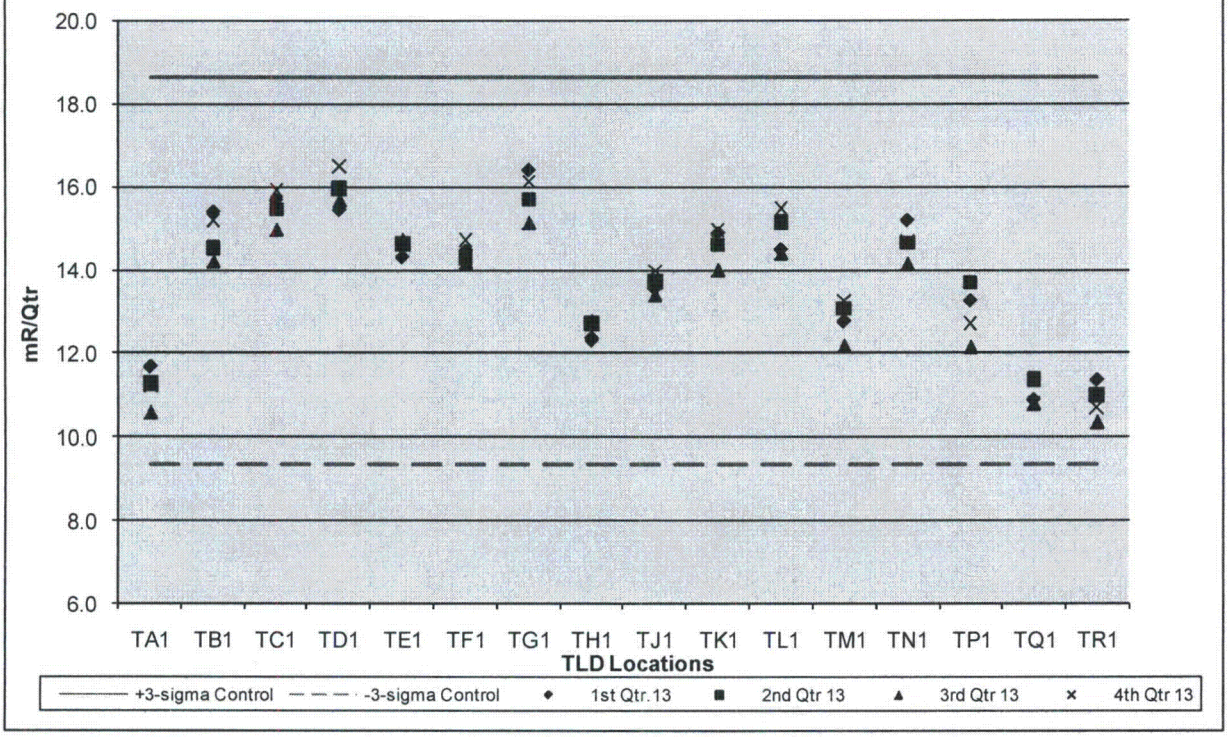
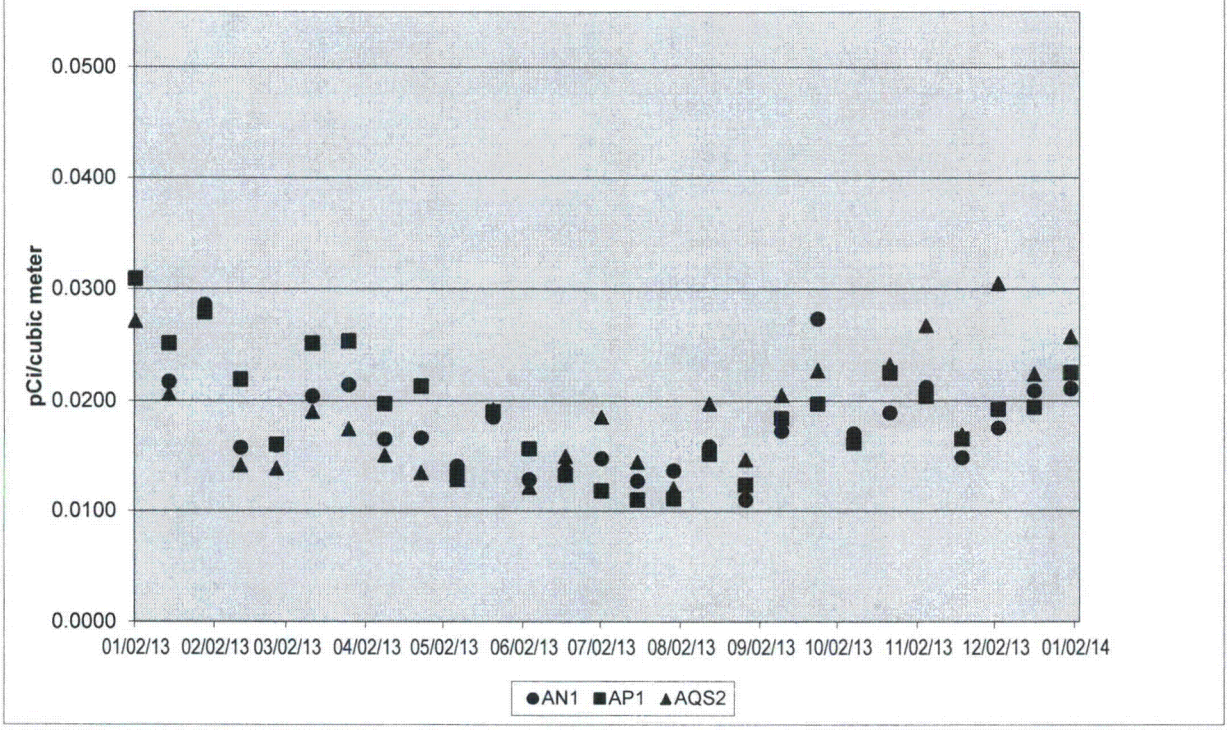


FIGURE 2-2
Gross Beta Indicator Results (2013)



3. Radiological Environmental Monitoring Program Summary

3.1. 2013 Program Results Summary

Table 3.1 summarizes the 2013 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

Environmental Radiological Monitoring Program Summary

TABLE 3.1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Name of Facility River Bend Station
Location of Facility St. Francisville, Louisiana
(County/State)

Docket No. 50-458
Reporting Period January 1 2013 to December 31 2013

Medium of Pathway Sampled (Unit of Measurement)	Type & Total No. of Analysis Performed		Lower Limit of Detection(1) (LLD)	All Indicator Locations Mean(2) Range(2)	Location with Highest Annual Mean Name	Mean(2) Range(2)	Control Location Mean(2) Range(2)	No. of Reportable Occurrences
Air Particulate (pCi/m^3)	GR-B	108	0.01	0.019(81/81) (0.011/0.031)	Sta. AQS2 (5.8 km NW)	0.019(27/27) (0.012/0.031)	0.019(27/27) (0.012/0.029)	0
Air Iodine (pCi/m^3)	I-131	108	0.07	ND(0/81) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/27) (ND-ND)	0
Indicators TLDs (mR/Quarter)	Gamma Dose Quarterly	64	NA	13.8(64/64) (10.4/16.5)	Sta. TD1 (1.6 km ENE)	15.9(4/4) (15.4/16.5)	NA(0/0) (NA-NA)	0
Special Interest TLDs (mR/Quarter)	Gamma Dose Quarterly	24	NA	14.5(24/24) (12.7/17.3)	Sta. TGS (17.0 km SE)	16.5(4/4) (15.6/17.3)	NA(0/0) (NA-NA)	0
Control TLDs (mR/Quarter)	Gamma Dose Quarterly	7	NA	ND(0/0) (ND-ND)	Sta. TAC (15.8 km N)	15.8(3/3) (15.8/15.9)	15.1(7/7) (14.2/15.9)	0
Surface Water (pCi/L)	H-3	10	3000	ND(0/5) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/5) (ND-ND)	0
	MN-54	10	15	ND(0/5) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/5) (ND-ND)	0
	CO-58	10	15	ND(0/5) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/5) (ND-ND)	0
	FE-59	10	30	ND(0/5) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/5) (ND-ND)	0
	CO-60	10	15	ND(0/5) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/5) (ND-ND)	0

TABLE 3.1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Name of Facility River Bend Station
Location of Facility St. Francisville, Louisiana
(County/State)

Docket No. 50-458
Reporting Period January 1 2013 to December 31 2013

Medium of Pathway Sampled (Unit of Measurement)	Type & Total No. of Analysis Performed		Lower Limit of Detection(1) (LLD)	All Indicator Locations Mean(2) Range(2)	Location with Highest Annual Mean Name	Mean(2) Range(2)	Control Location Mean(2) Range(2)	No. of Reportable Occurrences
Surface Water (cont'd) (pCi/L)	ZN-65	10	30	ND(0/5) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/5) (ND-ND)	0
	NB-95	10	15	ND(0/5) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/5) (ND-ND)	0
	ZR-95	10	30	ND(0/5) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/5) (ND-ND)	0
	I-131	10	15	ND(0/5) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/5) (ND-ND)	0
	CS-134	10	15	ND(0/4) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/5) (ND-ND)	0
	CS-137	10	18	ND(0/4) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/5) (ND-ND)	0
	BA-140	10	60	ND(0/4) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/5) (ND-ND)	0
	LA-140	10	15	ND(0/4) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/5) (ND-ND)	0
Ground Water (pCi/L)	H-3	4	3000	ND(0/2) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/2) (ND-ND)	0
	MN-54	4	15	ND(0/2) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/2) (ND-ND)	0

TABLE 3.1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Name of Facility River Bend Station
Location of Facility St. Francisville, Louisiana
(County/State)

Docket No. 50-458
Reporting Period January 1 2013 to December 31 2013

Medium of Pathway Sampled (Unit of Measurement)	Type & Total No. of Analysis Performed		Lower Limit of Detection(1) (LLD)	All Indicator Locations Mean(2) Range(2)	Location with Highest Annual Mean Name	Mean(2) Range(2)	Control Location Mean(2) Range(2)	No. of Reportable Occurrences
Ground Water (cont'd) (pCi/L)	CO-58	4	15	ND(0/2) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/2) (ND-ND)	0
	FE-59	4	30	ND(0/2) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/2) (ND-ND)	0
	CO-60	4	15	ND(0/2) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/2) (ND-ND)	0
	ZN-65	4	30	ND(0/2) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/2) (ND-ND)	0
	NB-95	4	15	ND(0/2) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/2) (ND-ND)	0
	ZR-95	4	30	ND(0/2) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/2) (ND-ND)	0
	I-131	4	15	ND(0/2) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/2) (ND-ND)	0
	CS-134	4	15	ND(0/2) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/2) (ND-ND)	0
	CS-137	4	18	ND(0/2) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/2) (ND-ND)	0
	BA-140	4	60	ND(0/2) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/2) (ND-ND)	0

TABLE 3.1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Name of Facility River Bend Station
Location of Facility St. Francisville, Louisiana
(County/State)

Docket No. 50-458
Reporting Period January 1 2013 to December 31 2013

Medium of Pathway Sampled (Unit of Measurement)	Type & Total No. of Analysis Performed		Lower Limit of Detection(1) (LLD)	All Indicator Locations Mean(2) Range(2)	Location with Highest Annual Mean Name	Mean(2) Range(2)	Control Location Mean(2) Range(2)	No of Reportable Occurrences
Ground Water (cont'd) (pCi/L)	LA-140	4	15	ND(0/2) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/2) (ND-ND)	0
Shoreline Sediment (pCi/kg,dry)	MN-54	2	NA	ND(0/1) (ND)	NA	NA(0/0) (ND)	ND(0/1) (ND)	0
	CO-58	2	NA	ND(0/1) (ND)	NA	NA(0/0) (ND)	ND(0/1) (ND)	0
	FE-59	2	NA	ND(0/1) (ND)	NA	NA(0/0) (ND)	ND(0/1) (ND)	0
	CO-60	2	NA	ND(0/1) (ND)	NA	NA(0/0) (ND)	ND(0/1) (ND)	0
	ZN-65	2	NA	ND(0/1) (ND)	NA	NA(0/0) (ND)	ND(0/1) (ND)	0
	NB-95	2	NA	ND(0/1) (ND)	NA	NA(0/0) (ND)	ND(0/1) (ND)	0
	ZR-95	2	NA	ND(0/1) (ND)	NA	NA(0/0) (ND)	ND(0/1) (ND)	0
	I-131	2	NA	ND(0/1) (ND)	NA	NA(0/0) (ND)	ND(0/1) (ND)	0
	CS-134	2	150	ND(0/1) (ND)	NA	NA(0/0) (ND)	ND(0/1) (ND)	0

TABLE 3.1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Name of Facility River Bend Station
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Docket No. 50-458
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Medium of Pathway Sampled (Unit of Measurement)	Type & Total No. of Analysis Performed		Lower Limit of Detection(1) (LLD)	All Indicator Locations Mean(2) Range(2)	Location with Highest Annual Mean Name	Mean(2) Range(2)	Control Location Mean(2) Range(2)	No. of Reportable Occurrences
Shoreline Sediment (cont'd) (pCi/kg,dry)	CS-137	2	180	ND(0/1) (ND)	NA	NA(0/0) (ND)	ND(0/1) (ND)	0
	BA-140	2	NA	ND(0/1) (ND)	NA	NA(0/0) (ND)	ND(0/1) (ND)	0
	LA-140	2	NA	ND(0/1) (ND)	NA	NA(0/0) (ND)	ND(0/1) (ND)	0
Food Products (pCi/kg,wet)	MN-54	8	NA	ND(0/4) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/4) (ND-ND)	0
	CO-58	8	NA	ND(0/4) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/4) (ND-ND)	0
	FE-59	8	NA	ND(0/4) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/4) (ND-ND)	0
	CO-60	8	NA	ND(0/4) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/4) (ND-ND)	0
	ZN-65	8	NA	ND(0/4) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/4) (ND-ND)	0
	NB-95	8	NA	ND(0/4) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/4) (ND-ND)	0
	ZR-95	8	NA	ND(0/4) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/4) (ND-ND)	0

TABLE 3.1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Name of Facility River Bend Station
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(County/State)

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Food Products (cont'd) (pCi/kg,wet)	I-131	8	60	ND(0/4) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/4) (ND-ND)	0
	CS-134	8	60	ND(0/4) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/4) (ND-ND)	0
	CS-137	8	80	ND(0/4) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/4) (ND-ND)	0
	BA-140	8	NA	ND(0/4) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/4) (ND-ND)	0
	LA-140	8	NA	ND(0/4) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/4) (ND-ND)	0
Fish (pCi/kg,wet)	MN-54	4	130	ND(0/3) (ND-ND)	NA	NA(0/0) (NA-NA)	NA(0/1) (ND)	0
	CO-58	4	130	ND(0/3) (ND-ND)	NA	NA(0/0) (NA-NA)	NA(0/1) (ND)	0
	FE-59	4	260	ND(0/3) (ND-ND)	NA	NA(0/0) (NA-NA)	NA(0/1) (ND)	0
	CO-60	4	130	ND(0/3) (ND-ND)	NA	NA(0/0) (NA-NA)	NA(0/1) (ND)	0
	ZN-65	4	260	ND(0/3) (ND-ND)	NA	NA(0/0) (NA-NA)	NA(0/1) (ND)	0

TABLE 3.1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Name of Facility River Bend Station
Location of Facility St. Francisville, Louisiana
(County/State)

Docket No. 50-458
Reporting Period January 1 2013 to December 31 2013

Medium of Pathway Sampled (Unit of Measurement)	Type & Total No. of Analysis Performed		Lower Limit of Detection(1) (LLD)	All Indicator Locations Mean(2) Range(2)	Location with Highest Annual Mean Name	Mean(2) Range(2)	Control Location Mean(2) Range(2)	No of Reportable Occurrences
Fish (cont'd) (pCi/kg,wet)	NB-95	4	NA	ND(0/3) (ND-ND)	NA	NA(0/0) (NA-NA)	NA(0/1) (ND)	0
	ZR-95	4	NA	ND(0/3) (ND-ND)	NA	NA(0/0) (NA-NA)	NA(0/1) (ND)	0
	I-131	4	NA	ND(0/3) (ND-ND)	NA	NA(0/0) (NA-NA)	NA(0/1) (ND)	0
	CS-134	4	130	ND(0/3) (ND-ND)	NA	NA(0/0) (NA-NA)	NA(0/1) (ND)	0
	CS-137	4	150	ND(0/3) (ND-ND)	NA	NA(0/0) (NA-NA)	NA(0/1) (ND)	0
	BA-140	4	NA	ND(0/3) (ND-ND)	NA	NA(0/0) (NA-NA)	NA(0/1) (ND)	0
	LA-140	4	NA	ND(0/3) (ND-ND)	NA	NA(0/0) (NA-NA)	NA(0/1) (ND)	0

(1) Nominal Lower Limit of Detection (LLD), as stated in ODAM.

(2) Mean and Range based upon detectable measurements only. Fraction of detectable measurements at specified location indicated in brackets().

(3) ND = Non Detectable.

(4) NA = Not Applicable.

Attachment 1 through 7

Data Tables

ATTACHMENT 1.1

RIVER BEND STATION

AIRBORNE PARTICULATE AND CHARCOAL CARTRIDGES - CONTROL LOCATION

LOCATION AGC

COLL START DATE	TIME STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (pCi/cu.m.)	CHARCOAL FILTER I-131 (pCi/cu.m.)
12/18/12	01/02/13	7.57E+02	CU.M	2.93E-02 ± 6.00E-04	L.T. 6.00E-03
01/02/13	01/15/13	7.37E+02	CU.M	1.98E-02 ± 2.35E-03	L.T. 2.35E-02
01/15/13	01/29/13	8.11E+02	CU.M	2.16E-02 ± 2.31E-03	L.T. 2.88E-02
01/29/13	02/12/13	8.39E+02	CU.M	1.50E-02 ± 1.89E-03	L.T. 2.73E-02
02/12/13	02/26/13	8.05E+02	CU.M	1.32E-02 ± 2.01E-03	L.T. 2.59E-02
02/26/13	03/12/13	8.04E+02	CU.M	1.89E-02 ± 2.24E-03	L.T. 3.86E-02
03/12/13	03/26/13	8.08E+02	CU.M	2.04E-02 ± 2.29E-03	L.T. 1.23E-02
03/26/13	04/09/13	8.06E+02	CU.M	1.43E-02 ± 1.90E-03	L.T. 1.41E-02
04/09/13	04/23/13	8.06E+02	CU.M	1.21E-02 ± 1.92E-03	L.T. 2.41E-02
04/23/13	05/07/13	8.34E+02	CU.M	1.27E-02 ± 1.92E-03	L.T. 2.39E-02
05/07/13	05/21/13	7.72E+02	CU.M	1.69E-02 ± 2.27E-03	L.T. 3.59E-02
05/21/13	06/04/13	7.56E+02	CU.M	1.27E-02 ± 2.02E-03	L.T. 4.06E-02
06/04/13	06/18/13	7.33E+02	CU.M	1.38E-02 ± 2.14E-03	L.T. 3.25E-02
06/18/13	07/02/13	7.47E+02	CU.M	1.60E-02 ± 2.10E-03	L.T. 3.11E-02
07/02/13	07/16/13	7.35E+02	CU.M	1.45E-02 ± 1.98E-03	L.T. 4.94E-02
07/16/13	07/30/13	7.69E+02	CU.M	1.50E-02 ± 2.08E-03	L.T. 1.49E-02
07/30/13	08/13/13	7.45E+02	CU.M	1.85E-02 ± 2.29E-03	L.T. 3.85E-02
08/13/13	08/27/13	7.36E+02	CU.M	1.37E-02 ± 1.99E-03	L.T. 3.05E-02
08/27/13	09/10/13	7.46E+02	CU.M	2.11E-02 ± 2.46E-03	L.T. 3.25E-02
09/10/13	09/24/13	7.16E+02	CU.M	2.56E-02 ± 2.68E-03	L.T. 3.52E-02
09/24/13	10/08/13	7.31E+02	CU.M	1.90E-02 ± 2.38E-03	L.T. 5.27E-02
10/08/13	10/22/13	7.55E+02	CU.M	2.47E-02 ± 2.55E-03	L.T. 2.73E-02
10/22/13	11/05/13	8.05E+02	CU.M	2.46E-02 ± 2.52E-03	L.T. 2.70E-02
11/05/13	11/19/13	7.99E+02	CU.M	1.90E-02 ± 2.17E-03	L.T. 2.58E-02
11/19/13	12/03/13	7.90E+02	CU.M	2.15E-02 ± 2.32E-03	L.T. 3.14E-02
12/03/13	12/17/13	7.99E+02	CU.M	2.29E-02 ± 2.46E-03	L.T. 3.40E-02
12/17/13	12/31/13	7.93E+02	CU.M	2.61E-02 ± 2.53E-03	L.T. 3.34E-02

ATTACHMENT 1.1

RIVER BEND STATION

AIRBORNE PARTICULATE AND CHARCOAL CARTRIDGES - INDICATOR LOCATION

LOCATION AN1

COLL START DATE	TIME STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (pCi/cu.m.)	CHARCOAL FILTER I-131 (pCi/cu.m.)
12/18/12	01/02/13	8.41E+02	CU.M	3.09E-02 ± 6.00E-04	L.T. 8.00E-03
01/02/13	01/15/13	7.54E+02	CU.M	2.17E-02 ± 2.41E-03	L.T. 2.28E-02
01/15/13	01/29/13	7.79E+02	CU.M	2.86E-02 ± 2.67E-03	L.T. 2.97E-02
01/29/13	02/12/13	7.92E+02	CU.M	1.57E-02 ± 2.00E-03	L.T. 1.13E-02
02/12/13	02/26/13	8.07E+02	CU.M	1.59E-02 ± 2.14E-03	L.T. 2.59E-02
02/26/13	03/12/13	7.87E+02	CU.M	2.04E-02 ± 2.34E-03	L.T. 3.95E-02
03/12/13	03/26/13	8.09E+02	CU.M	2.14E-02 ± 2.33E-03	L.T. 1.23E-02
03/26/13	04/09/13	7.89E+02	CU.M	1.65E-02 ± 2.04E-03	L.T. 3.26E-02
04/09/13	04/23/13	7.62E+02	CU.M	1.66E-02 ± 2.23E-03	L.T. 2.55E-02
04/23/13	05/07/13	7.71E+02	CU.M	1.40E-02 ± 2.10E-03	L.T. 2.59E-02
05/07/13	05/21/13	7.81E+02	CU.M	1.85E-02 ± 2.33E-03	L.T. 3.56E-02
05/21/13	06/04/13	7.20E+02	CU.M	1.28E-02 ± 2.09E-03	L.T. 1.66E-02
06/04/13	06/18/13	7.33E+02	CU.M	1.36E-02 ± 2.13E-03	L.T. 3.26E-02
06/18/13	07/02/13	8.29E+02	CU.M	1.47E-02 ± 1.91E-03	L.T. 2.81E-02
07/02/13	07/16/13	8.10E+02	CU.M	1.27E-02 ± 1.77E-03	L.T. 4.47E-02
07/16/13	07/30/13	7.98E+02	CU.M	1.36E-02 ± 1.96E-03	L.T. 3.69E-02
07/30/13	08/13/13	7.87E+02	CU.M	1.58E-02 ± 2.08E-03	L.T. 3.66E-02
08/13/13	08/27/13	7.87E+02	CU.M	1.10E-02 ± 1.76E-03	L.T. 2.86E-02
08/27/13	09/10/13	8.08E+02	CU.M	1.72E-02 ± 2.16E-03	L.T. 3.01E-02
09/10/13	09/24/13	6.31E+02	CU.M	2.73E-02 ± 2.97E-03	L.T. 1.55E-02
09/25/13	10/08/13	7.45E+02	CU.M	1.70E-02 ± 2.25E-03	L.T. 4.95E-02
10/08/13	10/22/13	2.59E+02	CU.M	1.89E-02 ± 2.46E-03	L.T. 3.11E-02
10/23/13	10/31/13	4.75E+02	CU.M	2.12E-02 ± 1.59E-03	L.T. 5.36E-02
11/12/13	11/19/13	4.03E+02	CU.M	1.48E-02 ± 2.98E-03	L.T. 3.76E-02
11/19/13	12/03/13	7.76E+02	CU.M	1.75E-02 ± 2.14E-03	L.T. 3.20E-02
12/03/13	12/17/13	9.06E+02	CU.M	2.09E-02 ± 2.20E-03	L.T. 2.99E-02
12/17/13	12/31/13	9.03E+02	CU.M	2.11E-02 ± 2.14E-03	L.T. 2.92E-02

ATTACHMENT 1.1

RIVER BEND STATION

AIRBORNE PARTICULATE AND CHARCOAL CARTRIDGES - INDICATOR LOCATION

LOCATION AP1

COLL START DATE	TIME STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (pCi/cu.m.)	CHARCOAL FILTER I-131 (pCi/cu.m.)
12/18/12	01/02/13	8.27E+02	CU.M	3.09E-02 ± 6.00E-04	L.T. 8.00E-03
01/02/13	01/15/13	6.87E+02	CU.M	2.51E-02 ± 2.70E-03	L.T. 9.72E-03
01/15/13	01/29/13	7.26E+02	CU.M	2.79E-02 ± 2.75E-03	L.T. 3.19E-02
01/29/13	02/12/13	7.20E+02	CU.M	2.19E-02 ± 2.43E-03	L.T. 3.19E-02
02/12/13	02/26/13	7.53E+02	CU.M	1.60E-02 ± 2.24E-03	L.T. 2.78E-02
02/26/13	03/12/13	7.60E+02	CU.M	2.51E-02 ± 2.60E-03	L.T. 4.09E-02
03/12/13	03/26/13	7.55E+02	CU.M	2.53E-02 ± 2.60E-03	L.T. 1.32E-02
03/26/13	04/09/13	7.35E+02	CU.M	1.97E-02 ± 2.29E-03	L.T. 3.49E-02
04/09/13	04/23/13	7.35E+02	CU.M	2.13E-02 ± 2.51E-03	L.T. 2.65E-02
04/23/13	05/07/13	7.53E+02	CU.M	1.31E-02 ± 2.08E-03	L.T. 1.11E-02
05/07/13	05/21/13	7.45E+02	CU.M	1.90E-02 ± 2.42E-03	L.T. 3.73E-02
05/21/13	06/04/13	7.38E+02	CU.M	1.56E-02 ± 2.20E-03	L.T. 4.18E-02
06/04/13	06/18/13	3.66E+02	CU.M	1.32E-02 ± 3.43E-03	L.T. 3.37E-02
06/18/13	07/02/13	8.91E+02	CU.M	1.18E-02 ± 1.67E-03	L.T. 2.62E-02
07/02/13	07/16/13	8.92E+02	CU.M	1.10E-02 ± 1.58E-03	L.T. 4.07E-02
07/16/13	07/30/13	8.98E+02	CU.M	1.11E-02 ± 1.69E-03	L.T. 3.28E-02
07/30/13	08/13/13	8.88E+02	CU.M	1.51E-02 ± 1.90E-03	L.T. 3.24E-02
08/13/13	08/27/13	8.47E+02	CU.M	1.23E-02 ± 1.75E-03	L.T. 9.37E-03
08/27/13	09/10/13	8.48E+02	CU.M	1.84E-02 ± 2.16E-03	L.T. 2.87E-02
09/10/13	09/24/13	8.45E+02	CU.M	1.97E-02 ± 2.18E-03	L.T. 2.99E-02
09/24/13	10/08/13	8.80E+02	CU.M	1.61E-02 ± 1.99E-03	L.T. 4.40E-02
10/08/13	10/22/13	8.60E+02	CU.M	2.25E-02 ± 2.28E-03	L.T. 2.41E-02
10/22/13	11/05/13	8.54E+02	CU.M	2.04E-02 ± 2.26E-03	L.T. 2.56E-02
11/05/13	11/19/13	8.57E+02	CU.M	1.65E-02 ± 1.96E-03	L.T. 2.41E-02
11/19/13	12/03/13	8.67E+02	CU.M	1.92E-02 ± 2.09E-03	L.T. 2.87E-02
12/03/13	12/17/13	8.33E+02	CU.M	1.94E-02 ± 2.25E-03	L.T. 3.25E-02
12/17/13	12/31/13	8.04E+02	CU.M	2.25E-02 ± 2.33E-03	L.T. 3.29E-02

ATTACHMENT 1.1

RIVER BEND STATION

AIRBORNE PARTICULATE AND CHARCOAL CARTRIDGES - INDICATOR LOCATION

LOCATION AQS2

COLL START DATE	TIME STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (pCi/cu.m.)	CHARCOAL FILTER I-131 (pCi/cu.m.)
12/18/12	01/02/13	9.16E+02	CU.M	2.71E-02 ± 6.00E-04	L.T. 7.00E-03
01/02/13	01/15/13	7.70E+02	CU.M	2.06E-02 ± 2.33E-03	L.T. 2.23E-02
01/15/13	01/29/13	8.08E+02	CU.M	2.86E-02 ± 2.61E-03	L.T. 2.87E-02
01/29/13	02/12/13	8.80E+02	CU.M	1.41E-02 ± 1.80E-03	L.T. 2.61E-02
02/12/13	02/26/13	8.76E+02	CU.M	1.38E-02 ± 1.93E-03	L.T. 2.39E-02
02/26/13	03/12/13	8.64E+02	CU.M	1.90E-02 ± 2.15E-03	L.T. 1.40E-02
03/12/13	03/26/13	9.09E+02	CU.M	1.74E-02 ± 2.00E-03	L.T. 1.09E-02
03/26/13	04/09/13	8.46E+02	CU.M	1.50E-02 ± 1.88E-03	L.T. 3.03E-02
04/09/13	04/23/13	8.36E+02	CU.M	1.34E-02 ± 1.94E-03	L.T. 2.33E-02
04/23/13	05/07/13	8.07E+02	CU.M	1.28E-02 ± 1.97E-03	L.T. 2.47E-02
05/07/13	05/21/13	8.08E+02	CU.M	1.92E-02 ± 2.31E-03	L.T. 3.44E-02
05/21/13	06/04/13	8.10E+02	CU.M	1.21E-02 ± 1.89E-03	L.T. 3.80E-02
06/04/13	06/18/13	8.05E+02	CU.M	1.49E-02 ± 2.07E-03	L.T. 2.97E-02
06/18/13	07/02/13	8.10E+02	CU.M	1.85E-02 ± 2.13E-03	L.T. 1.49E-02
07/02/13	07/16/13	8.57E+02	CU.M	1.44E-02 ± 1.81E-03	L.T. 4.23E-02
07/16/13	07/30/13	8.70E+02	CU.M	1.20E-02 ± 1.77E-03	L.T. 3.38E-02
07/30/13	08/13/13	8.03E+02	CU.M	1.97E-02 ± 2.24E-03	L.T. 3.58E-02
08/13/13	08/27/13	8.89E+02	CU.M	1.46E-02 ± 1.82E-03	L.T. 2.53E-02
08/27/13	09/10/13	8.99E+02	CU.M	2.05E-02 ± 2.17E-03	L.T. 2.70E-02
09/10/13	09/24/13	9.58E+02	CU.M	2.27E-02 ± 2.16E-03	L.T. 2.64E-02
09/24/13	10/08/13	9.72E+02	CU.M	1.61E-02 ± 1.87E-03	L.T. 3.97E-02
10/08/13	10/22/13	9.66E+02	CU.M	2.32E-02 ± 2.16E-03	L.T. 8.90E-03
10/22/13	11/05/13	8.12E+02	CU.M	2.67E-02 ± 2.60E-03	L.T. 2.66E-02
11/05/13	11/19/13	8.53E+02	CU.M	1.69E-02 ± 1.99E-03	L.T. 2.42E-02
11/19/13	12/03/13	6.11E+02	CU.M	3.05E-02 ± 3.12E-03	L.T. 4.07E-02
12/03/13	12/17/13	8.42E+02	CU.M	2.24E-02 ± 2.36E-03	L.T. 3.21E-02
12/17/13	12/31/13	8.48E+02	CU.M	2.57E-02 ± 2.37E-03	L.T. 3.11E-02

ATTACHMENT 2.1
RIVER BEND STATION
THERMOLUMINESCENT DOSIMETERS (TLD)
mR/Qtr

Sample Nuclide	Location	First Quarter 01/01-03/31	Second Quarter 04/01-06/30	Third Quarter 07/01-09/30	Fourth Quarter 10/01-01/01	Quarter Average - 1 S.D.
TLD	TAC	15.8	15.9	15.8	(1)	15.8 ± 0.1
	TA1	11.7	11.3	10.6	11.2	11.2 ± 0.4
	TB1	15.4	14.5	14.2	15.2	14.8 ± 0.5
	TC1	15.7	15.5	15.0	15.9	15.5 ± 0.4
	TCS	12.9	12.9	12.8	13.4	13.0 ± 0.3
	TD1	15.4	16.0	15.7	16.5	15.9 ± 0.5
	TEC	14.2	15.0	14.3	14.4	14.5 ± 0.4
	TE1	14.3	14.7	14.7	14.6	14.6 ± 0.2
	TF1	14.5	14.3	14.2	14.7	14.4 ± 0.2
	TG1	16.4	15.7	15.2	16.1	15.9 ± 0.5
	TGS	17.3	16.2	15.6	16.7	16.5 ± 0.7
	TH1	12.3	12.7	12.8	12.5	12.6 ± 0.2
	TJ1	13.6	13.7	13.4	14.0	13.7 ± 0.2
	TK1	14.9	14.6	14.0	15.0	14.6 ± 0.4
	TL1	14.5	15.2	14.4	15.5	14.9 ± 0.5
	TM1	12.8	13.1	12.2	13.3	12.8 ± 0.5
	TN1	15.2	14.7	14.2	14.7	14.7 ± 0.4
	TNS	14.2	14.3	13.5	13.8	13.9 ± 0.3
	TP1	13.3	13.7	12.2	12.7	13.0 ± 0.7
	TQ1	10.9	11.4	10.8	10.8	11.0 ± 0.3
	TR1	11.4	11.0	10.4	10.7	10.9 ± 0.4
	TRS	15.1	15.4	14.5	14.5	14.9 ± 0.5
	TQS1	16.0	15.5	15.0	15.6	15.5 ± 0.4
	TQS2	13.1	13.6	12.7	13.1	13.1 ± 0.4
Average/Quarter		14.2 ± 1.7	14.2 ± 1.5	13.7 ± 1.6	14.1 ± 1.7	
Range		(10.9-17.3)	(11-16.2)	(10.4-15.8)	(10.7-16.7)	
Detection/Total		24/24	24/24	24/24	23/23	

(1) See Sampling Deviations section for explanation

ATTACHMENT 3.1
RIVER BEND STATION
SURFACE WATER
pCi/L

LOCATION SWD

DATE COLLECTED	01/08/13	04/08/13	07/03/13	10/08/13
RADIOCHEMICAL ANALYSIS:				
H-3	L.T. 5.99E+02	L.T. 6.30E+02	L.T. 5.62E+02	L.T. 6.34E+02
GAMMA SPECTRUM ANALYSIS:				
MN-54	L.T. 6.47E+00	L.T. 5.77E+00	L.T. 3.26E+00	L.T. 6.35E+00
CO-58	L.T. 7.59E+00	L.T. 5.17E+00	L.T. 3.69E+00	L.T. 5.62E+00
FE-59	L.T. 1.23E+01	L.T. 1.07E+01	L.T. 7.85E+00	L.T. 1.16E+01
CO-60	L.T. 6.69E+00	L.T. 5.19E+00	L.T. 3.19E+00	L.T. 7.12E+00
ZN-65	L.T. 1.37E+01	L.T. 1.17E+01	L.T. 5.99E+00	L.T. 1.18E+01
NB-95	L.T. 5.67E+00	L.T. 5.96E+00	L.T. 3.71E+00	L.T. 5.89E+00
ZR-95	L.T. 1.24E+01	L.T. 9.15E+00	L.T. 5.34E+00	L.T. 1.01E+01
I-131	L.T. 1.24E+01	L.T. 9.73E+00	L.T. 8.11E+00	L.T. 1.05E+01
CS-134	L.T. 6.07E+00	L.T. 6.13E+00	L.T. 2.46E+00	L.T. 4.95E+00
CS-137	L.T. 5.46E+00	L.T. 6.01E+00	L.T. 3.28E+00	L.T. 5.81E+00
BA-140	L.T. 3.16E+01	L.T. 2.64E+01	L.T. 1.83E+01	L.T. 2.50E+01
LA-140	L.T. 1.15E+01	L.T. 7.89E+00	L.T. 7.07E+00	L.T. 1.19E+01

ATTACHMENT 3.1
RIVER BEND STATION
SURFACE WATER
pCi/L

LOCATION SWD DUP

DATE COLLECTED	07/03/13
RADIOCHEMICAL ANALYSIS:	
H-3	L.T. 5.75E+02
GAMMA SPECTRUM ANALYSIS:	
MN-54	L.T. 3.03E+00
CO-58	L.T. 3.67E+00
FE-59	L.T. 6.80E+00
CO-60	L.T. 3.04E+00
ZN-65	L.T. 5.78E+00
NB-95	L.T. 3.39E+00
ZR-95	L.T. 5.41E+00
I-131	L.T. 8.44E+00
CS-134	L.T. 2.91E+00
CS-137	L.T. 3.00E+00
BA-140	L.T. 2.00E+01
LA-140	L.T. 7.61E+00

ATTACHMENT 3.1
RIVER BEND STATION
SURFACE WATER
pCi/L

LOCATION SWU

DATE COLLECTED	01/08/13	04/08/13	07/03/13	10/08/13
RADIOCHEMICAL ANALYSIS:				
H-3	L.T. 6.09E+02	L.T. 6.34E+02	L.T. 5.65E+02	L.T. 6.42E+02
GAMMA SPECTRUM ANALYSIS:				
MN-54	L.T. 6.04E+00	L.T. 3.78E+00	L.T. 2.41E+00	L.T. 6.50E+00
CO-58	L.T. 6.09E+00	L.T. 4.63E+00	L.T. 2.59E+00	L.T. 7.00E+00
FE-59	L.T. 1.21E+01	L.T. 8.19E+00	L.T. 5.71E+00	L.T. 1.26E+01
CO-60	L.T. 6.50E+00	L.T. 5.00E+00	L.T. 2.36E+00	L.T. 6.93E+00
ZN-65	L.T. 1.33E+01	L.T. 1.07E+01	L.T. 5.46E+00	L.T. 1.10E+01
NB-95	L.T. 6.93E+00	L.T. 5.20E+00	L.T. 2.63E+00	L.T. 6.60E+00
ZR-95	L.T. 1.06E+01	L.T. 7.80E+00	L.T. 4.01E+00	L.T. 1.13E+01
I-131	L.T. 1.03E+01	L.T. 7.89E+00	L.T. 6.87E+00	L.T. 1.04E+01
CS-134	L.T. 5.25E+00	L.T. 4.16E+00	L.T. 2.43E+00	L.T. 6.13E+00
CS-137	L.T. 7.04E+00	L.T. 4.92E+00	L.T. 2.32E+00	L.T. 7.06E+00
BA-140	L.T. 3.06E+01	L.T. 2.26E+01	L.T. 1.66E+01	L.T. 3.21E+01
LA-140	L.T. 1.12E+01	L.T. 7.75E+00	L.T. 5.26E+00	L.T. 9.87E+00

ATTACHMENT 3.1
RIVER BEND STATION
SURFACE WATER
pCi/L

LOCATION SWU DUP

DATE COLLECTED	07/03/13
RADIOCHEMICAL ANALYSIS:	
H-3	L.T. 5.48E+02
GAMMA SPECTRUM ANALYSIS:	
MN-54	L.T. 3.19E+00
CO-58	L.T. 3.33E+00
FE-59	L.T. 7.65E+00
CO-60	L.T. 3.17E+00
ZN-65	L.T. 5.54E+00
NB-95	L.T. 3.87E+00
ZR-95	L.T. 6.09E+00
I-131	L.T. 9.53E+00
CS-134	L.T. 3.18E+00
CS-137	L.T. 3.41E+00
BA-140	L.T. 2.21E+01
LA-140	L.T. 6.68E+00

ATTACHMENT 4.1
RIVER BEND STATION
GROUNDWATER
pCi/L

	LOCATION GWD		LOCATION GWU	
DATE COLLECTED	03/20/13	09/18/13	03/20/13	09/18/13
RADIOCHEMICAL ANALYSIS:				
H-3	L.T. 6.63E+02	L.T. 6.68E+02	L.T. 6.55E+02	L.T. 6.68E+02
GAMMA SPECTRUM ANALYSIS:				
MN-54	L.T. 3.41E+00	L.T. 3.57E+00	L.T. 4.16E+00	L.T. 3.72E+00
CO-58	L.T. 3.51E+00	L.T. 3.95E+00	L.T. 4.26E+00	L.T. 3.95E+00
FE-59	L.T. 6.60E+00	L.T. 7.87E+00	L.T. 9.65E+00	L.T. 8.54E+00
CO-60	L.T. 2.99E+00	L.T. 3.56E+00	L.T. 3.30E+00	L.T. 4.12E+00
ZN-65	L.T. 6.56E+00	L.T. 6.98E+00	L.T. 5.43E+00	L.T. 8.22E+00
NB-95	L.T. 3.55E+00	L.T. 3.87E+00	L.T. 4.81E+00	L.T. 4.65E+00
ZR-95	L.T. 5.74E+00	L.T. 7.21E+00	L.T. 8.09E+00	L.T. 6.43E+00
I-131	L.T. 6.30E+00	L.T. 7.41E+00	L.T. 6.74E+00	L.T. 6.96E+00
CS-134	L.T. 3.04E+00	L.T. 3.74E+00	L.T. 4.47E+00	L.T. 3.59E+00
CS-137	L.T. 3.62E+00	L.T. 3.75E+00	L.T. 4.96E+00	L.T. 4.17E+00
BA-140	L.T. 1.69E+01	L.T. 2.01E+01	L.T. 1.79E+01	L.T. 1.88E+01
LA-140	L.T. 6.19E+00	L.T. 7.26E+00	L.T. 6.78E+00	L.T. 6.96E+00

ATTACHMENT 5.1
RIVER BEND STATION
SHORELINE SEDIMENT
pCi/kg, dry

	LOCATION SEDD	LOCATION SEDU
DATE COLLECTED	08/15/13	08/15/13
GAMMA SPECTRUM ANALYSIS:		
MN-54	L.T. 7.11E+01	L.T. 5.40E+01
CO-58	L.T. 6.92E+01	L.T. 4.76E+01
FE-59	L.T. 1.45E+02	L.T. 1.26E+02
CO-60	L.T. 7.12E+01	L.T. 7.09E+01
ZN-65	L.T. 1.44E+02	L.T. 1.09E+02
NB-95	L.T. 7.67E+01	L.T. 6.32E+01
ZR-95	L.T. 1.01E+02	L.T. 9.46E+01
I-131	L.T. 1.00E+02	L.T. 7.35E+01
CS-134	L.T. 6.26E+01	L.T. 4.79E+01
CS-137	L.T. 7.67E+01	L.T. 5.86E+01
BA-140	L.T. 3.46E+02	L.T. 2.10E+02
LA-140	L.T. 7.78E+01	L.T. 7.31E+01

ATTACHMENT 6.1
RIVER BEND STATION
FOOD PRODUCTS
pCi/kg, wet

LOCATION GN1

DATE COLLECTED	01/08/13	04/08/13	07/03/13	10/09/13
GAMMA SPECTRUM ANALYSIS:				
MN-54	L.T. 7.01E+00	L.T. 2.09E+01	L.T. 8.88E+00	L.T. 2.03E+01
CO-58	L.T. 7.23E+00	L.T. 2.15E+01	L.T. 9.68E+00	L.T. 2.04E+01
FE-59	L.T. 1.56E+01	L.T. 4.96E+01	L.T. 2.19E+01	L.T. 4.57E+01
CO-60	L.T. 7.71E+00	L.T. 2.46E+01	L.T. 1.06E+01	L.T. 2.35E+01
ZN-65	L.T. 1.52E+01	L.T. 5.03E+01	L.T. 2.08E+01	L.T. 4.39E+01
NB-95	L.T. 7.15E+00	L.T. 2.10E+01	L.T. 9.69E+00	L.T. 2.25E+01
ZR-95	L.T. 1.28E+01	L.T. 3.76E+01	L.T. 1.64E+01	L.T. 3.75E+01
I-131	L.T. 1.67E+01	L.T. 3.94E+01	L.T. 2.76E+01	L.T. 3.82E+01
CS-134	L.T. 6.18E+00	L.T. 2.11E+01	L.T. 8.71E+00	L.T. 2.07E+01
CS-137	L.T. 7.40E+00	L.T. 2.43E+01	L.T. 9.43E+00	L.T. 2.25E+01
BA-140	L.T. 3.93E+01	L.T. 1.09E+02	L.T. 6.05E+01	L.T. 1.03E+02
LA-140	L.T. 1.18E+01	L.T. 2.92E+01	L.T. 1.53E+01	L.T. 2.59E+01

ATTACHMENT 6.1
RIVER BEND STATION
FOOD PRODUCTS
pCi/kg, wet

LOCATION GQC

DATE COLLECTED	03/20/13	06/20/13	09/23/13	12/12/13
GAMMA SPECTRUM ANALYSIS:				
MN-54	L.T. 1.18E+01	L.T. 1.72E+01	L.T. 2.14E+01	L.T. 1.47E+01
CO-58	L.T. 1.18E+01	L.T. 1.48E+01	L.T. 1.92E+01	L.T. 1.41E+01
FE-59	L.T. 2.46E+01	L.T. 4.53E+01	L.T. 4.58E+01	L.T. 3.44E+01
CO-60	L.T. 1.39E+01	L.T. 2.41E+01	L.T. 2.46E+01	L.T. 1.71E+01
ZN-65	L.T. 2.62E+01	L.T. 4.15E+01	L.T. 5.29E+01	L.T. 3.19E+01
NB-95	L.T. 1.39E+01	L.T. 1.90E+01	L.T. 1.80E+01	L.T. 1.94E+01
ZR-95	L.T. 2.26E+01	L.T. 3.30E+01	L.T. 3.45E+01	L.T. 2.54E+01
I-131	L.T. 1.96E+01	L.T. 3.08E+01	L.T. 2.12E+01	L.T. 3.97E+01
CS-134	L.T. 1.15E+01	L.T. 1.68E+01	L.T. 1.75E+01	L.T. 1.45E+01
CS-137	L.T. 1.27E+01	L.T. 1.87E+01	L.T. 2.08E+01	L.T. 1.52E+01
BA-140	L.T. 5.81E+01	L.T. 9.62E+01	L.T. 6.89E+01	L.T. 1.00E+02
LA-140	L.T. 1.45E+01	L.T. 2.78E+01	L.T. 2.23E+01	L.T. 2.43E+01

ATTACHMENT 7.1
RIVER BEND STATION
FISH
pCi/kg, wet

	LOCATION FD			LOCATION FU
DATE COLLECTED	06/18/13	06/18/13	06/18/13	06/04/13
GAMMA SPECTRUM ANALYSIS:				
MN-54	L.T. 8.11E+01	L.T. 6.19E+01	L.T. 5.14E+01	L.T. 4.61E+01
CO-58	L.T. 7.65E+01	L.T. 5.82E+01	L.T. 6.48E+01	L.T. 3.36E+01
FE-59	L.T. 1.56E+02	L.T. 1.23E+02	L.T. 1.33E+02	L.T. 1.15E+02
CO-60	L.T. 9.16E+01	L.T. 5.26E+01	L.T. 7.28E+01	L.T. 5.16E+01
ZN-65	L.T. 1.72E+02	L.T. 1.34E+02	L.T. 1.45E+02	L.T. 1.04E+02
NB-95	L.T. 7.50E+01	L.T. 5.88E+01	L.T. 6.91E+01	L.T. 5.84E+01
ZR-95	L.T. 1.24E+02	L.T. 1.21E+02	L.T. 1.13E+02	L.T. 1.05E+02
I-131	L.T. 1.85E+02	L.T. 1.29E+02	L.T. 1.39E+02	L.T. 3.00E+02
CS-134	L.T. 8.37E+01	L.T. 6.13E+01	L.T. 6.12E+01	L.T. 4.30E+01
CS-137	L.T. 8.43E+01	L.T. 5.32E+01	L.T. 7.04E+01	L.T. 4.76E+01
BA-140	L.T. 4.76E+02	L.T. 2.96E+02	L.T. 3.32E+02	L.T. 4.34E+02
LA-140	L.T. 1.18E+02	L.T. 1.21E+02	L.T. 8.95E+01	L.T. 1.47E+02

Attachment 8

Teledyne Brown Engineering's Interlaboratory Comparison Program Tables

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
March 2013	E10477	Milk	Sr-89	pCi/L	120	99.7	1.20	A
			Sr-90	pCi/L	9.21	11.0	0.84	A
	E10478	Milk	I-131	pCi/L	87.1	100	0.87	A
			Ce-141	pCi/L	186	187	0.99	A
			Cr-51	pCi/L	463	472	0.98	A
			Cs-134	pCi/L	201	214	0.94	A
			Cs-137	pCi/L	262	266	0.98	A
			Co-58	pCi/L	200	208	0.96	A
			Mn-54	pCi/L	215	208	1.03	A
			Fe-59	pCi/L	266	252	1.06	A
			Zn-65	pCi/L	311	301	1.03	A
			Co-60	pCi/L	384	400	0.96	A
	E10480	AP	Ce-141	pCi	95.3	95.6	1.00	A
			Cr-51	pCi	264	241	1.10	A
			Cs-134	pCi	123	109	1.13	A
			Cs-137	pCi	142	136	1.04	A
			Co-58	pCi	112	106	1.06	A
			Mn-54	pCi	115	106	1.08	A
			Fe-59	pCi	139	129	1.08	A
			Zn-65	pCi	163	153	1.07	A
			Co-60	pCi	212	204	1.04	A
	E10479	Charcoal	I-131	pCi	90.1	92.6	0.97	A
	E10481	Water	Fe-55	pCi/L	1840	1890	0.97	A
June 2013	E10564	Milk	Sr-89	pCi/L	110	95.0	1.16	A
			Sr-90	pCi/L	15.8	17.0	0.93	A
	E10545	Milk	I-131	pCi/L	92.6	95.5	0.97	A
			Ce-141	pCi/L	83.1	90.4	0.92	A
			Cr-51	pCi/L	253	250	1.01	A
			Cs-134	pCi/L	118	125	0.94	A
			Cs-137	pCi/L	143	151	0.95	A
			Co-58	pCi/L	87.1	94.0	0.93	A
			Mn-54	pCi/L	171	172	0.99	A
			Fe-59	pCi/L	125	120	1.04	A
			Zn-65	pCi/L	220	217	1.01	A
			Co-60	pCi/L	169	175	0.97	A
	E10547	AP	Ce-141	pCi	56.8	56.7	1.00	A
			Cr-51	pCi	168	157	1.07	A
			Cs-134	pCi	85.2	78.4	1.09	A
			Cs-137	pCi	101	94.6	1.07	A
			Co-58	pCi	62.7	58.9	1.06	A
			Mn-54	pCi	125	108	1.16	A
			Fe-59	pCi	85.7	75.0	1.14	A
			Zn-65	pCi	169	136	1.24	W
			Co-60	pCi	116	110	1.05	A
	E10546	Charcoal	I-131	pCi	86.5	89.7	0.96	A

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
June 2013	E10549	Water	Fe-55	pCi/L	1610	1610	1.00	A
September 2013	E10646	Milk	Sr-89	pCi/L	63.9	96.0	0.67	N (1)
			Sr-90	pCi/L	8.88	13.2	0.67	N (1)
	E10647	Milk	I-131	pCi/L	93.9	98.3	0.96	A
			Ce-141	pCi/L				NA (2)
			Cr-51	pCi/L	272	277	0.98	A
			Cs-134	pCi/L	150	172	0.87	A
			Cs-137	pCi/L	125	131	0.95	A
			Co-58	pCi/L	105	108	0.97	A
			Mn-54	pCi/L	138	139	0.99	A
			Fe-59	pCi/L	125	130	0.96	A
			Zn-65	pCi/L	264	266	0.99	A
			Co-60	pCi/L	187	196	0.95	A
	E10672	AP	Ce-141	pCi				NA (2)
			Cr-51	pCi	208	223	0.93	A
			Cs-134	pCi	143	139	1.03	A
			Cs-137	pCi	106	105	1.01	A
			Co-58	pCi	97.0	86.5	1.12	A
			Mn-54	pCi	116	112	1.04	A
			Fe-59	pCi	98.6	105	0.94	A
			Zn-65	pCi	219	214	1.02	A
			Co-60	pCi	166	158	1.05	A
	E10648	Charcoal	I-131	pCi	76.3	71.7	1.06	A
	E10673	Water	Fe-55	pCi/L	1790	1690	1.06	A
December 2013	E10774	Milk	Sr-89	pCi/L	97.3	93.8	1.04	A
			Sr-90	pCi/L	13.3	12.9	1.03	A
	E10775	Milk	I-131	pCi/L	89.7	96.1	0.93	A
			Ce-141	pCi/L	99.8	110	0.91	A
			Cr-51	pCi/L	297	297	1.00	A
			Cs-134	pCi/L	129	142	0.91	A
			Cs-137	pCi/L	126	126	1.00	A
			Co-58	pCi/L	116	112	1.04	A
			Mn-54	pCi/L	167	168	0.99	A
			Fe-59	pCi/L	117	110	1.06	A
			Zn-65	pCi/L	757	741	1.02	A
			Co-60	pCi/L	141	147	0.96	A
	E10777	AP	Ce-141	pCi	85.1	88.0	0.97	A
			Cr-51	pCi	278	238	1.17	A
			Cs-134	pCi	123	114	1.08	A
			Cs-137	pCi	102	101	1.01	A
			Co-58	pCi	84.4	89.9	0.94	A
			Mn-54	pCi	132	135	0.98	A
			Fe-59	pCi	101	88.3	1.14	A
			Zn-65	pCi	506	595	0.85	A
			Co-60	pCi	118	118	1.00	A

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
December 2013	E10776	Charcoal	I-131	pCi	84.7	80.5	1.05	A
	E10778	Water	Fe-55	pCi/L	2010	1910	1.05	A

(1) Milk, Sr-89/90 - The failure was due to analyst error. No client samples were affected by this failure. NCR 13-15

(2) The sample was not spiked with Ce-141.

(a) Teledyne Brown Engineering reported result.

(b) The Analytics known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(c) Ratio of Teledyne Brown Engineering to Analytics results.

(d) Analytics evaluation based on TBE internal QC limits: A= Acceptable, reported result falls within ratio limits of 0.80-1.20. W-Acceptable with warning, reported result falls within 0.70-0.80 or 1.20-1.30. N = Not Acceptable, reported result falls outside the ratio limits of < 0.70 and > 1.30.

DOE's MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
March 2013	13-MaW28	Water	Cs-134	Bq/L	21.0	24.4	17.1 - 31.7	A
			Cs-137	Bq/L	0.0446		(1)	A
			Co-57	Bq/L	28.3	30.9	21.6 - 40.2	A
			Co-60	Bq/L	18.2	19.56	13.69 - 25.43	A
			H-3	Bq/L	506	507	355 - 659	A
			Mn-54	Bq/L	25.7	27.4	19.2 - 35.6	A
			K-40	Bq/L	2.09		(1)	A
			Sr-90	Bq/L	10.5	10.5	7.4 - 13.7	A
			Zn-65	Bq/L	29.2	30.4	21.3 - 39.5	A
	13-GrW28	Water	Gr-A	Bq/L	2.74	2.31	0.69 - 3.93	A
			Gr-B	Bq/L	15.6	13.0	6.5 - 19.5	A
	13-MaS28	Soil	Cs-134	Bq/kg	859	887	621 - 1153	A
			Cs-137	Bq/kg	633	587	411 - 763	A
			Co-57	Bq/kg	0.256		(1)	A
			Co-60	Bq/kg	738	691	484 - 898	A
			Mn-54	Bq/kg	0.671		(1)	A
			K-40	Bq/kg	714	625.3	437.7 - 812.9	A
			Sr-90	Bq/kg	442	628	440 - 816	W
			Zn-65	Bq/kg	1057	995	697 - 1294	A
	13-RdF28	AP	Cs-134	Bq/sample	1.73	1.78	1.25 - 2.31	A
			Cs-137	Bq/sample	2.73	2.60	1.82 - 3.38	A
			Co-57	Bq/sample	2.38	2.36	1.65 - 3.07	A
			Co-60	Bq/sample	0.0302		(1)	A
			Mn-54	Bq/sample	4.36	4.26	2.98 - 5.54	A
			Sr-90	Bq/sample	1.43	1.49	1.04 - 1.94	A
			Zn-65	Bq/sample	3.14	3.13	2.19 - 4.07	A
	13-GrF28	AP	Gr-A	Bq/sample	0.767	1.20	0.36 - 2.04	A
			Gr-B	Bq/sample	0.871	0.85	0.43 - 1.28	A
	13-RdV28	Vegetation	Cs-134	Bq/sample	-0.197		(1)	A
			Cs-137	Bq/sample	7.39	6.87	4.81 - 8.93	A
			Co-57	Bq/sample	9.87	8.68	6.08 - 11.28	A
			Co-60	Bq/sample	6.08	5.85	4.10 - 7.61	A
			Mn-54	Bq/sample	-0.0104		(1)	A
			Sr-90	Bq/sample	1.28	1.64	1.15 - 2.13	W
			Zn-65	Bq/sample	6.84	6.25	4.38 - 8.13	A
September 2013	13-MaW29	Water	Cs-134	Bq/L	29.1	30.0	21.0 - 39.0	A
			Cs-137	Bq/L	34.5	31.6	22.1 - 41.1	A
			Co-57	Bq/L	0.0358		(1)	A
			Co-60	Bq/L	24.6	23.58	16.51 - 30.65	A
			H-3	Bq/L	2.45		(1)	A
			Mn-54	Bq/L	0.0337		(1)	A
			K-40	Bq/L	0.193		(1)	A
			Sr-90	Bq/L	9.12	7.22	5.05 - 9.39	W
			Zn-65	Bq/L	38.1	34.6	24.2 - 45.0	A
	13-GrW29	Water	Gr-A	Bq/L	1.13	0.701	0.210 - 1.192	A
			Gr-B	Bq/L	7.61	5.94	2.97 - 8.91	A

DOE's MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
September 2013	13-MaS29	Soil	Cs-134	Bq/kg	1150	1172	820 - 1524	A
			Cs-137	Bq/kg	1100	977	684 - 1270	A
			Co-57	Bq/kg	670		(1)	N (2)
			Co-60	Bq/kg	502	451	316 - 586	A
			Mn-54	Bq/kg	758	674	472 - 876	A
			K-40	Bq/kg	796	633	443 - 823	W
			Sr-90	Bq/kg	664	460	322 - 598	N (2)
			Zn-65	Bq/kg	210		(1)	N (2)
	13-RdF29	AP	Cs-134	Bq/sample	-0.570		(1)	N (2)
			Cs-137	Bq/sample	2.85	2.7	1.9 - 3.5	A
			Co-57	Bq/sample	3.30	3.4	2.4 - 4.4	A
			Co-60	Bq/sample	2.41	2.3	1.6 - 3.0	A
			Mn-54	Bq/sample	3.65	3.5	2.5 - 4.6	A
			Sr-90	Bq/sample	1.40	1.81	1.27 - 2.35	W
			Zn-65	Bq/sample	2.90	2.7	1.9 - 3.5	A
	13-GrF29	AP	Gr-A	Bq/sample	0.872	0.9	0.3 - 1.5	A
			Gr-B	Bq/sample	1.57	1.63	0.82 - 2.45	A
	13-RdV29	Vegetation	Cs-134	Bq/sample	5.29	5.20	3.64 - 6.76	A
			Cs-137	Bq/sample	7.48	6.60	4.62 - 8.58	A
			Co-57	Bq/sample	0.0129		(1)	A
			Co-60	Bq/sample	0.0523		(1)	A
			Mn-54	Bq/sample	8.78	7.88	5.52 - 10.24	A
			Sr-90	Bq/sample	1.63	2.32	1.62 - 3.02	W (2)
			Zn-65	Bq/sample	3.18	2.63	1.84 - 3.42	W

(1) False positive test.

(2) Soil, Co-57 & Zn-65 identified by gamma software as not detected, MAPEP evaluated as failing the false positive test. A large concentration of Eu-152 was spiked into the sample, causing interference in the analysis. Gamma software recognized the interference and identified them as not detected. MAPEP does not allow clients to enter non-detect designation. NCR 13-14

Soil, Sr-90 - incorrect results were submitted to MAPEP. Should have been 332 bq/kg, which would have passed. NCR 13-14

AP, Cs-134 - MAPEP evaluated the -0.570 as a failed false positive test. No client samples were affected by these failures. NCR 13-14

Vegetation, Sr-90 - it appears that the carrier was double spiked into the sample, resulting in the low activity for this sample. NCR 13-14

(a) Teledyne Brown Engineering reported result.

(b) The MAPEP known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(c) DOE/MAPEP evaluation: A=acceptable, W=acceptable with warning, N=not acceptable.

ERA ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Limits	Evaluation (c)
May 2013	RAD-93	Water	Sr-89	pCi/L	48.3	41.3	31.6 - 48.4	A
			Sr-90	pCi/L	19.3	23.9	17.2 - 28.0	A
			Ba-133	pCi/L	81.9	82.1	69.0 - 90.3	A
			Cs-134	pCi/L	40.9	42.8	34.2 - 47.1	A
			Cs-137	pCi/L	44.0	41.7	37.0 - 48.8	A
			Co-60	pCi/L	61.9	65.9	59.3 - 75.0	A
			Zn-65	pCi/L	202	189	170 - 222	A
			Gr-A	pCi/L	34.2	40.8	21.1 - 51.9	A
			Gr-B	pCi/L	18.0	21.6	13.0 - 29.7	A
			I-131	pCi/L	23.8	23.8	19.7 - 28.3	A
			U-Nat	pCi/L	60.4	61.2	49.8 - 67.9	A
			H-3	pCi/L	3970	4050	3450 - 4460	A
	MRAD-18	Filter	Gr-A	pCi/filter	Lost during processing			
November 2013	RAD-95	Water	Sr-89	pCi/L	25.5	21.9	14.4 - 28.2	A
			Sr-90	pCi/L	14.3	18.1	12.8 - 21.5	A
			Ba-133	pCi/L	57.2	54.2	44.7 - 59.9	A
			Cs-134	pCi/L	83.3	86.7	71.1 - 95.4	A
			Cs-137	pCi/L	201	206	185 - 228	A
			Co-60	pCi/L	104	102	91.8 - 114	A
			Zn-65	pCi/L	361	333	300 - 389	A
			Gr-A	pCi/L	29.5	42.8	22.2 - 54.3	A
			Gr-B	pCi/L	30.1	32.2	20.8 - 39.9	A
			I-131	pCi/L	23.1	23.6	19.6 - 28.0	A
			U-Nat	pCi/L	5.53	6.24	47.0 - 7.44	A
			H-3	pCi/L	17650	17700	15500 - 19500	A
	MRAD-19	Filter	Gr-A	pCi/filter	33.0	83.0	27.8 - 129	A

(a) Teledyne Brown Engineering reported result.

(b) The ERA known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(c) ERA evaluation: A=acceptable. Reported result falls within the Warning Limits. NA=not acceptable. Reported result falls outside of the Control Limits. CE=check for Error. Reported result falls within the Control Limits and outside of the Warning Limit.