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April 25, 1996

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River Bend Station - Unit I  
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RBFI-96-0167

Gentlemen:

Enclosed is the River Bend Station (RBS) Annual Radiological Environmental Operating Report for the period January 1, 1995 through December 31, 1995. This report is submitted in accordance with the RBS Technical Specifications, Section 5.6.2. Data used to develop this report is being maintained as permanent plant records and can be made available for review upon request.

Should you have any questions regarding the enclosed information, please contact Mr. David Lorring of my staff at (504) 381-4157.

Sincerely,

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Radiological Environmental Operating Report for 1995

April 25, 1996

RBG-42851

RBFI-96-0167

Page 2 of 2

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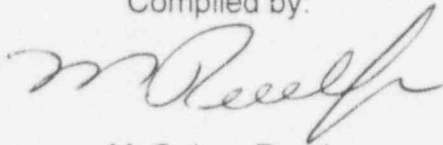
# RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

## RIVER BEND STATION

FOR THE OPERATING PERIOD

January 1, 1995- December 31, 1995

Compiled by:

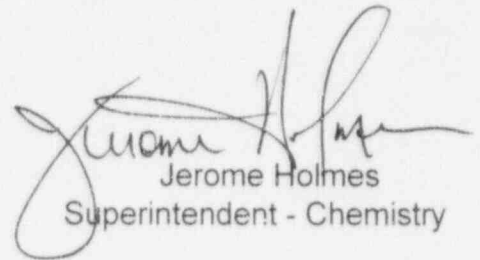


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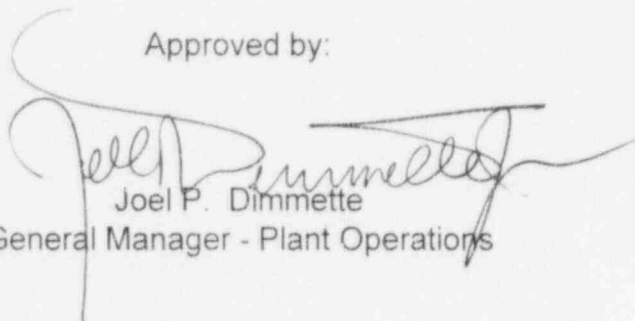


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**RIVER BEND STATION  
RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 1995**

Abstract

During 1995, radiological environmental monitoring and a land use census were conducted in the vicinity of River Bend Station (RBS). As part of the monitoring program, the RBS Radiological Environmental Monitoring Program (REMP) laboratory participated in an interlaboratory comparison program with 97.0 percent of analytical results within control limits. The land use census revealed 4 salient changes in receptor locations since 1994. Twenty-three monitoring exceptions, involving Technical Specifications/Technical Requirements Manual (TRM) required samples, occurred out of a total effort of 1,274 samples collected and 1,382 subsequent analyses performed. None of the exceptions had significant impact on program quality. Although well below the required detection limits, slightly elevated (relative to baseline data) levels of Cesium-137 were sporadically measured in both indicator and control media; these concentrations were presumably attributable to the 1986 incident at Chernobyl, Russia. The only measurable increases in radionuclide activity, or levels of radiation above baseline levels in the vicinity of RBS during 1995, which are attributed to plant operation, are the expected low levels in the liquid discharge line. The levels of activity measured in environmental media and in the liquid discharge were below the required levels of detection, and therefore, substantially below Technical Specification/TRM reporting levels. The 1995 Radiological Environmental Monitoring Program thus substantiated the adequacy of source control and effluent monitoring at River Bend Station.

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# RIVER BEND STATION

## RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 1995

### 1.0 INTRODUCTION

This Annual Radiological Environmental Operating Report for the period of January 1 through December 31, 1995, is submitted in accordance with Technical Requirements Manual (TR 5.6.2) as required by Technical Specification (5.6.2) of Appendix A to River Bend Station License Number NPF-47.

River Bend Station (RBS) is a 936 MWe General Electric boiling water reactor located in West Feliciana Parish, Louisiana, 4.1 km southeast of St. Francisville (Figure 1). Waste heat from RBS is dissipated via a system using five mechanical draft cooling towers which draw makeup water from the Mississippi River, 3.3 (air) km to the west. Blowdown from the cooling tower system dilutes low-level liquid radioactive waste and is discharged to the Mississippi River through a 4.4-km buried pipe located downstream of the intake structure (Fig. 2). Gaseous radioactive effluents are released through the main plant exhaust duct, the fuel building exhaust duct, and the radwaste building exhaust duct.

The area within a 16-km radius of RBS includes substantial portions of West Feliciana, East Feliciana, and Pointe Coupee parishes, as well as small portions of East and West Baton Rouge parishes. Most of the land in this area is devoted, in about equal proportions, to forests and agriculture (pasture, various crops). Wetlands, streams/lakes, and urban/improved lands comprise the remainder of the immediate vicinity of the plant. Besides St. Francisville, (4.1 km northwest), human population centers near RBS are New Roads (10 km southwest) and Jackson (12 km northeast). Industrial facilities in the immediate vicinity of RBS are Crown Vantage Paper Plant (5 km south); Big Cajun No. 2 Power Station (5 km southwest); and the Corps of Engineers concrete casting yard (5 km west).

The area within an 80-km radius of RBS contains all or portions of 19 Louisiana parishes and five Mississippi counties. This area has generally the same makeup as that of the immediate vicinity of RBS, although wetlands, agricultural lands, and urban/improved lands are relatively more extensive (at the expense of forested lands) in the southwestern and southeastern quadrants. Baton Rouge, centered at about 38 km southeast, is the only large city in the general vicinity of RBS.

During 1995, radiological environmental monitoring in the vicinity of RBS was performed by the River Bend Station Environmental Services Group, a part of the plant Chemistry Department, with support from the plant Radiation Control Department in maintaining/calibrating air samplers and in reading/annealing thermoluminescence dosimeters.

### 2.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM (REMP)

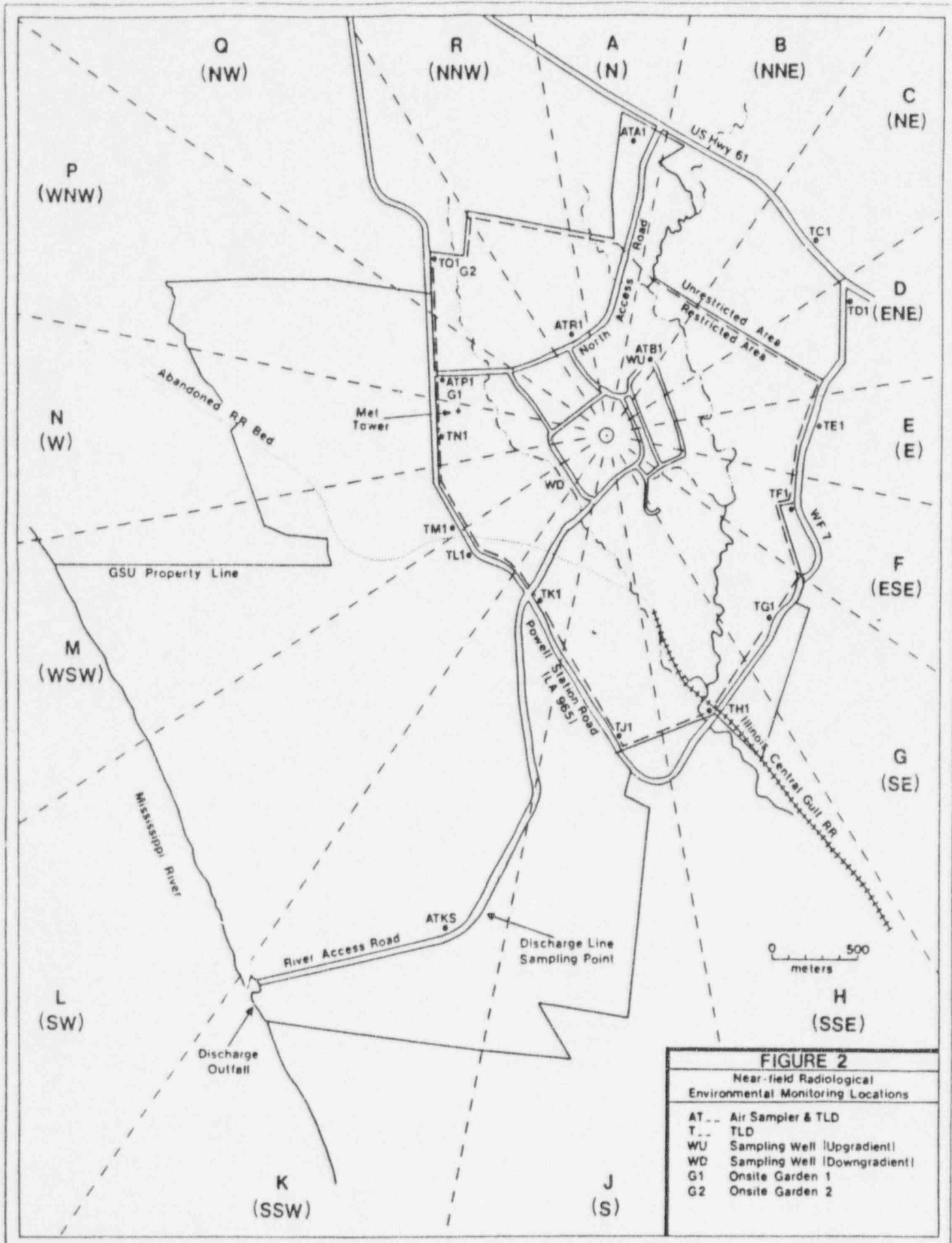
#### 2.1 Purpose/Bases

The Radiological Environmental Monitoring Program (REMP) was established to provide representative measurements of radiation and of radioactive materials, resulting from RBS operation, in those exposure pathways and for those radionuclides that lead to the highest potential exposures of members of the public.





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**FIGURE 2**  
 Near-field Radiological  
 Environmental Monitoring Locations

AT	Air Sampler & TLD
T	TLD
WU	Sampling Well (Upgradient)
WD	Sampling Well (Downgradient)
G1	Onsite Garden 1
G2	Onsite Garden 2

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The REMP implements Section IV.B.2 of Appendix I of 10CFR50 and thereby supplements the radioactive effluent monitoring program by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and the modeling of the environmental exposure pathways.

The REMP applies the concepts of indicator vs. control and preoperational vs. operational intercomparisons to verify the adequacy of source controls and resultant human radiation doses. In addition to 10CFR50, Appendix I, the program is based on guidance provided in the Nuclear Regulatory Commission's Radiological Branch Technical Position, Revision 1, November 1979, as well as NRC Regulatory Guides 4.1 and 4.15.

**2.2 Environmental Radiation Exposure Pathways**

Elements of the REMP monitor indications of the impacts of gaseous (airborne) and liquid effluents released from River Bend Station. The specific methods used in monitoring the pathways by which these effluents could lead to human exposure, based on existing demographic information, are:

**HUMAN EXPOSURE PATHWAYS**

<b>(A) <u>Airborne Pathway</u></b>	<b><u>Monitoring Media</u></b>
Inhalation Dose (internal)	Air Samples (Particulates and Radioiodines)
Ground Plane Dose (external)	Thermoluminescence Dosimetry (TLD)
Immersion Dose (external)	Thermoluminescence Dosimetry (TLD)
Ingestion Dose (internal)	Vegetation/Food Crop Samples
<b>(B) <u>Direct Exposure Pathway</u></b>	<b><u>Monitoring Media</u></b>
External Dose	Thermoluminescence Dosimetry (TLD)
<b>(C) <u>Waterborne Pathway</u></b>	<b><u>Monitoring Media</u></b>
Ingestion Dose (internal)	Surface Water Samples Groundwater Samples Drinking Water Samples Fish/Invertebrate Samples Shoreline Sediment Samples
Immersion Dose (external)	Surface Water Samples Shoreline Sediment Samples

Site-related dispersion characteristics, demography, hydrology, land use, anticipated source terms, and the exposure pathways outlined above were considered in the selection of the sample media, sampling and analysis frequencies, sampling/measurement locations, and types of analyses. These criteria were used to establish both the preoperational and operational phases of the REMP

# RIVER BEND STATION

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The program that evolved during the preoperational (baseline) monitoring phase incorporates all of the elements in the RBS Technical Specifications (3/4.12.1, 3/4.12.2, 3/4.12.3) plus special study criteria, and is illustrated in Table 1 and Figures 1 and 2.

### 2.3 Land Use Census for 1995

The annual land use census, which implements Section IV.B.3 of Appendix I of 10CFR50, was conducted during the 1995 growing season in accordance with RBS Technical Specification 3/4.12.2 and/or Technical Requirements Manual (TR 3.12.2). Table 2 summarizes the results and notes changes in nearest receptor locations within 8 km from those identified in the Radiological Environmental Operating Report for 1994.

The 1995 census identified residences within 8 km of the RBS reactor containment in all sectors except L (SW) and M (WSW). The nearest resident in sector Q (NNW) was 1.4 km, compared to 1.3 km in 1994. The gardens identified in sectors P (WNW) and Q (NW) are the onsite gardens established near sectors with the highest calculated annual average ground level D/Q. These gardens are REMP indicator locations for broadleaf vegetation (Table 1, Fig. 2). No receptor garden was found in sector E (E) compared to a garden at 2.2 km in the 1994 census. A farther resident was located in sector F (ESE) at 3.5 km, compared to 3.4 km in the 1994 census. No gardens were located in sectors L (SW), M (WSW), and N (W) during the 1995 census.

No dairy animals were found within 8 km of RBS during the 1995 census. Historically, there have never been enough dairy sites to accommodate the minimum RBS Technical Specification requirements for analysis of milk, so monitoring of broadleaf vegetation has been performed from the outset.

River Bend began a survey of meat animals within the 8 km radius of RBS during the 1990 census. This initial survey identified beef herds in all sectors except L (SW). During the 1991 census, meat animals were located in sector L (SW) at 4.6 km. There were no meat animals found in sector R (NNW) during the 1995 census, compared to animals at 3.0 km in the 1994 census. The meat animal survey will be discontinued in 1996, due to program reductions of non-required activities.

### 2.4 Interlaboratory Comparison Program Results for 1995

The RBS REMP Laboratory participated in the U.S. Environmental Protection Agency (USEPA) Performance Evaluation Study Program during 1995 in accordance with RBS Technical Specification 3/4.12.3 and/or Technical Requirements Manual (TR 3.12.3). RBS results (Table 3) were within the control limits for the normalized range (precision) for all analyses, and within the USEPA "known" value (accuracy) for all but one analysis. The discrepancy for this analysis is discussed below. The USEPA discontinued the cross-check media for "food" in 1989, and although milk sampling and analysis is not required of RBS at this time, the results for the cross-check media for "milk" are included as a gauge for the "food" sample analyses (i.e., vegetation and fish) performed by RBS.

### 2.5 Program Exceptions

Certain samples and analyses were inadvertently omitted or unavoidably altered during the 1995 operating period, out of a total effort of 1,274 samples collected and 1,382 subsequent analyses performed. These exceptions and the reasons for the omissions/alterations are delineated in Table 4 in accordance with Technical Specification requirements. Corrective actions and impacts on program quality are discussed starting on page 12.

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TABLE 1

**RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM  
(Page 1 of 6)**

Exposure Pathway and/or Sample	Sample Point Description, Distance, and Direction	Sampling and Collection Frequency	Type and Frequency of Analysis
Airborne Particulates and Radioiodines	Samples from 9 Locations:		
	<b>INDICATOR STATIONS</b>		
	AA1. River Bend Training Center; 1.7 km N	Continuous air sampler with filter collection weekly or as required by dust loading, whichever is more frequent.	Charcoal cartridge: analysis weekly for radioiodine.
	AR1. River Bend Station North Access Road across from plant entrance; 0.8 km NNW		
	AP1. Near River Bend Station Onsite Garden #1; 0.9 km WNW		
	AQS2. St. Francis Substation on U.S. Hwy. (Bus.) 61 in St. Francisville; 5.8 km NW (nearest community location).		
	<b>CONTROL AND SPECIAL INTEREST STATIONS<sup>1</sup></b>		
	ALC. Parlange Power Center in Oscar; 20 km SW (Control).		
	AB1. River Bend Station cooling tower yard; 0.5 km NNE. <sup>2</sup>		
	AKS. River Bend Station River Access Road; 2.8 km SSW. <sup>2</sup>		
	AGS. GSU Service Center compound in Zachary; 17 km SE. <sup>2</sup>		
	AHS. Roof of GSU Office Building, North Blvd., Baton Rouge; 40 km SSE. <sup>2</sup>		
Direct Radiation	Measurements from 44 locations:		
	<b>INDICATOR STATIONS</b>		
	TA1. River Bend Training Center; 1.7 km N	Thermoluminescence dosimeters (TLDs); deployment / retrieval quarterly	Gamma exposure quarterly. <sup>3</sup>
	TA2. WF-17 siren pole south of La. Hwy. 10 and West Feliciana Parish Road (WF) 2 in Elm Park; 8 km N.		
	TB1. River Bend Station cooling tower yard; 0.5 km NNE.		
	TB2. Stub pole at Jct. of La. Hwy. 965 and Audubon Lane (WF 17); 5 km NNE.		

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TABLE 1

**RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM  
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Exposure Pathway and/or Sample	Sample Point Description, Distance, and Direction	Sampling and Collection Frequency	Type and Frequency of Analysis
Direct Radiation (continued)	TC1. Stub pole at Jct. of US Hwy 61 and Old Highway 61; 1.7 km NE.	Thermoluminescence dosimeters (TLDs); deployment / retrieval quarterly. <sup>3</sup>	Gamma exposure quarterly. <sup>3</sup>
	TC2. Stub pole along La Hwy 966, 0.6 km south of Jct. of La. Hwys. 966 and 965; 7 km NE.		
	TD1. Stub pole along WF 7, 150 meters south of Jct. of WF 7 and U.S. Hwy. 61; 1.6 km ENE.		
	TD2. Stub pole along La Hwy. 966, 4 km south of Jct. of La. Hwys. 966 and 965; 6.3 km ENE.		
	TE1. Stub pole along WF 7, 1 km south of Jct of WF 7 and U.S. Hwy. 61; 1.3 km E.		
	TE2. Gravel Power Center on La Hwy. 68, 2 km north of Jct. of La. Hwys. 68 and 964; 10 km E.		
	TF1. Stub pole along WF 7, 1.6 km south of Jct. of WF 7 and U.S. Hwy. 61; 1.3 km ESE.		
	TF2. On La Hwy. 954, 0.6 km north of Jct. of La. 954 and U.S. Hwy. 61; 6 km ESE.		
	TG1. Stub pole along WF 7, 2 km south of Jct. of WF 7 and U.S. Hwy. 61; 1.6 km SE.		
	TG2. Telephone pole at gate to Marathon Tank Farm on U.S. Hwy. 61, near Delombre; 7.5 km SE.		
	TH1. Stub pole at Illinois Central Gulf Railroad crossing of WF 7 (near Grants Bayou); 1.7 km SSE.		
	TH2. First telephone pole on La Hwy 964 north of the entrance to Crown Vantage Paper Plant; 5.5 km SSE.		
	TJ1. Stub pole near River Bend Station gate #23 on La Hwy. 965; 1.5 km S.		
	TJ2. Large tree along River Road, 100 meters north of Crown Vantage Paper Plant intake structure; 5.8 km S.		
	TK1. GSU utility pole #L10178 on La Hwy. 965, 20 meters south of RBS River Access Road; 0.9 km SSW.		
	TK2. Stub pole at Jct. of La. Hwys. 414 and 415; 8 km SSW.		

**RIVER BEND STATION  
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TABLE 1

**RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM  
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Exposure Pathway and/or Sample	Sample Point Description, Distance, and Direction	Sampling and Collection Frequency	Type and Frequency of Analysis
Direct Radiation (continued)	<b>TL1.</b> Second utility pole on La. Hwy. 965 south of former Illinois Central Gulf Railroad crossing; 1.0 km SW.	Thermoluminescence dosimeters (TLDs); deployment / retrieval quarterly. <sup>3</sup>	Gamma exposure quarterly. <sup>3</sup>
	<b>TL2.</b> Second utility pole along La Hwy 415 east of Louisiana & Arkansas Railroad crossing (near Patin's Dike); 9.5 km SW.		
	<b>TM1.</b> First utility pole on La. Hwy. 965 north of former Illinois Central Gulf Railroad crossing; 0.9 km WSW.		
	<b>TM2.</b> Utility pole along La. Hwy. 981, about 3 km south of Jct. of La. Hwys. 981 and 10; 4.2 km WSW.		
	<b>TN1.</b> Utility pole along La. Hwy. 965, between RBS gates #13 and #14; 0.9 km W.		
	<b>TN2.</b> Utility pole with electrical meter near west bank ferry landing (La. Hwy. 10); 6 km W.		
	<b>TP1.</b> Near RBS Onsite Garden #1; 0.9 km WNW.		
	<b>TP2.</b> Stub pole about 1.5 km north of former ICG RR trestle on Tunica Street, western outskirts of St. Francisville; 7.3 km WNW.		
	<b>TQ1.</b> GSU property sign along La. Hwy. 965 about 1 km north of RBS North Access Road; 1.4 km NW.		
	<b>TQ2.</b> GSU pole at Jct of North Commerce and American Beauty Streets, St Francisville; 6.9 km NW.		
	<b>TR1.</b> RBS North Access Road across from plant entrance; 0.8 km NNW.		
	<b>TR2.</b> Tree along north side of WF 2, past Jacock Road, about 1.8 km east of Jct. of WF 2 and U.S. Hwy. 61; 8 km NNW.		
	<b>CONTROL AND SPECIAL INTEREST STATIONS<sup>1</sup></b>		
<b>TAC.</b> Telephone pole along U.S. Hwy. 61 about 200 meters north of Hamilton Station Water Tower, near Wakefield; 18 km N.			

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TABLE 1

**RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM  
(Page 4 of 6)**

Exposure Pathway and/or Sample	Sample Point Description, Distance, and Direction	Sampling and Collection Frequency	Type and Frequency of Analysis
<b>CONTROL AND SPECIAL INTEREST STATIONS<sup>1</sup></b>			
Direct Radiation (continued)	<b>TEC</b> Stub pole at Jct of La. Hwy. 955 and Midway Road, 4.8 km north of Jct. of La. Hwys. 955 and 964; 16 km E. <sup>2</sup>	Thermoluminescence dosimeters (TLDs); deployment / retrieval quarterly. <sup>3</sup>	Gamma exposure quarterly. <sup>3</sup>
	<b>TLC</b> Parlange Power Center in Oscar; 20 km SW.		
	<b>TCS</b> Utility pole at gate to East Louisiana State Hospital in Jackson; 12.3 km NE.		
	<b>TGS</b> GSU Service Center compound in Zachary; 17 km SE.		
	<b>THS</b> Roof of GSU Office Building, North Boulevard, Baton Rouge; 40 km SSE.		
	<b>TKS</b> RBS River Access Road; 2.8 km SSW. <sup>2</sup>		
	<b>TLS</b> Utility pole near False River Academy sign at edge of New Roads; 5 km SW.		
	<b>TQS1</b> Behind Pentecostal Church (opposite West Feliciana Hospital) near Jct. of U.S. Hwy. 61 and Ferdinand Street; 4 km NW.		
	<b>TQS2</b> St. Francis Substation on U.S. Hwy. (Business) 61 in St. Francisville; 5.8 km NW.		
	<b>TQS3</b> Utility pole at Louisiana State Penitentiary dairy, near Angola; 35 km NW.		
<b>TRS</b> Stub pole at Jct of WF 2 and US Hwy 61, near Bains (West Feliciana High School); 3.2 km NNW. <sup>2</sup>			
Waterborne	<b>SURFACE WATER<sup>4</sup></b>		
	<b>SWU</b> Mississippi River about 4 km upstream from the RBS liquid discharge, near La. Hwy. 10 ferry crossing.	Weekly grabs, composited over monthly and quarterly periods.	Monthly composite: gamma isotopic, tritium <sup>3</sup> and gross beta analysis <sup>5</sup> . Quarterly composite: tritium analysis.
	<b>SWD</b> Mississippi River about 4 km downstream from the RBS liquid discharge, near the Crown Vantage Paper Plant.		
	<b>DL</b> RBS liquid discharge line at the blowdown control structure along the River Access Road.	Flow-weighted hourly grabs, composited monthly and quarterly.	

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**TABLE 1  
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM  
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Exposure Pathway and/or Sample	Sample Point Description, Distance, and Direction	Sampling and Collection Frequency	Type and Frequency of Analysis
Waterborne	<b>DRINKING WATER<sup>6</sup></b>		
	Nearest downstream water supply: IH-10 bridge in Baton Rouge, 53.9 km downstream from the RBS liquid discharge, or People's Water Service Company in Donaldsonville, 138 km downstream from the RBS liquid discharge.	Weekly grabs, composited over monthly and quarterly periods.	Monthly composite: gamma isotopic, tritium <sup>3</sup> and gross beta analysis <sup>5</sup> . Quarterly composite: tritium analysis.
	<b>GROUNDWATER</b>		
	<b>WD</b> Upland Terrace Aquifer well, downgradient from the plant, about 470 meters SW.	Quarterly grab.	Gross beta, gamma isotopic, and tritium analyses quarterly <sup>7</sup> .
	<b>WU</b> Upland Terrace Aquifer well, upgradient from the plant, about 470 meters NNE (control).		
	<b>SHORELINE SEDIMENT</b>		
	<b>SEDD</b> East shore of the Mississippi River, about 4 km downstream from the plant, near the Crown Vantage Corporation paper mill.	Semiannual grab.	Gamma isotopic analysis semiannually.
	<b>SEDU</b> East shore of the Mississippi River, about 4 km upstream from the plant, near the La Hwy 10 ferry. <sup>4</sup>		
Ingestion	<b>FISH AND INVERTEBRATES</b>		
	<b>FD</b> One sample of each of three commercially and/or recreationally important species from the downstream area influenced by the RBS liquid discharge.	Semiannually or seasonally, when available.	Gamma isotopic analysis on edible portions semiannually or seasonally.
	<b>FU</b> One sample of each of three commercially and/or recreationally important species from the upstream area not influenced by the RBS liquid discharge (control). <sup>7</sup>		
	<b>PRODUCE<sup>8</sup></b>		
	<b>G1/G2</b> Two samples of each of three different types of leafy vegetables from onsite gardens near the site boundary in areas of highest calculated average ground-level D/Q, 1 km WNW and 1.1 km NW.	Monthly during the growing season.	Gamma isotopic and I-131 analyses monthly.
	<b>GQC</b> One sample of each of three different kinds of leafy vegetables from the Louisiana State Penitentiary at Angola, 35 km NW (control).		



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TABLE 1

**RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM  
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NOTES:

- (1) For purposes of data summary, comparisons, and discussion, the sampling locations designated as "Special Interest" are treated as indicator stations if they are within 16 km of RBS and control stations if they are beyond 16 km.
- (2) Sample/measurement location not required by RBS Technical Specifications (not identified in ODCM).
- (3) Sampling and/or analysis frequency greater than required by RBS Technical Specifications and ODCM.
- (4) The upstream (control) sample is taken at a distance beyond influence of the plant discharge. The downstream (indicator) sample is taken in an area beyond but near the mixing zone.
- (5) Gross beta analysis not required by RBS Technical Specifications and ODCM.
- (6) Drinking water sampling/analyses not required by RBS Technical Specifications and ODCM. (No drinking water pathway exists due to extreme distance to nearest intake). The upstream surface water sampling location (SWU) is used as a "control" for drinking water analyses comparisons.
- (7) Preferred species are river shrimp (Macrobracium ohione), blue catfish (Ictalurus furcatus), and freshwater drum (Aplodinotus grunniens); if these are unavailable, other edible species may be substituted.
- (8) No irrigation pathway exists due to the extreme distance of nearest domestic water intake (see Note 6); leafy vegetables are sampled and analyzed because of limited availability of milk samples.

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## Air Particulates and Radioiodines

Twenty-three program exceptions, with loss of sample/sample volume, occurred involving air particulate and radioiodine sampling. Fifteen of these involved non-technical specification/requirement locations. All were caused by power outages due to weather, or equipment/electrical malfunctions on the feeder line. The program exceptions, involving technical specification locations, were a result of equipment problems/failures, and power outages of unknown reasons, which may have been weather related. In spite of the numerous power failures, samples were collected and analyzed from all locations with adequate volumes to achieve all required detection limits, except for locations AB1 (7/18 - 8/8, 9/19 - 10/24); AKS (3/22 - 3/27, 7/18 - 8/8); and AHS (3/7 - 3/15). All preceding air sample locations are not required by RBS Technical Specifications/TRM. These three locations will be discontinued in 1996, due to program reductions of non-technical specification/requirement activities.

RBS is currently using methods for determining more precisely when, during the week-long sample period, power outages or equipment failures occur so that comparison with wind direction joint frequencies will document the extent to which required sampling was achieved. Plotters are used at sampling locations to plot actual hours of power outages as they occur.

Air sample location AP1 (WNW, 0.9km) was reported to have a higher-than-normal gross beta activity for the week of 5/16/95 to 5/23/95. Even though this activity was less than ten times the yearly control sample mean for the previous year (as required by the TRM); it was analyzed by gamma isotopic, and peaks of Co-60 and Mn-54 were quantified. The second quarter AP1 filter composite gamma analysis quantified Mn-54 at 0.005 pCi/m<sup>3</sup>, and Co-60 at 0.013 pCi/m<sup>3</sup>. The third quarter AP1 filter composite analysis quantified Co-60 at 0.018 pCi/m<sup>3</sup>. Fourth quarter AP1 filter composite quantified only natural nuclides. Individual AP1 weekly filters analyzed from 10/24/95 revealed only background radiation.

## Direct Radiation (TLD)

Data for the first quarter at locations TK2 and TN1; second quarter at location TN2; and fourth quarter at locations TJ2, TL2, and TP2 was lost due to vandalism. The loss of TLD badges is a common occurrence when deploying TLD's in 44 locations over five parishes.

## Water Sample

Discharge line weekly composite samples for the month of May were not flow-weighted the entire month due to problems experienced with the flow meter on the discharge line. The composite sampler was used in the time mode instead of flow mode for part of the monthly collection. Discharge line samples analyzed during the months of May and June failed to achieve the detection limit for Iodine-131 due to a software problem that failed to count the sample to the pre-set MDA level as programmed. This problem has been addressed by a revision to the software that should correct the recurring problem. The two discharge line samples with detection limits and actual achieved MDA's are shown below.

Water Sample Location	I-131 (15 pCi/l LLD)
DL (5/95)	16.3
DL (6/95)	15.9

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TABLE 2  
RESULTS OF LAND USE CENSUS

Sector	Nearest Residence	Range (km)	Nearest Garden	Range (km)	Nearest Dairy	Range (km)	Nearest Meat Animal	Range (km)
A (N)	Jones	1.8	Jones	1.8	-	-	Daniel, H.	3.0
B (NNE)	Dreher	1.6	Harvey	1.8	-	-	Harvey	1.8
C (NE)	Magee	1.5	Magee	1.5	-	-	Daniel, H.	1.7
D (ENE)	Daniel, E.	1.6	Daniel, E.	1.6	-	-	Daniel, E.	1.2
E (E)	Bickham, S	2.2	<sup>3</sup>	-	-	-	Daniel, E.	1.2
F (ESE)	<sup>2</sup> Bickham, L	3.4	Eisworth	3.6	-	-	Daniel, E.	1.2
G (SE)	Mills	6.6	Mills	6.3	-	-	Bickham	3.5
H (SSE)	Koffman	1.7	Koffman	1.7	-	-	Daniel, E.	3.9
J (S)	Bliss	1.8	Bliss	1.8	-	-	Daniel, E.	3.5
K (SS W)	Guillory	7.4	Guillory	7.4	-	-	Daniel, E.	3.5
L (SW)	-	-	-	-	-	-	Bergeron	4.6
M (WSW)	-	-	-	-	-	-	Langois	5.0
N (W)	Lacost	6.1	-	-	-	-	Langois	5.0
P (WNW)	Hermann	3.4	Site #1	0.96	-	-	Hardovin	7.4
Q (NW)	<sup>1</sup> Leet	1.4	Site #2	1.07	-	-	Cole	1.3
R (NNW)	Young	1.7	Cummings	3.7	-	-	<sup>4</sup>	

NOTES:

- (1) Further resident at 1.4 km compared to 1.3 km in the 1994 census.
- (2) Further resident at 3.5 km compared to 3.4 km in the 1994 census.
- (3) No garden compared to a garden at 2.2 km in the 1994 census.
- (4) No meat animal compared to meat animals at 3.0 km in the 1994 census.

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**TABLE 3  
USEPA INTERCOMPARISON (CROSS-CHECK) PROGRAM PARTICIPATION RESULTS**

Sample Type (units)	Date	Analysis	USEPA "Known" Value <sup>a</sup>	RBS Value	RBS N-DEV <sup>b</sup>	RBS N-RANGE <sup>c</sup>	Average Result <sup>d</sup>
Air Filter (pCi/filter)	08/25/95	Beta	86.6 ± 17.3	98.0	+2.00	0.473	87.4 ± 8.81
		Alpha	25.0 ± 10.9	30.0	+1.40	0.375	26.7 ± 3.98
		Cs-137	25.0 ± 8.7	22.0	-1.00	0.354	26.8 ± 3.88
Milk <sup>e</sup>	09/29/95	I-131	99.0 ± 17.3	100.0	+0.20	0.413	71.2 ± 7.25
		Cs-137	50.0 ± 8.7	50.3	+0.10	0.118	51.0 ± 2.87
		K (nat)	1654.0 ± 143.8	1746.0	+1.90	0.171	1665.5 ± 119.4
Water (pCi/liter)	01/27/95	Beta	5.0 ± 6.9	8.0	+1.04	0.236	6.62 ± 1.93
	02/03/95	I-131	100.0 ± 17.3	95.0	-0.87	0.177	98.53 ± 5.59
	03/10/95	H-3	7435.0 ± 1290.5	6649.3	-1.83	0.074	7299.2 ± 682.97
	04/18/95	Beta	86.6 ± 17.3	41.0 <sup>f</sup>	-7.90 <sup>f</sup>	0.473	86.93 ± 10.42
		Co-60	29.0 ± 8.7	28.7	-0.12	0.118	29.39 ± 2.24
		Cs-134	20.0 ± 8.7	17.3	-0.92	0.354	18.33 ± 2.38
		Cs-137	11.0 ± 8.7	11.3	0.12	0.118	11.78 ± 1.68
		06/09/95 <sup>g</sup>	Co-60	40.0 ± 8.7	38.3	-0.58	0.118
	06/09/95 <sup>g</sup>	Zn-65	76.0 ± 13.9	75.7	-0.06	0.369	78.8 ± 5.52
		Ba-133	79.0 ± 13.9	76.0	-0.65	0.148	76.2 ± 5.46
		Cs-134	50.0 ± 8.7	42.7	-2.53	0.709	45.6 ± 3.99
		Cs-137	35.0 ± 8.7	35.3	0.10	0.118	35.5 ± 2.90
		07/21/95	Beta	19.4 ± 8.7	14.0	-1.87	0.354
	08/04/95	H-3	4872.0 ± 844.9	4540.0	-1.18	0.243	4788.09 ± 844.9
	10/06/95	I-131	148.0 ± 26	154.3	0.70	0.276	152.9 ± 10.71
	10/17/95	Beta	123.5 ± 32.0	107.0	-1.54	0.958	124.0 ± 14.6
		Co-60	49.0 ± 8.7	49.0	0.00	0.591	49.3 ± 2.75
		Cs-134	40.0 ± 8.7	34.7	-1.80	0.473	36.7 ± 3.06
		Cs-137	30.0 ± 8.7	29.0	-0.30	0.591	30.9 ± 2.52
		10/27/95	Beta	24.8 ± 8.7	20.7	-1.40	0.673
	11/03/95	Co-60	60.0 ± 8.7	60.7	0.23	0.118	59.7 ± 4.05
Zn-65		125.0 ± 22.5	134.3	1.20	0.409	128.9 ± 8.98	
Ba-133		99.0 ± 17.3	102.7	0.60	0.295	95.6 ± 6.59	
Cs-134		40.0 ± 8.7	36.7	-1.20	0.236	36.9 ± 3.03	
Cs-137		49.0 ± 8.7	52.7	1.30	0.236	50.8 ± 3.13	

**NOTES:**

- (a) USEPA "known" values are listed with a range reflecting control (3 sigma) limits.
- (b) The normalized deviation from the "known" value is computed by USEPA from the deviation and the standard error of the mean; ±2.000 is the warning limit and ±3.000 is the control limit.
- (c) The normalized range is computed by USEPA from the mean range, the control limit, and the standard error of the range; +2.000 is the warning limit and +3.000 is the control limit.
- (d) The grand average of all participants' results (excluded outliers) is listed with the experimental (calculated) sigma for all laboratories.
- (e) USEPA discontinued the cross-check media "Food" in 1989. Although milk sampling and analysis by RBS is not performed, the cross-check samples of milk were analyzed, and the data included as a gauge of the "food" sample (i.e., vegetation, fish) analyses performed by RBS. The units for the nuclides I-131 and Cs-137 are pCi/liter, and for natural potassium is mg/l.
- (f) The results reported to USEPA were out of the control limits; refer to the discussion on program exceptions.
- (g) Sample analyzed but not reported to EPA in time for publication. Statistical calculations performed in house and included in records.

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**TABLE 4  
MONITORING PROGRAM EXCEPTIONS**

SAMPLE TYPE	PERIOD	LOCATION	EXCEPTION/REASON
Air Particulate & Radioiodine	12/27-01/03	AA1, AB1*, AR1, AKS*, AP1	1% weekly volume lost due to power outage of unknown reason
	01/3-01/10	AB1*	57% weekly volume lost due to weather related power outage
	01/10-01/16	AB1*	28% weekly volume lost due to power outage from previous week
	01/10-01/16	AHS*	8% weekly volume lost due to power outage from building remodeling
	01/24-01/31	AR1	62% weekly volume lost due to fuse failure on transformer feeder pole
	01/31-02/07	AR1	17% weekly volume lost due to power outage from previous week
	02/07-02/14	AR1	44% weekly volume lost due to GFI breaker trip at sampler location
	02/14-02/21	AHS*	6% weekly volume lost due to power outage from building remodeling
	03/07-03/15	AHS*	100% weekly volume lost due to power outage from building remodeling
	03/15-03/22	AKS*	32% weekly volume lost due GFI breaker trip
	03/22-03/27	AKS*	100% weekly volume lost due to GFI breaker trip
	03/27-04/04	AKS*	48% weekly volume lost due to GFI breaker; sampler replaced at location
	05/09-05/16	AA1, AR1, AP1	2% weekly volume lost due to power outage of unknown reason
	06/27-07/05	AKS*, AB1*	3% weekly volume lost due to power outage of unknown reason
	07/11-07/18	AR1	41% weekly volume lost due to power outage from inclement weather
	07/18-08/8	AB1*, AKS*	82% weekly volume lost due to no power from feeder pole
	08/08-08/15	AB1*	100% weekly volume lost due to no power from feeder pole
	07/11-07/18	AB1*	41% weekly volume lost due to power problem from previous weeks
	09/12-09/19	AB1*, AKS*	LLD for I-131 not achieved due to small volume caused by power outage
	09/19-10/24	AB1*	54% weekly volume lost due to no power from feed pole
10/17-10/24	AB1*	100% weekly sample lost due to no power from feed pole	
10/31-11/07	ALC	3% weekly volume lost due power outage of unknown cause	
12/12-12/19	AA1, AB1*, AR1, AKS*, AQS2	5%-12% weekly volume lost due to general power outage of unknown cause	
12/19-12/27	ALC	4% weekly volume lost due to power outage of unknown cause	
		AGS*	59% weekly volume lost due to air pump failure
TLD's	1st Quarter	TK2, TN1	Data lost due to badges missing / stolen
	2nd Quarter	TN2	Data lost due to badge missing / stolen
	4th Quarter	TJ2, TL2, TP2	Data lost due to badges missing / stolen
Water	05/95	DL	All samples collected not flow-weighted due to flow meter inoperability
	05/95	DL	LLD for I-131 not achieved due to gamma software problems
	06/95	DL	LLD for I-131 not achieved due to gamma software problems
Vegetation	10/12	GQC	LLD for I-131 not achieved due to gamma software problems
	12/95	G1, G2	Sample collections decreased due to inclement weather/freeze
Cross Checks	04/18	Gross Beta in water study	Results out of control limits of study caused by preparation process

\*Sample/measurement is not required by RBS Technical Specifications/TRM (not identified in ODCM)

# RIVER BEND STATION RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 1995

## Vegetation Samples

A control vegetation sample collected during the month of October was analyzed and failed to achieve the detection limit for Iodine-131. The LLD for I-131 is 60.0 pCi/kg; while the actual MDA achieved was 89.3 pCi/kg. This is thought to be caused by the same software problem that was experienced with the discharge line samples. The revision to the gamma software should correct this problem. Due to the inclement weather experienced during December, the vegetation sample collections were inadequate in the site indicator gardens during December.

## USEPA Cross-check

The RBS results of the EPA Performance Evaluation Study for gross beta-in-water of 4/13/95 were outside the control limits of the study. RBS reported results averaging 41.0 pCi/l, while the control limits were 69.3 to 103.9 pCi/l, with a known value of 86.6 pCi/l. Instrument quality control data and worksheet calculations were reviewed with no indication of a problem. Four other beta-in-water studies were prepared and analyzed during 1995 with all results within the control limits for the respective studies. The reason for the low results is thought to be caused from the loss of sample during the later stages of sample preparation.

## 3.0 INTERPRETATION OF REMP RESULTS

### 3.1 Summary of Operational REMP Results

Monitoring results for the exposure pathways are itemized in Appendix A and summarized in Table 5, from which measured activities of the naturally-occurring daughters of uranium and thorium are excluded. For purposes of data summary, comparison, and discussion, the sampling locations designated "Special Interest" in Table 1 are treated as indicator stations if they are within 16 km of RBS and control stations if they are beyond 16 km.

3.1.1 Airborne Exposure Pathway - Measurements of radioiodine and other gamma-emitters were all below their respective LLDs -- that is, "undetectable" at the required analytical sensitivities. Noble gases (Kr-87, Xe-133, Xe-135) were detected in air samples throughout the year. Gross beta activities averaged 0.021 pCi/m<sup>3</sup> at indicator locations and 0.022 pCi/m<sup>3</sup> at control locations.

3.1.2 Direct Exposure Pathway - Quarterly exposures averaged 12.7 mR total at indicator locations and 13.1 mR total at control locations.

3.1.3 Waterborne Exposure Pathway No gamma-emitters were measured in surface water or in drinking water at levels approaching the Technical Specification LLDs. The gamma emitters Mn-54, Co-58, Fe-59, Co-60, Cr-51, La-140, Nb-95, Cs-137, and I-131 were measured in monthly composite samples from the CWS discharge line at concentrations between 1.53 and 276 pCi/l. Gross beta activities in surface water averaged 42.5 pCi/l in the discharge line and from 2.42 to 3.07 pCi/l at all other locations. Tritium (H-3) activities in surface water averaged 3873 pCi/l in the discharge line and were below detection limits at all other locations. Gross beta activities averaged 1.80 pCi/l in the downgradient WD (indicator), and 3.90 pCi/l in upgradient WU (control) groundwater. Only naturally-occurring gamma-emitter, K-40, was measured in Mississippi River shoreline up-stream and down-stream sediments.

3.1.4 Ingestion Exposure Pathway - Specific activities for radioiodine were below the required LLD in the ingestion pathway monitoring media during 1995. Only naturally-occurring gamma-emitters was measured in fish. Cs-137 was measured twice in control vegetation samples, and once in an indicator sample; but these levels were well below LLD levels.

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TABLE 5

**RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY  
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River Bend Station  
West Feliciana Parish, Louisiana

Docket Number: 50-458  
Reporting Period 1/1/95 to 12/31/95

Medium or Pathway Sampled (Unit of Measure)	Type and Total Number of Analyses Performed	Lower Limit of Detection <sup>1</sup> (LLD)	All Indicator Stations Mean (f) <sup>2</sup> Range	Location with Highest Annual Mean		Control Locations Mean (f) <sup>2</sup> Range	Number of Nonroutine Reported Results
				Name Distance/Direction	Mean (f) <sup>2</sup> Range		
Air Particulate (pCi/m <sup>3</sup> )	Gross Beta (464)	0.01	0.021 (306/306) 0.005 - 0.059	AP1 0.9 Km WNW	0.023 (53/53) 0.005 - 0.059	0.022 (158/158) 0.004 - 0.053	0
	K-40 <sup>3</sup> (464)	None Required	0.490 (306/306) 0.114 - 0.999	AB1 0.5 Km NNE	0.509 (53/53) 0.114 - 0.999	0.490 (158/158) 0.233 - 0.899	0
	Cs-134 (36)	0.05	All < LLD			All < LLD	0
	Cs-137 (36)	0.06	All < LLD			All < LLD	0
Air Radiiodine (pCi/m <sup>3</sup> )	I-131 (464)	0.07	All < LLD			All < LLD	0
Direct (TLD) <sup>4</sup> (mR total)	Gamma Quarterly (171)		12.73 (147/147) 8.65 - 18.11	TM2 4.2 km WSW	15.15 (4/4) 14.14 - 17.79	13.10 (24/24) 10.23 - 16.80	0
Surface Water (pCi/liter)	H-3 (12)	3000	3145(5/8) 235 - 4849	DL	3873(4/4) 3454 - 4849	All < LLD	0
	Mn-54 (36)	15	44.0 (12/24) 11.5 - 163	DL	44.0 (12/12) 11.5 - 163	All < LLD	0
	Co-58 (36)	15	6.59 (10/24) 1.95 - 15.7	DL	6.59 (10/12) 1.95 - 16.7	All < LLD	0
	Fe-59 (36)	30	14.2 (4/24) 8.54 - 20.5	DL	14.2 (4/12) 8.54 - 20.5	All < LLD	0
	Co-60 (36)	15	66.8 (12/24) 22.2 - 276	DL	66.8 (12/12) 22.2 - 276	All < LLD	0
	Zn-65 (36)	30	All < LLD			All < LLD	0
	Nb-95 (36)	15	All < LLD		All < LLD	All < LLD	0
	Zr-95 (36)	30	All < LLD			All < LLD	0
	I-131 (36)	15	11.0 (6/24) 6.75 - 15.2	DL	11.0 (6/12) 6.75 - 15.2	All < LLD	0
	Cs-134 (36)	15	All < LLD			All < LLD	0
	Cs-137 (36)	18	1.53 (1/24) single value	DL	1.53 (1/12) single value	All < LLD	0

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				Name Distance/Direction	Mean (f) <sup>2</sup> Range		
Surface Water (pCi/liter)	Ba-140 (36)	0	All < LLD			All < LLD	0
	La-140 (36)	15	42.6 (2/24) 37.9 - 47.2	DL	42.6 (2/12) 37.9 - 47.2	All < LLD	0
	Gross Beta (36)	4	27.2 (20/24) 1.56 - 86.9	DL	42.5 (12/12) 17.7 - 86.9	3.07 (11/12) 1.60 - 5.95	0
Groundwater (pCi/liter)	H-3 (8)	3000	All < LLD			All < LLD	0
	Mn-54 (8)	15	All < LLD			All < LLD	0
	Co-58 (8)	15	All < LLD			All < LLD	0
	Fe-59 (8)	30	All < LLD			All < LLD	0
	Co-60 (8)	15	All < LLD			All < LLD	0
	Zn-65 (8)	30	All < LLD			All < LLD	0
	Nb-95 (8)	15	All < LLD			All < LLD	0
	Zr-95 (8)	30	All < LLD			All < LLD	0
	I-131 (8)	15	All < LLD			All < LLD	0
	Cs-134 (8)	15	All < LLD			All < LLD	0
	Cs-137 (8)	18	All < LLD			All < LLD	0
	Ba-140 (8)	60	All < LLD			All < LLD	0
	La-140 (8)	15	All < LLD			All < LLD	0
	Gross Beta (8)	4	1.80 (1/4) single value		WU 470 m NNE	3.90 (1/4) single value	3.90 (1/4) single value
Drinking Water <sup>5</sup> (pCi/liter)	H-3 (4)	3000	All < LLD			All < LLD	0
	Mn-54 (12)	15	All < LLD			All < LLD	0
	Co-58 (12)	15	All < LLD			All < LLD	0
	Fe-59 (12)	30	All < LLD			All < LLD	0



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				Name Distance/Direction	Mean (f) <sup>2</sup> Range		
Drinking Water (pCi/liter)	Zn-65 (12)	30	All < LLD			All < LLD	0
	Co-60 (12)	15	All < LLD			All < LLD	0
	Nb-95 (12)	15	All < LLD			All < LLD	0
	Zr-95 (12)	30	All < LLD			All < LLD	0
	I-131 (12)	15	All < LLD			All < LLD	0
	Cs-134 (12)	15	All < LLD			All < LLD	0
	Cs-137 (12)	18	All < LLD			All < LLD	0
	Ba-140 (12)	60	All < LLD			All < LLD	0
	La-140 (12)	15	All < LLD			All < LLD	0
	Gross Beta (12)	4	2.42 (5/12) 1.70 - 2.90		SWU 4 km upstream	3.07 (11/12) 1.60 - 5.95	3.07 (11/12) 1.60 - 5.95
Sediment <sup>6</sup> (pCi/kg dry)	K-40 <sup>3</sup> (4)	None Required	1293 (2/2) 1254-1332	SEDU 4 km upstream	3509 (2/2) 1427-5591	3509(2/2) 1427- 5591	0
	Cs-134 (4)	150	All < LLD			All < LLD	0
	Cs-137 (4)	180	All < LLD	SEDU 4 km upstream		All < LLD	0
Fish/Invertebrate (pCi/kg wet)	K-40 <sup>1</sup> (12)	None Required	2334 (4/6) 703 - 3633	FU 4 km upstream	3009 (4/6) 2635-3393	3009 (4/6) 2635 - 3393	0
	Mn-54 (12)	130	All < LLD			All < LLD	0
	Co-58 (12)	130	All < LLD			All < LLD	0
	Fe-59 (12)	260	All < LLD			All < LLD	0
	Co-60 (12)	130	All < LLD			All < LLD	0
	Zn-65 (12)	260	All < LLD			All < LLD	0
	Cs-134 (12)	130	All < LLD			All < LLD	0
	Cs-137 (12)	160	All < LLD			All < LLD	0

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				Name Distance/Direction	Mean (f) <sup>2</sup> Range		
Broadleaf Vegetation (pCi/kg wet)	Be-7 <sup>3</sup> (103)	None Required	827 (19/67) 87-2842	G1 1 km WNW	847 (9/35) 251- 3556	526 (11/36) 211- 915	N/A
	K-40 <sup>3</sup> (103)	None Required	4785 (38/67) 255-9031	G2 1.1 km NW	5240 (18/32) 3128 - 7647	4258 (21/36) 1566 - 8638	N/A
	I-131 (103)	60	All < LLD			All < LLD	0
	Cs-134 (103)	60	All < LLD			All < LLD	0
	Cs-137 (103)	80	17 (1/35) single value	GQC 35 km NW	17.5(2/36) 11- 24	17.5(2/36) 11- 24	0

NOTES:

- (1) Lower Limit of Detection (LLD) as defined in RBS Technical Specifications (NUREG-1172).
- (2) Mean and range based on detectable measurements only. The fraction of detectable measurements at specified locations is indicated in parentheses (f).
- (3) Specific activities found for certain common and readily distinguished, naturally-occurring nuclides are included to provide perspective. It should also be noted that other gamma-emitting, naturally-occurring nuclides (e.g., primordial series) are often detected but not reported because of the complexities and uncertainties of specific identification.
- (4) Quarterly gamma exposure estimates are "normalized" to a 90-day quarter.
- (5) The upstream surface water sampling location, though not required, is used as a "control" for drinking water comparisons.
- (6) An upstream sediment sampling location, though not required, is used as a "control" for shoreline sediment comparisons.

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## 3.2 Comparison of Operational and Baseline REMP Results

Radiiodine and other gamma-emitters in the airborne exposure pathway were not measured at levels above the required LLDs during 1995. Gross beta activities on air particulate filters averaged 0.021 pCi/m<sup>3</sup> at indicator and 0.022 pCi/m<sup>3</sup> at control locations in 1995, compared to 0.03 pCi/m<sup>3</sup> at both indicator and control locations during the preoperational phase of the REMP (Appendix B).

In the direct exposure pathway, the 1995 net average readings for quarterly TLDs from both indicator and control locations were slightly lower than the corresponding values for the baseline period. Thus far, no appreciable differences have been observed in TLD exposures between indicator and control locations or between the same locations from one year to the next.

In the waterborne exposure pathway, average activities analyzed for required gamma-emitting nuclides were measured below the RBS Technical Specification LLDs during 1995 as had been the case during the preoperational phase (Appendix B). Gross beta and tritium levels in water are compared below:

### WATERBORNE AVERAGE GROSS BETA (pCi/l)

<u>Location</u>	<u>Pre-Operational</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>
Surface Water, Upstream (4 km)	7.80	9.75	4.55	5.15	6.52	3.98	3.07
RBS Discharge Line	N/A	40.39	33.90	143.55	45.60	106	42.53
Surface Water, Downstream (4 km)	8.10	9.52	5.23	5.59	7.60	5.37	2.81
Drinking Water (Baton Rouge, I-10 bridge)	6.80	9.47	5.05	5.01	5.65	5.30	2.42
Upgradient groundwater	6.00	6.03	<2.91	<3.02	2.31	4.51	3.90
Downgradient groundwater	4.00	4.73	3.17	3.04	2.78	3.92	1.80

### WATERBORNE AVERAGE TRITIUM (pCi/l)

<u>Location</u>	<u>Pre-Operational</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>
Surface Water, Upstream (4 km)	<3000	<209	<371	<355	<362	<324	<249
RBS Discharge Line	N/A	20452	7047	5744	4962	10236	3873
Surface Water, Downstream (4 km)	<3000	<209	<374	<364	<362	158	235
Drinking Water (Baton Rouge, IH-10 bridge)	<3000	<210	188	<360	<373	176	<249
Upgradient groundwater	<3000	<211	<366	<352	<372	336	<244
Downgradient groundwater	<3000	<207	<363	<348	<373	173	<251

Gross beta activities in the discharge line samples returned to normal in 1993 after the elevated levels of 1992 due to outage decontamination activities. The same observation can be made from 1994 to 1995 levels. As observed in previous years, the annual average gross beta activity for the control location (SWU) averaged the same as that for the indicator location (SWD). The gross beta activity levels in the discharge line (DL), during years with no refueling outages, seemingly reflect the normal cycles of concentration at which the station cooling towers are operated.

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Tritium activities in the discharge line have remained constant on average since 1991, reflecting the releases already noted in the 1995 Annual Radioactive Effluent Release Report (see also Table 6). These tritium levels reflect a decrease from 1990 due to removal of failed fuel, but represent an increase compared to years prior to 1990, due to more efficient radioactive wastewater treatment and reuse (e.g., boiler makeup). In the RBS boiler-reactor, tritium is produced by ternary fission of the reactor fuel ( $^{235}\text{U}$ ), although only a small fraction of that tritium would diffuse through the fuel's cladding. Tritium is also produced by neutron reactions with certain isotopes of boron, deuterium and lithium when present in the boiler (e.g. as control rod material - boron). The particulates (metals and salts) are removed in this treatment leaving the tritium behind as water (e.g.,  $^3\text{H-O-}^1\text{H}$ ). When this water is reused as boiler makeup, the tritium concentration in the water increases.

In the ingestion exposure pathway, no gamma-emitting nuclides were measured above LLDs during 1995, although Cs-137 was quantified in three vegetation samples, well below LLD limits. There appears to have been no increase in radionuclide concentrations attributable to RBS operation in food/forage media over baseline levels (Appendix B). Naturally-occurring K-40 was measured at an average of 4786 pCi/kg in indicator vegetation and at an average of 4258 pCi/kg in control vegetation in 1995, roughly the same levels encountered prior to RBS operation (Appendix B). Another natural nuclide, Be-7, averaged 827 and 526 pCi/kg in indicator and control vegetation samples, respectively, during 1995. Although presumably present, Be-7 was not quantified during the preoperational phase for comparison.

### 3.3 Comparison of REMP Results with Operating Controls

The only measurable increases in concentrations of radionuclides or levels of radiation, attributable to plant operation, in the vicinity of RBS during 1995 appear to have been the expected low levels in the liquid Discharge Line. The indicator vs. control comparisons for airborne gross beta activity (Section 3.1.1; Table 5 and Appendix A) corroborate the reports of limited or no releases of particulates or radioiodine in 1995. The 1995 TLD data (Section 3.1.2; Table 5 and Appendix A) showed no appreciable differences in direct radiation exposures between indicator and control locations. Excerpted liquid effluent data from the Annual Radioactive Effluent Release Report are listed in Table 6 along with the corresponding Discharge Line analytical data for those nuclides which were measured by the REMP during 1995. These nuclide activities were well below the NRC reporting levels, but are listed here for comparison to substantiate the adequacy of source control and effluent monitoring at River Bend Station.

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**TABLE 6**

**SUMMARY COMPARISON OF LIQUID EFFLUENT QUANTITIES/ACTIVITIES  
AND REMP DISCHARGE LINE MONITORING RESULTS**

<b>Quantities Released</b>	<b>1st Quarter</b>	<b>2nd Quarter</b>	<b>3rd Quarter</b>	<b>4th Quarter</b>	<b>Totals for 1995</b>
Liters of Effluent	5.34E+06	7.65E+06	8.57E+06	7.81E+06	2.94E+07
Liters of Dilution	8.20E+08	1.01E+09	1.26E+09	1.49E+09	4.58E+09
Curies of H-3	4.95E+00	5.88E+00	5.23E+00	4.41E+00	2.05E+01
Curies of Cr-51	1.30E-01	2.11E-01	7.41E-02	1.08E-01	5.23E-01
Curies of Mn-54	3.30E-02	5.17E-02	2.85E-02	2.63E-02	1.40E-01
Curies of Co-58	4.93E-03	7.36E-03	3.47E-03	6.08E-03	2.18E-02
Curies of Fe-59	5.16E-03	9.87E-03	5.29E-03	9.02E-03	2.93E-02
Curies of Co-60	5.28E-02	8.04E-02	4.47E-02	3.47E-02	2.13E-01
Curies of I-131	6.04E-03	1.21E-02	8.70E-03	9.91E-03	3.68E-02
Curies of La-140	1.18E-01	1.68E-01	1.27E-01	8.84E-02	5.01E-01

**Predicted (Extrapolated) Specific Activities (pCi/l) versus 1995 REMP**

<b>Measured Nuclide</b>	<b>1st Qtr</b>	<b>2nd Qtr</b>	<b>3rd Qtr</b>	<b>4th Qtr</b>	<b>Mean</b>	<b>REMP</b>
H-3	5998	5778	4123	2944	<b>4711</b>	<b>3873</b>
Cr-51	158.54	207.34	58.41	72.11	<b>124.10</b>	<b>121.00</b>
Mn-54	39.98	50.80	22.47	17.56	<b>32.70</b>	<b>44.00</b>
Co-58	5.97	7.23	2.74	4.06	<b>5.00</b>	<b>6.59</b>
Fe-59	6.25	9.70	4.17	6.02	<b>6.54</b>	<b>14.24</b>
Co-60	63.97	79.01	35.24	23.17	<b>50.35</b>	<b>66.76</b>
I-131	7.32	11.89	6.86	6.62	<b>8.17</b>	<b>11.00</b>
La-140	142.97	165.09	100.11	59.02	<b>116.80</b>	<b>42.60</b>

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APPENDIX A

Listings of 1995 REMP Results

The following tables list individual analytical results and direct measurements of radiation (TLD exposures) recorded by the Radiological Environmental Monitoring Program (REMP) during 1995. Concentrations measured for certain common and readily-distinguished, naturally-occurring nuclides are included to provide perspective. It should be noted that other gamma-emitting, naturally-occurring nuclides (e.g., primordial series) were often detected but are not listed because of the complexities and uncertainties of specific identifications.

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Gross Beta Activities (pCi/liter) in Water (LLD = 4 pCi/L)

PERIOD	INDICATORS				CONTROLS	
	SWD	DW	DL	WD	SWU	WU
JAN	2.70	2.90	45.90		1.90	
FEB	< 2.10	< 2.10	33.30	< 1.80	2.60	< 1.80
MAR	2.50	1.70	39.80		2.50	
APR	< 2.30	< 2.30	56.40		1.60	
MAY	2.60	2.50	18.70	1.80	2.00	< 1.90
JUN	< 3.51	< 3.51	36.40		5.28	
JUL	2.70	2.30	20.20		2.70	
AUG	2.20	2.70	17.70	< 1.80	2.80	< 1.80
SEP	1.56	< 2.59	86.90		5.95	
OCT	3.86	< 2.24	42.30		2.73	
NOV	< 3.24	< 3.24	66.60	< 3.24	3.66	3.90
DEC	4.39	< 3.47	46.20		< 3.47	
<hr/>						
MAX	4.39	2.90	86.90	1.80	5.95	3.90
AVG	2.81	2.42	42.53	1.80	3.07	3.90
MIN	1.56	1.70	17.70	1.80	1.60	3.90

Tritium Activities (pCi/liter) in Water (LLD = 3000 pCi/L)

PERIOD	INDICATORS				CONTROLS	
	SWD	DW	DL	WD	SWU	WU
1st Quarter	< 250	< 249	3721	< 251	< 249	< 244
2nd Quarter	< 230	< 230	3468	< 228	< 230	< 230
3rd Quarter	< 234	< 234	4849	< 233	< 233	< 233
4th Quarter	235	< 229	3454	< 229	< 225	< 224
<hr/>						
MAX	235	< LLD	4849	< LLD	< LLD	< LLD
AVG	235		3873			
MIN	235		3454			

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## Gamma-Emitting Nuclide Activity (pCi/liter) in Water

### CESIUM - 134 (LLD = 15 pCi/l)

PERIOD	INDICATORS				CONTROLS	
	SWD	DW	DL	WD	SWU	WU
JAN	< 4.66	< 5.12	< 4.47		< 5.86	
FEB	< 6.35	< 5.40	< 5.56	< 9.38	< 6.98	< 11.4
MAR	< 4.52	< 3.59	< 3.85		< 3.72	
APR	< 3.17	< 2.99	< 5.44		< 3.52	
MAY	< 3.79	< 3.51	< 4.24	< 6.26	< 4.09	< 8.32
JUN	< 2.52	< 2.29	< 2.80		< 2.59	
JUL	< 2.81	< 1.77	< 3.15		< 2.72	
AUG	< 2.41	< 4.49	< 2.33	< 4.97	< 4.66	< 4.28
SEP	< 3.13	< 3.15	< 3.58		< 3.63	
OCT	< 2.66	< 2.43	< 3.59		< 3.90	
NOV	< 0.52	< 0.85	< 2.31	< 3.01	< 1.09	< 2.89
DEC	< 3.60	< 4.43	< 3.25		< 2.87	
MAX	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
AVG						
MIN						

### CESIUM - 137 (LLD = 18 pCi/l)

PERIOD	INDICATORS				CONTROLS	
	SWD	DW	DL	WD	SWU	WU
JAN	< 5.28	< 5.48	< 4.32		< 5.15	
FEB	< 8.68	< 6.44	< 6.15	< 9.84	< 7.87	< 11.90
MAR	< 5.54	< 3.65	< 4.43		< 4.68	
APR	< 3.27	< 3.17	< 5.61		< 3.81	
MAY	< 3.90	< 3.67	< 4.17	< 7.68	< 4.58	< 9.64
JUN	< 2.74	< 2.51	1.53		< 2.63	
JUL	< 3.06	< 1.93	< 3.67		< 2.99	
AUG	< 2.53	< 4.68	< 2.63	< 5.37	< 4.62	< 4.90
SEP	< 3.29	< 3.34	< 3.92		< 3.44	
OCT	< 2.91	< 2.59	< 3.96		< 4.88	
NOV	< 0.56	< 0.92	< 2.39	< 2.42	< 1.05	< 3.25
DEC	< 3.54	< 4.05	< 3.50		< 2.84	
MAX	< LLD	< LLD	1.53	< LLD	< LLD	< LLD
AVG			1.53			
MIN			1.53			



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## Gamma-Emitting Nuclide Activity (pCi/liter) in Water

### IODINE - 131 (LLD = 15 pCi/L)

PERIOD	INDICATORS				CONTROLS	
	SWD	DW	DL	WD	SWU	WU
JAN	< 14.90	< 14.50	< 12.00		< 13.40	
FEB	< 13.80	< 12.30	6.75	< 07.3	< 12.90	< 10.2
MAR	< 14.90	< 14.90	8.54		< 14.90	
APR	< 14.30	< 14.90	10.40		< 14.90	
MAY	< 14.80	< 14.20	< 16.30	< 06.7	< 14.90	< 11.6
JUN	< 14.80	< 14.90	< 15.90		< 14.90	
JUL	< 14.70	< 14.90	< 14.90		< 14.80	
AUG	< 14.90	< 13.90	14.30	< 12.8	< 14.90	< 14.0
SEP	< 14.90	< 14.90	15.20		< 14.80	
OCT	< 10.50	< 12.50	10.90		< 14.90	
NOV	< 5.25	< 10.40	< 15.00	< 14.8	< 11.80	< 13.6
DEC	< 13.60	< 14.90	< 14.90		< 14.90	
<hr/>						
MAX	< LLD	< LLD	15.20	< LLD	< LLD	< LLD
AVG			11.0			
MIN			6.75			

### BARIUM - 140 (LLD = 60 pCi/L)

PERIOD	INDICATORS				CONTROLS	
	SWD	DW	DL	WD	SWU	WU
JAN	< 32.90	< 33.90	< 30.70		< 32.70	
FEB	< 42.70	< 34.50	< 31.10	< 19.60	< 39.10	< 42.90
MAR	< 38.60	< 29.40	< 35.80		< 34.60	
APR	< 27.60	< 26.00	< 34.80		< 32.20	
MAY	< 30.70	< 32.10	< 37.00	< 22.20	< 32.00	< 39.30
JUN	< 26.60	< 25.90	< 28.80		< 28.40	
JUL	< 27.60	< 22.70	< 27.80		< 25.60	
AUG	< 27.60	< 28.70	< 25.70	< 35.80	< 30.20	< 27.50
SEP	< 28.70	< 29.20	< 31.70		< 29.50	
OCT	< 21.70	< 23.40	< 28.70		< 32.10	
NOV	< 7.77	< 14.70	< 23.70	< 25.50	< 17.70	< 21.90
DEC	< 32.70	< 37.50	< 27.60		< 27.90	
<hr/>						
MAX	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
AVG						
MIN						

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Gamma-Emitting Nuclide Activity (pCi/liter) in Water

LANTHANUM - 140 (LLD=15 pCi/L)

PERIOD	INDICATORS				CONTROLS	
	SWD	DW	DL	WD	SWU	WU
JAN	< 9.79	< 11.80	37.90		< 9.88	
FEB	< 9.88	< 12.90	< 14.70	< 13.60	< 11.10	< 14.90
MAR	< 10.30	< 11.90	47.20		< 13.60	
APR	< 8.89	< 9.68	< 14.20		< 10.30	
MAY	< 10.10	< 11.60	< 13.90	< 07.36	< 10.20	< 10.80
JUN	< 8.36	< 8.47	< 12.00		< 9.50	
JUL	< 10.30	< 8.42	< 11.00		< 8.94	
AUG	< 9.76	< 10.50	< 9.06	< 10.00	< 10.20	< 10.70
SEP	< 9.37	< 10.90	< 12.00		< 10.40	
OCT	< 7.38	< 9.27	< 11.20		< 10.00	
NOV	< 2.60	< 5.36	< 8.62	< 12.40	< 5.68	< 9.27
DEC	< 9.64	< 13.20	< 10.40		< 10.40	

MAX	< LLD	< LLD	47.2	< LLD	< LLD	< LLD
AVG			42.6			
MIN			37.9			

MANGANESE - 54 (LLD=15 pCi/L)

PERIOD	INDICATORS				CONTROLS	
	SWD	DW	DL	WD	SWU	WU
JAN	< 4.40	< 4.78	80.60		< 5.76	
FEB	< 7.49	< 5.79	70.50	< 9.49	< 7.42	< 11.40
MAR	< 6.15	< 4.24	20.20		< 5.31	
APR	< 3.46	< 3.09	163.00		< 3.65	
MAY	< 4.28	< 3.98	14.10	< 7.20	< 4.42	< 12.40
JUN	< 2.95	< 2.46	11.50		< 2.68	
JUL	< 2.92	< 1.95	54.50		< 2.93	
AUG	< 2.70	< 4.68	20.20	< 4.43	< 5.08	< 4.58
SEP	< 3.28	< 3.09	20.10		< 3.80	
OCT	< 2.63	< 2.52	17.30		< 3.67	
NOV	< 0.60	< 1.02	36.10	< 2.80	< 1.16	< 2.90
DEC	< 3.23	< 4.34	20.40		< 3.01	

MAX	< LLD	< LLD	163.00	< LLD	< LLD	< LLD
AVG			44.04			
MIN			11.50			

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Gamma-Emitting Nuclide Activity (pCi/liter) in Water

IRON - 59 (LLD = 30 pCi/L)

PERIOD	INDICATORS				CONTROLS	
	SWD	DW	DL	WD	SWU	WU
JAN	< 10.10	< 11.50	20.50		< 11.20	
FEB	< 13.40	< 12.20	< 10.10	< 13.30	< 13.90	< 17.20
MAR	< 11.10	< 9.67	< 9.91		< 7.83	
APR	< 7.16	< 7.24	17.20		< 9.33	
MAY	< 10.20	< 8.96	< 13.40	< 11.70	< 8.45	< 19.10
JUN	< 5.92	< 6.50	< 7.71		< 6.54	
JUL	< 7.61	< 5.03	< 9.47		< 6.87	
AUG	< 6.42	< 10.50	< 6.24	< 10.50	< 11.80	< 9.87
SEP	< 7.55	< 7.99	< 11.70		< 8.33	
OCT	< 6.11	< 6.34	8.54		< 10.90	
NOV	< 1.59	< 2.68	10.70	< 6.69	< 3.26	< 7.06
DEC	< 6.91	< 10.50	< 9.17		< 7.88	

MAX	< LLD	< LLD	20.50	< LLD	< LLD	< LLD
AVG			14.24			
MIN			8.54			

COBALT - 58 (LLD = 15 pCi/L)

PERIOD	INDICATORS				CONTROLS	
	SWD	DW	DL	WD	SWU	WU
JAN	< 5.57	< 5.05	8.15		< 5.48	
FEB	< 8.12	< 4.99	9.43	< 8.97	< 8.87	< 10.50
MAR	< 4.18	< 4.18	2.88		< 5.29	
APR	< 3.55	< 3.62	16.70		< 4.33	
MAY	< 4.22	< 3.97	< 5.60	< 7.80	< 4.65	< 7.94
JUN	< 3.12	< 2.97	< 3.75		< 3.24	
JUL	< 3.15	< 2.10	7.06		< 3.10	
AUG	< 2.85	< 4.38	1.95	< 5.17	< 4.75	< 4.16
SEP	< 3.36	< 3.37	4.60		< 3.64	
OCT	< 2.84	< 2.80	6.61		< 4.91	
NOV	< 0.65	< 0.96	5.00	< 3.85	< 1.45	< 3.52
DEC	< 4.16	< 5.22	3.48		< 3.49	

MAX	< LLD	< LLD	16.70	< LLD	< LLD	< LLD
AVG			6.59			
MIN			1.95			

# RIVER BEND STATION RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 1995

## Gamma-Emitting Nuclide Activity (pCi/liter) in Water

### COBALT - 60 (LLD = 15 pCi/L)

PERIOD	INDICATORS				CONTROLS	
	SWD	DW	DL	WD	SWU	WU
JAN	< 4.55	< 6.68	110.00		< 5.57	
FEB	< 6.22	< 5.48	104.00	< 9.16	< 5.77	< 9.30
MAR	< 6.19	< 4.25	32.60		< 4.52	
APR	< 3.75	< 3.44	276.00		< 3.63	
MAY	< 4.50	< 3.88	25.70	< 6.24	< 4.54	< 4.43
JUN	< 2.76	< 2.85	22.20		< 2.71	
JUL	< 3.45	< 1.92	82.80		< 2.76	
AUG	< 2.61	< 4.85	32.30	< 5.91	< 5.32	< 4.41
SEP	< 3.57	< 3.13	26.10		< 3.69	
OCT	< 2.78	< 2.83	27.40		< 3.97	
NOV	< 0.62	< 0.91	37.90	< 2.75	< 1.14	< 3.22
DEC	< 3.09	< 4.99	24.10		< 3.35	
MAX	< LLD	< LLD	276.00	< LLD	< LLD	< LLD
AVG			66.76			
MIN			22.20			

### ZINC - 65 (LLD = 30 pCi/L)

PERIOD	INDICATORS				CONTROLS	
	SWD	DW	DL	WD	SWU	WU
JAN	< 9.59	< 10.3	< 10.50		< 11.40	
FEB	< 14.50	< 14.5	< 12.90	< 16.30	< 15.20	< 29.60
MAR	< 9.83	< 8.48	< 8.80		< 11.40	
APR	< 7.15	< 6.75	< 14.00		< 7.47	
MAY	< 6.57	< 8.28	< 11.40	< 13.40	< 8.07	< 26.00
JUN	< 6.41	< 4.92	< 5.96		< 6.25	
JUL	< 5.80	< 3.89	< 7.70		< 5.58	
AUG	< 5.24	< 7.32	< 5.41	< 9.74	< 9.72	< 9.47
SEP	< 5.83	< 6.86	< 8.36		< 6.36	
OCT	< 5.45	< 4.98	< 8.86		< 9.34	
NOV	< 1.21	< 1.91	< 5.05	< 7.77	< 2.45	< 7.26
DEC	< 6.36	< 9.33	< 7.68		< 6.86	
MAX	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
AVG						
MIN						

# RIVER BEND STATION RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 1995

## Gamma-Emitting Nuclide Activity (pCi/liter) in Water

### NIOBIUM - 95 (LLD = 15 pCi/L)

PERIOD	INDICATORS				CONTROLS	
	SWD	DW	DL	WD	SWU	WU
JAN	< 6.56	< 6.49	< 5.72		< 7.55	
FEB	< 10.50	< 7.31	< 7.13	< 9.86	< 12.10	< 14.90
MAR	< 5.87	< 6.05	6.50		< 6.91	
APR	< 4.28	< 4.46	< 7.01		< 5.22	
MAY	< 5.19	< 4.97	< 6.74	< 7.66	< 5.27	< 13.40
JUN	< 4.16	< 3.46	< 3.93		< 3.78	
JUL	< 4.12	< 2.88	< 4.31		< 4.15	
AUG	< 3.65	< 5.36	< 3.62	< 5.81	< 5.54	< 6.16
SEP	< 4.85	< 4.35	< 5.20		< 4.71	
OCT	< 3.53	< 3.47	< 4.84		< 4.68	
NOV	< 0.92	< 1.54	< 3.26	< 3.82	< 1.91	< 4.66
DEC	< 5.18	< 5.88	< 4.29		< 4.06	
MAX	< LLD	< LLD	6.50	< LLD	< LLD	< LLD
AVG			6.50			
MIN			6.50			

### ZIRCONIUM - 95 (LLD = 30 pCi/L)

PERIOD	INDICATORS				CONTROLS	
	SWD	DW	DL	WD	SWU	WU
JAN	< 9.65	< 10.50	< 7.92		< 11.50	
FEB	< 14.30	< 13.30	< 10.30	< 18.60	< 8.67	< 17.50
MAR	< 8.63	< 7.58	< 8.28		< 10.30	
APR	< 6.61	< 6.19	< 9.89		< 7.28	
MAY	< 8.49	< 7.50	< 10.70	< 11.30	< 8.72	< 17.50
JUN	< 5.23	< 4.95	< 5.41		< 5.32	
JUL	< 5.99	< 3.88	< 6.40		< 6.11	
AUG	< 5.09	< 7.10	< 4.83	< 10.50	< 9.82	< 8.66
SEP	< 6.65	< 7.04	< 7.43		< 7.33	
OCT	< 5.52	< 5.66	< 6.95		< 8.39	
NOV	< 1.25	< 2.08	< 4.56	< 7.21	< 2.49	< 5.54
DEC	< 7.21	< 9.41	< 6.70		< 5.78	
MAX	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
AVG						
MIN						

# RIVER BEND STATION RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 1995

Gamma-Emitting Nuclide Activity (pCi/liter) in Water

PERIOD	POTASSIUM - 40 (No LLD)				CONTROLS	
	INDICATORS				SWU	WU
	SWD	DW	DL	WD		
JAN						
FEB						
MAR	33.1	50.6	45.6		47.6	
APR		49.8	72.1		93.8	
MAY		78.5				
JUN	30.2				34.3	
JUL		45.6	59.3			
AUG	62.6		70.9			
SEP	54.7				66.1	
OCT	41.4	28.2	57.2		49.3	
NOV	18.2	15.1	56.5			
DEC			47.1		73.4	
<hr/>						
MAX	62.6	78.5	72.1		93.8	
AVG	40.0	44.6	58.4		60.8	
MIN	18.2	15.1	45.6		34.3	

PERIOD	CHROMIUM - 51 (No LLD)				CONTROLS	
	INDICATORS				SWU	WU
	SWD	DW	DL	WD		
JAN			62.7			
FEB			156.0			
MAR			177.0			
APR			309.0			
MAY			50.3			
JUN			140.0			
JUL			114.0			
AUG			44.8			
SEP			85.5			
OCT			83.1			
NOV			91.5			
DEC			134.0			
<hr/>						
MAX			309.0			
AVG			120.7			
MIN			44.8			

**RIVER BEND STATION**  
**RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 1995**

Normalized Gamma-Ray Exposure Summary (mR)  
 Quarterly Thermoluminescence Dosimeter Results

INDICATOR LOCATION	1ST QTR	2ND QTR	3RD QTR	4TH QTR	MEAN
TA1	8.96	9.18	8.93	11.75	9.70
TA2	12.28	11.77	13.24	15.90	13.30
TB1	14.07	13.93	13.47	15.58	14.26
TB2	13.78	13.97	13.70	14.90	14.09
TC1	13.78	12.73	13.83	13.00	13.34
TC2	11.53	11.00	11.96	13.90	12.10
TCS	11.64	11.20	12.32	14.90	12.51
TD1	13.64	12.44	13.83	18.11	14.51
TD2	12.49	12.25	12.87	13.90	12.88
TE1	12.19	12.74	12.69	15.04	13.17
TE2	10.35	10.81	10.49	11.90	10.89
TF1	11.88	12.74	12.86	14.02	12.88
TF2	13.14	13.68	13.98	13.90	13.67
TG1	13.74	14.03	13.92	15.04	14.18
TG2	13.24	12.54	13.06	14.90	13.43
TH1	10.33	10.47	10.39	10.95	10.54
TH2	11.42	12.25	12.23	12.90	12.20
TJ1	12.09	11.95	11.63	14.02	12.42
TJ2	10.95	10.52	10.81		10.76
TK1	12.71	12.44	12.95	15.04	13.29
TK2		13.26	13.41	16.80	14.49
TKS	11.26	11.60	11.20	12.70	11.69
TL1	12.64	12.15	12.58	13.00	12.59
TL2	10.57	10.62	10.35		10.51
TLS	12.94	13.26	14.06	14.82	13.77
TM1	11.11	10.66	10.79	11.98	11.14
TM2	14.32	14.14	14.34	17.79	15.15
TN1		13.83	13.02	15.04	13.96
TN2	10.57		10.54	12.85	11.32
TP1	13.56	12.74	13.19	15.58	13.77
TP2	12.88	12.77	12.78		12.81
TQ1	12.33	12.54	12.57	13.78	12.81
TQ2	12.05	12.38	11.59	13.90	12.48
TQS1	12.96	13.59	13.22	13.84	13.40
TQS2	11.58	11.60	11.83	11.78	11.70
TR1	8.65	9.08	9.11	9.83	9.17
TR2	12.49	13.11	12.87	16.90	13.84
TRS	12.71	13.30	13.24	15.90	13.79
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MAX	14.32	14.14	14.34	18.11	15.15
AVG	12.13	12.25	12.36	14.17	12.70
MIN	8.65	9.08	8.93	9.83	9.17

**RIVER BEND STATION  
RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 1995**

Normalized Gamma-Ray Exposure Summary (mR)  
Quarterly Thermoluminescence Dosimeter Results

<u>CONTROL LOCATION</u>	<u>1ST QTR</u>	<u>2ND QTR</u>	<u>3RD QTR</u>	<u>4TH QTR</u>	<u>MEAN</u>
TAC	12.26	12.77	12.60	15.81	13.36
TEC	11.74	12.82	12.97	14.90	13.11
TGS	12.94	12.18	12.20	14.82	13.04
THS	15.71	14.53	14.71	16.80	15.44
TLC	10.86	10.23	10.63	11.86	10.89
TQS3	12.67	12.22	12.40	13.84	12.78
<hr/>					
MAX	15.71	14.53	14.71	16.80	15.44
AVG	12.70	12.46	12.58	14.67	13.10
MIN	10.86	10.23	10.63	11.86	10.89

	<u>INDICATOR</u>	<u>CONTROL</u>
MAX	18.11	16.80
AVG	12.73	13.10
MIN	8.65	10.23



# RIVER BEND STATION RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 1995

Charcoal Cartridge Iodine-131 Activity (E-2 pCi/m<sup>3</sup>) (LLD = 0.07 pCi/m<sup>3</sup>)

Period	AA1	AB1	AR1	AKS	AP1	AQS2	ALC	AHS	AGS
01/03/95	<2.30	<1.97	<1.67	<1.57	<1.67	<1.98	<2.06	<1.69	<2.13
01/10/95	<2.30	<4.12	<1.33	<1.77	<1.39	<1.76	<1.75	<1.62	<1.79
01/16/95	<2.37	<3.59	<2.31	<2.03	<1.92	<1.47	<2.61	<1.88	<2.84
01/24/95	<1.48	<1.21	<1.79	<1.92	<1.88	<1.82	<1.79	<2.09	<1.29
01/31/95	<1.92	<2.02	<5.58	<2.00	<1.52	<1.94	<1.55	<1.65	<1.90
02/07/95	<1.36	<1.88	<2.49	<2.04	<1.19	<2.22	<1.37	<1.96	<1.60
02/14/95	<1.81	<2.44	<3.34	<2.13	<2.15	<2.55	<2.02	<2.22	<1.79
02/21/95	<1.62	<1.96	<2.11	<1.93	<2.09	<2.20	<1.85	<2.20	<2.50
02/28/95	<2.40	<1.91	<2.43	<2.10	<1.98	<1.95	<2.03	<1.11	<1.99
03/07/95	<1.62	<2.24	<2.72	<1.21	<1.95	<1.84	<1.78	<2.24	<2.12
03/15/95	<1.40	<2.45	<1.22	<1.74	<1.63	<2.34	<1.70		<2.44
03/22/95	<2.15	<2.20	<2.18	<3.05	<2.09	<2.10	<2.10	<1.91	<1.44
03/27/95	<2.25	<2.22	<2.60		<3.29	<3.41	<1.90	<2.09	<2.81
04/04/95	<1.84	<2.18	<1.79	<1.95	<1.25	<2.20	<1.84	<1.93	<1.67
04/11/95	<1.74	<1.95	<1.19	<2.27	<1.95	<2.48	<2.02	<2.13	<2.31
04/18/95	<2.22	<2.92	<2.75	<2.45	<1.93	<2.80	<2.29	<2.36	<1.59
04/25/95	<2.41	<2.04	<1.70	<2.41	<2.32	<2.18	<2.19	<2.01	<1.64
05/02/95	<1.77	<2.24	<2.22	<2.01	<1.79	<2.47	<2.26	<2.15	<1.65
05/09/95	<1.67	<1.61	<1.80	<1.72	<1.05	<2.00	<0.00	<1.83	<1.15
05/16/95	<2.06	<2.60	<2.88	<2.05	<2.20	<2.16	<2.29	<2.05	<1.87
05/23/95	<2.22	<1.77	<3.21	<2.02	<1.98	<2.16	<2.20	<2.26	<1.72
05/31/95	<1.71	<2.03	<2.20	<1.95	<1.52	<1.61	<1.65	<1.76	<1.18
06/06/95	<1.78	<1.76	<3.46	<2.20	<2.11	<2.06	<2.49	<2.32	<1.57
06/13/95	<1.65	<2.02	<3.11	<2.38	<1.72	<0.00	<3.41	<2.20	<2.38
06/21/95	<1.97	<1.69	<1.56	<1.81	<1.71	<1.41	<2.58	<1.66	<2.10
06/27/95	<2.30	<2.46	<3.62	<3.13	<1.90	<2.53	<2.65	<2.64	<2.50
07/05/95	<1.47	<1.86	<3.67	<1.94	<1.51	<1.55	<1.37	<1.46	<2.19
07/11/95	<1.48	<2.88	<3.18	<2.50	<1.93	<2.97	<2.51	<1.82	<2.29
07/18/95	<2.23	<9.09	<2.54	<8.48	<2.14	<2.19	<1.92	<1.80	<1.30
07/25/95	<1.89		<1.95		<1.74	<2.23	<2.06	<2.32	<2.40
08/01/95	<1.97		<2.64		<1.93	<1.70	<3.11	<2.01	<1.87
08/08/95	<1.64		<2.80		<2.17	<2.76	<1.60	<1.72	<1.69
08/15/95	<1.98	<4.59	<2.32	<1.69	<2.03	<2.14	<1.66	<2.25	<1.59
08/22/95	<1.89	<2.60	<2.42	<2.10	<1.68	<1.94	<1.68	<1.61	<2.42
08/29/95	<1.46	<1.79	<2.59	<2.20	<1.86	<1.51	<2.18	<1.51	<2.18
09/05/95	<1.96	<1.53	<2.85	<2.24	<1.54	<2.43	<2.78	<2.32	<1.86
09/12/95	<1.76	<2.41	<2.13	<2.53	<1.86	<2.47	<1.74	<2.00	<1.96
09/19/95	<2.21	<5.09	<2.38	<1.93	<1.83	<2.07	<2.06	<1.94	<2.02
09/26/95	<2.09		<2.91	<2.00	<3.80	<1.71	<1.92	<1.91	<1.93
10/03/95	<2.18		<2.39	<1.87	<1.64	<1.87	<2.65	<2.02	<1.50
10/10/95	<2.06		<2.32	<1.76	<1.87	<1.56	<2.40	<1.82	<2.27
10/17/95	<2.21		<2.09	<2.01	<1.76	<2.07	<2.97	<2.07	<2.08
10/24/95	<1.30		<2.35	<1.34	<1.61	<1.96	<1.77	<0.81	<2.30
10/31/95	<2.05	<2.22	<1.83	<1.97	<1.45	<2.55	<1.63	<1.66	<2.01
11/07/95	<2.17	<2.04	<1.87	<1.68	<2.30	<1.81	<1.64	<2.00	<1.91
11/14/95	<1.88	<2.46	<2.26	<2.06	<2.39	<2.34	<1.77	<2.28	<1.95
11/21/95	<1.39	<2.28	<2.23	<2.71	<2.59	<2.66	<2.64	<2.30	<2.03
11/28/95	<1.64	<2.20	<1.92	<2.16	<2.24	<2.55	<2.22	<1.90	<2.66
12/05/95	<1.86	<2.18	<2.60	<2.73	<2.48	<2.67	<2.18	<1.88	<1.51
12/12/95	<1.89	<2.69	<2.02	<2.57	<2.43	<2.02	<1.67	<2.28	<1.73
12/19/95	<1.97	<2.05	<2.21	<2.09	<1.91	<2.13	<1.94	<2.32	<2.07
12/27/95	<1.50	<2.19	<1.78	<2.18	<1.88	<1.92	<2.27	<1.38	<5.05
01/03/96	<1.68	<1.70	<1.80	<2.04	<2.72	<2.46	<2.38	<1.90	<1.86
<b>MAX</b>	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
<b>AVG</b>									
<b>MIN</b>									

# RIVER BEND STATION

## RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 1995

Air Particulate Filter Gross Beta Activity (E-2 pCi/m<sup>3</sup>) (LLD = 0.01 pCi/m<sup>3</sup>)

Period	Indicators						Controls		
	AA1	AB1	AR1	AKS	AP1	AQS2	ALC	AHS	AGS
01/03/95	1.60	1.40	2.00	1.80	1.30	2.60	2.00	2.00	1.10
01/10/95	1.10	0.70	1.70	1.60	1.30	1.30	1.40	2.00	2.10
01/16/95	1.20	0.60	1.60	1.30	1.00	1.60	1.20	1.70	1.60
01/24/95	0.90	0.90	1.20	0.90	0.70	1.20	1.10	1.20	0.90
01/31/95	0.70	0.80	1.00	0.90	0.80	1.20	1.00	1.10	1.30
02/07/95	1.10	1.20	1.40	1.20	1.00	1.40	1.20	1.60	1.50
02/14/95	0.90	1.20	1.40	1.20	1.00	1.40	1.20	1.60	1.20
02/21/95	0.70	0.70	0.90	0.90	0.60	0.80	1.20	0.90	1.00
02/28/95	0.90	0.90	1.40	1.00	0.80	1.00	1.00	1.20	1.40
03/07/95	1.20	0.90	1.40	1.10	0.80	1.10	1.60	1.70	1.80
03/15/95	0.90	1.20	1.70	1.30	1.10	1.50	1.60		1.90
03/22/95	0.90	1.00	1.40	0.80	0.80	1.70	1.40	1.40	1.20
03/27/95	1.10	1.00	1.70		1.10	1.40	1.70	1.70	1.60
04/04/95	1.30	1.30	1.60	1.80	1.00	2.00	2.10	1.80	1.50
04/11/95	0.90	0.70	1.00	1.10	0.60	1.00	1.10	1.10	1.20
04/18/95	1.10	1.00	1.30	1.60	0.80	1.20	1.50	2.10	1.40
04/25/95	0.80	0.70	0.90	1.00	0.50	0.80	0.90	0.40	0.90
05/02/95	2.00	1.10	1.50	1.50	4.30	1.50	1.90	1.80	1.60
05/09/95	1.40	1.20	2.00	2.10	2.60	1.30	1.10	1.30	1.30
05/16/95	1.30	1.10	1.10	1.00	2.50	0.90	1.40	1.10	0.90
05/23/95	1.40	1.40	1.10	1.00	5.90	1.10	1.20	1.40	1.50
05/31/95	1.40	1.10	1.00	1.00	2.20	1.10	0.90	1.30	1.10
06/06/95	0.90	1.10	0.80	1.20	1.90	1.10	0.60	1.20	1.00
06/13/95	1.51	1.32	1.42	1.69	2.77	1.26	1.68	1.63	1.66
06/21/95	2.50	2.63	2.96	2.58	3.29	2.58	2.94	2.54	2.83
06/27/95	3.25	2.85	2.78	3.27	4.27	2.53	3.77	3.22	3.30
07/05/95	1.86	1.59	1.81	1.93	2.78	2.16	2.43	1.68	1.91
07/11/95	2.43	2.00	2.16	2.39	3.15	2.80	3.07	2.17	2.90
07/18/95	2.47	2.63	2.62	4.14	4.31	2.49	2.83	2.74	2.46
07/25/95	1.76		1.75		2.17	1.78	2.39	1.96	1.75
08/01/95	1.35		1.29		1.64	1.26	1.43	1.44	1.37
08/08/95	1.49		1.72		1.65	1.73	1.82	1.77	1.67
08/15/95	2.23	1.10	2.25	1.86	2.23	2.18	1.95	2.26	2.20
08/22/95	2.21	1.89	2.26	1.82	2.51	2.42	2.78	2.62	2.54
08/29/95	3.04	2.30	3.37	2.37	5.75	3.50	3.26	3.17	3.04
09/05/95	3.92	3.57	4.25	3.66	1.60	4.60	4.79	4.45	4.53
09/12/95	4.80	3.91	4.89	4.17	1.58	5.26	5.27	4.90	4.70
09/19/95	2.92	3.25	2.75	2.49	2.77	3.08	2.89	2.41	2.57
09/26/95	3.10		3.23	2.92	3.34	3.27	3.29	3.31	3.23
10/03/95	3.55		3.40	3.57	3.28	3.84	3.92	3.73	3.81
10/10/95	2.52		2.59	2.75	2.44	2.71	2.83	2.73	2.62
10/17/95	2.53		2.67	2.66	2.95	2.68	2.63	2.36	2.67
10/24/95	2.27		2.16	2.27	2.09	2.22	2.47	2.23	2.00
10/31/95	2.41	2.36	2.18	2.24	2.47	2.06	2.51	2.36	2.29
11/07/95	2.27	2.07	2.23	2.40	2.11	2.61	2.40	2.41	2.20
11/14/95	2.23	2.48	2.36	2.39	2.40	2.34	2.71	2.32	2.35
11/21/95	3.78	3.62	3.77	3.97	3.68	3.83	4.10	3.65	3.41
11/28/95	3.52	3.57	3.55	3.65	3.80	3.77	3.78	3.35	3.69
12/05/95	3.14	3.02	3.55	3.16	3.33	3.54	3.11	2.93	2.92
12/12/95	3.35	3.38	3.33	3.16	3.38	3.29	3.49	3.15	3.08
12/19/95	1.83	1.12	1.65	1.61	1.61	1.57	1.60	1.54	1.55
12/27/95	3.94	3.83	3.98	4.15	4.23	4.10	4.24	4.33	3.05
01/03/96	2.87	2.75	2.73	2.92	2.50	2.66	3.23	2.88	1.73
MIN	0.70	0.60	0.80	0.80	0.50	0.80	0.60	0.40	0.90
MAX	4.80	3.91	4.89	4.17	5.90	5.26	5.27	4.90	4.70
AVG	2.00	1.78	2.12	2.09	2.27	2.15	2.24	2.18	2.10
INDICATOR	MIN: 0.50		MAX: 5.90		AVG: 2.07				
CONTROL	MIN: 0.40		MAX: 5.27		AVG: 2.17				

**RIVER BEND STATION  
RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 1995**

Air Particulate Filter Composite Cs-134 Activity (E-2 pCi/m<sup>3</sup>) by location (LLD = 0.05 pCi/m<sup>3</sup>)

PERIOD	AA1	AB1	AR1	AKS	AP1	AQS2	ALC	AHS	AGS
1ST QTR	< 0.10	< 0.13	< 0.11	< 0.09	< 0.10	< 0.11	< 0.10	< 0.08	< 0.11
2ND QTR	< 0.34	< 0.39	< 0.33	< 0.33	< 0.26	< 0.31	< 0.45	< 0.30	< 0.28
3RD QTR	< 0.26	< 0.57	< 0.37	< 0.54	< 0.50	< 0.29	< 0.53	< 0.33	< 0.29
4TH QTR	< 0.41	< 0.57	< 0.35	< 0.40	< 0.23	< 0.38	< 0.23	< 0.30	< 0.29
MAX	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
AVG									
MIN									

Air Particulate Filter Composite Cs-137 Activity (E-2 pCi/m<sup>3</sup>) by location (LLD = 0.06 pCi/m<sup>3</sup>)

PERIOD	AA1	AB1	AR1	AKS	AP1	AQS2	ALC	AHS	AGS
1ST QTR	< 0.10	< 0.10	< 0.08	< 0.07	< 0.08	< 0.08	< 0.10	< 0.06	< 0.10
2ND QTR	< 0.36	< 0.36	< 0.48	< 0.13	< 0.30	< 0.13	< 0.58	< 0.12	< 0.35
3RD QTR	< 0.71	< 0.71	< 0.40	< 0.61	< 0.52	< 0.41	< 0.35	< 0.11	< 0.48
4TH QTR	< 0.10	< 0.52	< 0.50	< 0.32	< 0.32	< 0.35	< 0.22	< 0.10	< 0.39
MAX	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
AVG									
MIN									

Note: Samples counted are composed of thirteen filters from each location composited each quarter.

# RIVER BEND STATION

## RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 1995

Charcoal Cartridge Potassium-40 Activity (E-2 pCi/m<sup>3</sup>) by location

Period Ending	AA1	AB1	AR1	AKS	AP1	AQS2	ALC	AHS	AGS
01/03/95	25.4	46.9	65.5	40.3	45.2	65.6	56.7		54.8
01/10/95	49.4	11.4			53.6	44.4	36.4		43.8
01/16/95	48.8	69.6		35.7	56.9		83.5	65.9	16.8
01/24/95		28.6		39.7	22.1	49.6		35.7	41.4
01/31/95	63.5	46.6	12.5		45.8	41.1		38.2	36.6
02/07/95		45.8		53.2	40.5	41.5		43.5	55
02/14/95	25.3		52.7	50.3	45.4	44.1	26.5	41.2	68.7
02/21/95	65.2	43.1		50.5	31.2	52		38.8	38.4
02/28/95		51.7	55.3	51.7	52.9	36.8	36.6	74.3	
03/07/95	67.5		54.8	50.1	45.2	68	51.2	67.2	
03/15/95	52.7	35.7	42.9	29.9		42.7	44.1		34
03/22/95	57.1	36.1		84.5	50.4	50.4	49.1	35.1	
03/27/95		88.8	94.1			54.2			89.9
04/04/95	32.7		38.8	74.5		50.6	34.9	45.4	
04/11/95	57.8	35.1	44.5		49.1	51.9	42.9	67.3	56.5
04/18/95		38.4		35.9	31.5	58.1	23.6	49.9	83.5
04/25/95	28.4		45.4	49.6		65.1		49.7	53.6
05/02/95	62.8	61.3	54.6	54.8		41.2			51.7
05/09/95	31.4	39.1	58.8		31.3	31.5	59.3	69.1	46.4
05/16/95	59.6	41.1	80.9			55.2	42.9	62.6	
05/23/95	56.5	43.8	99.9		44.8	45.1	62.8	37.5	
05/31/95		38.1	68.6	40.5	42.1		57.5	33.1	32.4
06/06/95	35.6		50.1		39.2	47.2	65.5	55.8	23.3
06/13/95	30.1	64.1		47.6		85.1	67.6		46.7
06/21/95		41.3	54.1	31.4	37.6	37.6	36.2		
06/27/95	35.3			68.6	54.1	64.1		57.6	83.2
07/05/95		43.7	47.9	39.1	37.6	35.3	41.7		
07/11/95	28.5			89.2		78.5	61.4	56.8	
07/18/95					57.5	44.7	45.6		59.9
07/25/95	47.6					58.4			
08/01/95	63.9				40.4		41.2		63.7
08/08/95	50.1				35.4	44.1			48.4
08/15/95		99.9	36.2	33.9	18.6		52.9		37.2
08/22/95	60.8			36.9	71.1		47.1	27.2	28.2
08/29/95	40.4			52.5	39.4			39.6	
09/05/95		50.8	80.7		27.8		49.1		61.1
09/12/95	34.2	65.1	38.3	63.1	52.8	42.7	47.5	40.4	
09/19/95	46.5	99.9	66.1	47.5			61.9	65.1	
09/26/95	55.9		75.5	66.5	28.1				56.9
10/03/95			41.1	47.5		22.5	45.9		62.7
10/10/95			47	55.7	41.5		47	43.8	24.4
10/17/95	50.4		79.3		53.3	73.5		46.5	51.9
10/24/95			29.2		37.9	35.4	61	49.4	
10/31/95	75.4	45.3	56.2				27.1	46.2	64.8
11/07/95			59.3	39.8	54.9	76.8	60.6		55.4
11/14/95	40.5	73	30.7	57.8		30.4	29.1	64.6	26.1
11/21/95	42.6		34.7	51.7		58.6		42.5	47.4
11/28/95			36.7	50.3	35.2		57.9		46.5
12/05/95		53						39.6	30.4
12/12/95			30.6		75.9	49.2	47		40
12/19/95				33.9		37.3	32.2	31.5	
12/27/95	21.6	50.5		70		27.5		37.4	87.9
01/03/96		38.6	47.4	43.9		31.3			36.7
<b>MAX</b>	75.4	99.9	99.9	89.2	75.9	85.1	83.5	74.3	89.9
<b>AVG</b>	46.8	50.9	53.2	50.5	43.6	49.2	48.2	48.4	50.4
<b>MIN</b>	21.6	11.4	12.5	29.9	18.6	22.5	23.6	27.2	23.3
<b>INDICATOR CONTROL</b>									
<b>MAX</b>		99.9	89.9						
<b>AVG</b>		49.0	49.0						
<b>MIN</b>		11.4	23.3						

# RIVER BEND STATION RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 1995

## Gamma-Emitting Nuclide Activity (pCi/kg wet) in Upstream Fish

COLLECTION DATE	LLD's (pCi/kg,wet)							
	130 CS-134	150 CS-137	130 MN-54	260 FE-59	130 CO-58	130 CO-60	260 ZN-65	K-40
6/30/95	< 068.30	< 079.60	< 065.90	< 243.00	< 086.20	< 086.20	< 174.00	2708
6/30/95	< 064.80	< 058.80	< 072.80	< 239.00	< 040.80	< 117.00	< 151.00	
6/30/95	< 064.10	< 076.40	< 074.90	< 229.00	< 086.40	< 130.00	< 153.00	3393
12/20/95	< 077.70	< 082.80	< 082.10	< 246.00	< 086.40	< 119.00	< 123.00	3298
12/20/95	< 085.40	< 105.00	< 110.00	< 247.00	< 076.40	< 081.20	< 189.00	
12/20/95	< 087.00	< 094.10	< 065.40	< 211.00	< 092.80	< 118.00	< 142.00	2635
<b>MAX</b>	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	3393
<b>AVG</b>								3009
<b>MIN</b>								2635

## Gamma-Emitting Nuclide Activity (pCi/kg wet) in Downstream Fish

COLLECTION DATE	CS-134	CS-137	MN-54	FE-59	CO-58	CO-60	ZN-65	K-40
6/30/95	< 071.60	< 084.70	< 083.10	< 240.00	< 057.10	< 091.40	< 207.00	2934
6/30/95	< 061.90	< 073.70	< 071.40	< 249.00	< 080.40	< 068.40	< 098.10	3633
6/30/95	< 083.10	< 087.70	< 110.00	< 245.00	< 097.70	< 126.00	< 192.00	2066
12/20/95	< 065.60	< 070.80	< 095.00	< 241.00	< 091.90	< 119.00	< 208.00	703
12/20/95	< 084.30	< 090.70	< 089.00	< 243.00	< 078.10	< 114.00	< 161.00	
12/20/95	< 079.70	< 104.00	< 106.00	< 066.60	< 116.00	< 122.00	< 247.00	
<b>MAX</b>	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	3633
<b>AVG</b>								2334
<b>MIN</b>								703

## Gamma-Emitting Nuclide Activity (pCi/kg dry) in Shoreline Sediment

LLD's (pCi/kg): Cs-134=150; Cs-137=180

COLLECTION DATE	UPSTREAM			DOWNSTREAM		
	CS-134	CS-137	K-40	CS-134	CS-137	K-40
6/30/95	< 019.60	< 021.90	5591.0	< 026.60	< 039.90	1332
12/28/95	< 029.80	< 037.50	1427.0	< 026.70	< 042.90	1254
<b>MAX</b>	< LLD	< LLD	5591	< LLD	< LLD	1332
<b>AVG</b>			3509			1293
<b>MIN</b>			1427			1254

# RIVER BEND STATION RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 1995

Gamma-Emitting Nuclide Activity (pCi/kg, wet) in Broadleaf Vegation  
Site Garden #1 (Indicator)

COLLECTION DATE	LLD's (pCi/kg, wet)			BE-7	K-40
	60 CS-134	80 CS-137	60 I-131		
1/11/95	< 41.0	< 39.0	< 50.0		
1/11/95	< 49.0	< 36.0	< 45.0		
1/11/95	< 24.0	< 24.0	< 35.0		
2/13/95	< 49.0	< 43.0	< 36.0		
2/13/95	< 21.0	< 23.0	< 21.0		
2/13/95	< 24.0	< 24.0	< 23.0		
3/20/95	< 32.0	< 29.0	< 28.0		
3/20/95	< 38.0	< 39.0	< 35.0		
3/20/95	< 47.0	< 39.0	< 44.0		
4/24/95	< 49.0	< 45.0	< 44.0		
4/24/95	< 26.0	17.0	< 24.0		
4/24/95	< 28.0	< 26.0	< 30.0		
5/30/95	< 20.0	< 20.0	< 18.0		
5/30/95	< 20.0	< 15.0	< 17.0		
5/30/95	< 31.0	< 26.0	< 26.0		
6/30/95	< 27.3	< 38.6	< 43.3	327	2973
6/30/95	< 27.7	< 26.7	< 32.1		3401
6/30/95	< 46.6	< 40.4	< 45.3		2785
7/27/95	< 20.8	< 47.7	< 35.7	915	5095
7/27/95	< 36.9	< 49.1	< 43.0		6332
7/28/95	< 47.0	< 45.9	< 36.0	408	4843
8/31/95	< 32.1	< 39.6	< 57.9	3556	4753
8/31/95	< 22.4	< 37.0	< 56.1		4821
9/31/95	< 31.1	< 32.5	< 56.9	268	5173
9/30/95	< 35.5	< 40.7	< 43.2		4158
9/30/95	< 29.3	< 40.2	< 43.2		3378
9/30/95	< 34.3	< 38.9	< 41.0		4742
10/21/95	< 36.3	< 42.9	< 46.7		4428
10/31/95	< 28.2	< 37.2	< 38.1		4171
10/31/95	< 27.2	< 26.6	< 37.7		3152
11/30/95	< 17.0	< 29.9	< 42.1	466	5606
11/30/95	< 26.6	< 40.1	< 46.5		2719
11/30/95	< 17.5	< 26.3	< 26.3	251	4597
12/28/95	< 31.8	< 43.7	< 43.0	724	3924
12/28/95	< 42.2	< 38.3	< 58.6	712	5597
<b>MAX</b>	< LLD	17.0	< LLD	3556	6332
<b>AVG</b>		17.0		847	4332
<b>MIN</b>		17.0		251	2719

NOTE: Activities of Be-7 and K-40 were not available for January through May

# RIVER BEND STATION RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 1995

Gamma Emitting Nuclide Activity (pCi/kg wet) in Broadleaf Vegation  
Site Garden #2 (Indicator)

COLLECTION DATE	LLD's (pCi/kg, wet)			BE-7	K-40
	60 CS-134	80 CS-137	60 I-131		
1/11/95	< 31.0	< 23.0	< 37.0		
1/11/95	< 56.0	< 44.0	< 57.0		
1/11/95	< 39.0	< 36.0	< 44.0		
2/13/95	< 47.0	< 38.0	< 42.0		
2/13/95	< 45.0	< 43.0	< 44.0		
2/13/95	< 34.0	< 31.0	< 34.0		
3/20/95	< 28.0	< 25.0	< 23.0		
3/20/95	< 24.0	< 22.0	< 24.0		
3/20/95	< 35.0	< 32.0	< 39.0		
4/24/95	< 40.0	< 35.0	< 31.0		
4/24/95	< 23.0	< 20.0	< 18.0		
5/30/95	< 14.0	< 11.0	< 13.0		
5/30/95	< 42.0	< 40.0	< 45.0		
5/30/95	< 22.0	< 20.0	< 21.0		
6/30/95	< 39.3	< 32.5	< 44.1	360	6032
6/30/95	< 42.0	< 53.1	< 56.4		4166
6/30/95	< 40.6	< 38.6	< 38.9		3396
7/27/95	< 37.0	< 43.2	< 41.5	394	7258
7/27/95	< 31.8	< 48.1	< 46.4		7647
7/28/95	< 32.0	< 53.8	< 44.8	461	5545
8/31/95	< 27.2	< 39.0	< 39.2		5169
8/31/95	< 27.0	< 24.2	< 53.5	2018	7281
8/31/95	< 25.1	< 27.2	< 48.9	247	4647
9/30/95	< 44.2	< 40.3	< 55.0		4943
9/30/95	< 31.9	< 37.2	< 50.1		4863
9/30/95	< 42.3	< 40.9	< 54.8	386	6958
10/31/95	< 37.9	< 36.6	< 51.6	291	4802
10/31/95	< 32.9	< 47.0	< 47.8		3128
10/31/95	< 56.7	< 46.2	< 59.9	2335	4066
11/30/95	< 49.0	< 36.0	< 58.1		3336
11/30/95	< 55.7	< 62.9	< 57.3	827	4610
11/30/95	< 47.3	< 44.3	< 58.2	753	5466
<b>MAX</b>	< LLD	< LLD	< LLD	2335	7647
<b>AVG</b>				807	5240
<b>MIN</b>				247	3128

NOTE: Activities of Be-7 and K-40 were not available for January through May.

# RIVER BEND STATION RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 1995

Gamma-Emitting Nuclide Activity (pCi/kg wet) in Broadleaf Vegation  
Angola Location (control)

COLLECTION DATE	LLD's (pCi/kg, wet)			BE-7	K-40
	60 CS-134	80 CS-137	60 I-131		
1/9/95	< 40.0	< 37.0	< 59.0		
1/9/95	< 32.0	< 25.0	< 40.0		
1/9/95	< 46.0	< 32.0	< 58.0		
2/13/95	< 22.0	< 26.0	< 21.0		
2/13/95	< 21.0	< 20.0	< 17.0		
2/13/95	< 17.0	< 17.0	< 16.0		
3/17/95	< 30.0	< 33.0	< 35.0		
3/17/95	< 32.0	< 28.0	< 41.0		
3/17/95	< 24.0	< 21.0	< 32.0		
4/5/95	< 12.0	< 09.0	< 19.0		
4/5/95	< 16.0	< 15.0	< 27.0		
4/5/95	< 14.0	< 11.0	< 20.0		
5/30/95	< 25.0	< 26.0	< 21.0		
5/30/95	< 31.0	24.0	< 25.0		
5/30/95	< 15.0	11.0	< 12.0		
6/27/95	< 37.2	< 33.5	< 40.2		4466
6/27/95	< 55.3	< 48.4	< 43.3		8638
6/27/95	< 53.0	< 47.3	< 35.5	264	4346
7/10/95	< 39.5	< 32.0	< 36.1	915	5331
7/10/95	< 28.9	< 51.0	< 37.9	904	4262
7/10/95	< 33.6	< 41.8	< 40.7	430	3356
8/28/95	< 16.7	< 24.1	< 59.4	333	4391
8/28/95	< 32.6	< 28.8	< 59.8		6432
8/28/95	< 22.4	< 22.4	< 53.4	629	4345
9/28/95	< 58.6	< 53.9	< 58.8	793	6001
9/28/95	< 30.0	< 17.8	< 37.7		3552
9/28/95	< 21.8	< 44.2	< 50.9		4283
10/12/95	< 34.7	< 41.2	< 50.9		4115
10/12/95	< 44.7	< 45.6	< 89.3	480	4444
10/12/95	< 26.4	< 30.5	< 58.6		2600
11/29/95	< 26.0	< 25.3	< 38.1	263	1607
11/29/95	< 31.2	< 25.2	< 39.4		2397
11/29/95	< 21.4	< 27.2	< 49.9		1566
12/19/95	< 17.9	< 21.9	< 54.0		1685
12/19/95	< 16.7	< 19.7	< 59.7	211	4605
12/19/95	< 17.9	< 26.1	< 59.2	559	6997
MAX	< LLD	24.0	< LLD	915	8638
AVG		17.5		526	4258
MIN		11.0		211	1566

NOTE: Activities of Be-7 and K-40 were not available for January through May.



RIVER BEND STATION  
RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 1995

APPENDIX B

Summary of Preoperational REMP (Baseline) Results

Table B.1 summarizes the results of preoperational radiological environmental monitoring from January, 1983, through October, 1985. Further details are available in the respective annual reports (1983, 1984, and 1985).

# RIVER BEND STATION RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 1995

TABLE B.1  
PREOPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY  
(Page 1 of 4)

River Bend Station  
West Feliciana Parish, Louisiana

Docket Number: 50-458  
Reporting Period 1/1/83 to 10/31/85

Medium or Pathway Sampled (Unit of Measure)	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Stations Mean (f) <sup>2</sup> Range	Location with Highest Annual Mean		Control Locations Mean (f) <sup>2</sup> Range	Number of Nonroutine Reported Results
				Name Distance/Direction	Mean (f) <sup>2</sup> Range		
Air Particulate (pCi/m <sup>3</sup> )	Gross Beta (1086)	0.01	0.03 (752/759) 0.01 - 0.09	AQS2 5.8 km NW	0.03 (146/158) 0.01 - 0.09	0.03 (326/327) 0.01 - 0.08	N/A
	Cs-134 (95)	0.05	All < LLD			All < LLD	N/A
	Cs-137 (95)	0.06	All < LLD			All < LLD	N/A
Air Radioiodine (pCi/m <sup>3</sup> )	I-131 (1086)	0.07	All < LLD			All < LLD	N/A
Direct (TLD) <sup>1</sup> (mR total)	Gamma Monthly (1214)		6.8 (1018/1064) 0.7 - 19.3	TM2 4.2 km WSW	7.6 (27/28) 3.2 - 16.2	6.7 (139/150) 0 - 27.8	N/A
	Gamma Quarterly (472)		19.0 <sup>3</sup> (404/418) 6.8 - 32.1	TG1 1.6 km SE	27.5 <sup>3</sup> (11/11) 12.2 - 27.6	18.9 <sup>3</sup> (51/54) 6.5 - 23.5	N/A
Surface Water (pCi/liter)	H-3 (24)	2000	All < LLD			All < LLD	N/A
	Mn-54 (68)	15	All < LLD			All < LLD	N/A
	Co-58 (68)	15	All < LLD			All < LLD	N/A
	Fe-59 (68)	30	All < LLD			All < LLD	N/A
	Co-60 (68)	15	All < LLD			All < LLD	N/A
	Zn-65 (68)	30				All < LLD	N/A
	Nb-94 (68)	15				All < LLD	N/A
	Zr-95 (68)	30	All < LLD			All < LLD	N/A
	I-131 (68)	15	All < LLD			All < LLD	N/A
	Cs-134 (68)	15	All < LLD			All < LLD	N/A
	Cs-137 (68)	18	All < LLD			ALL > LLD	N/A
	Ba-140 (68)	60	All < LLD			ALL < LLD	N/A
	La-140 (68)	15	All < LLD			All < LLD	N/A
Gross Beta (52)	4		8.1 (23/26) 4 - 12	SWD 4 km downstream	8.1 (23/26) 4 - 12	7.6 (24/26) 5 - 13	N/A

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Medium or Pathway Sampled (Unit of Measure)	Type and Total Number of Analyses Performed	Lower Limit of Detection <sup>1</sup> (LLD)	All Indicator Stations Mean (f) <sup>2</sup> Range	Location with Highest Annual Mean		Control Locations Mean (f) <sup>2</sup> Range	Number of Nonroutine Reported Results
				Name Distance/Direction	Mean (f) <sup>2</sup> Range		
Groundwater <sup>4</sup> (pCi/liter)	H-3 (24)	2000	All < LLD			All < LLD	N/A
	Mn-54 (22)	15	All < LLD			All < LLD	N/A
	Co-58 (22)	15	All < LLD			All < LLD	N/A
	Fe-59 (22)	30	All < LLD			All < LLD	N/A
	Co-60 (22)	15	All < LLD			All < LLD	N/A
	Zn-65 (22)	30	All < LLD			All < LLD	N/A
	Nb-95 (22)	15	All < LLD			All < LLD	N/A
	Zr-95 (22)	30	All < LLD			All < LLD	N/A
	I-131 (22)	15	All < LLD			All < LLD	N/A
	Cs-134 (22)	15	All < LLD			All < LLD	N/A
	Cs-137 (22)	18	All < LLD			All < LLD	N/A
	Ba-140 (22)	60	All < LLD			All < LLD	N/A
	La-140 (22)	15	All < LLD			All < LLD	N/A
	Gross Beta (15)	4	4 (5/12) 2 - 8		WD 470 m SW	4 (5/12) 2 - 8	6 (2/3) 3 - 9
Drinking Water <sup>5</sup> (pCi/liter)	H-3 (18)	2000	All < LLD			All < LLD	N/A
	Mn-54 (40)	15	All < LLD			All < LLD	N/A
	Co-58 (40)	15	All < LLD			All < LLD	N/A
	Fe-59 (40)	30	All < LLD			All < LLD	N/A
	Co-60 (40)	15	All < LLD			All < LLD	N/A
	Zn-65 (40)	30	All < LLD			All < LLD	N/A
	Nb-95 (40)	15	All < LLD			All < LLD	N/A

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				Name Distance/Direction	Mean (f) <sup>2</sup> Range		
Drinking Water <sup>3</sup> (pCi/liter)	Zr-95 (40)	30	All < LLD			All < LLD	N/A
	I-131 (40)	15	All < LLD			All < LLD	N/A
	Cs-134 (40)	15	All < LLD			All < LLD	N/A
	Cs-137 (40)	18	All < LLD			All < LLD	N/A
	Ba-140 (40)	60	All < LLD			All < LLD	N/A
	La-140 (40)	15	All < LLD			All < LLD	N/A
	Gross Beta (54)	4	6.8 (28/28) 3 - 12	Donaldsonville 138 km downstream	6.8 (28/28) 3 - 12	7.8 (24/26) 5 - 13	N/A
Shoreline Sediment <sup>4</sup> (pCi/kg dry)	K-40 <sup>5</sup> (2)	None Required	13700 (2/2) 11400 - 15900	SED 4 km downstream	13700 (2/2) 11400 - 15900	Not Required	N/A
	Cs-134 (4)	150	All < LLD			All < LLD	N/A
	Cs-137 (4)	180	All < LLD			All < LLD	N/A
Milk (pCi/liter)	K-40 <sup>5</sup> (18)	None Required	1313 (8/9) 1179 - 1475	MF2 6 km ESE	1313 (8/9) 1179 - 1475	1318 (7/9) 1196 - 1409	N/A
	I-131 (81)	1	All < LLD			All < LLD <sup>7</sup>	N/A
	Cs-134 (82)	15	All < LLD			All < LLD <sup>7</sup>	N/A
	Cs-137 (82)	18	All < LLD			All < LLD <sup>7</sup>	N/A
	Ba-140 (82)	60	All < LLD			All < LLD <sup>7</sup>	N/A
	La-140 (82)	15	All < LLD			All < LLD	N/A
Fish/Invertebrates (pCi/kg wet)	K-40 <sup>5</sup> (6)	None Required	9037 (2/2)	FD 4 km downstream	9037 (2/2) 6320 - 11754	7840 (4/4) 4177 - 11438	N/A
	Mn-54 (15)	130	All < LLD			All < LLD	N/A
	Co-58 (15)	130	All < LLD			All < LLD	N/A
	Fe-59 (15)	260	All < LLD <sup>8</sup>			All < LLD <sup>8</sup>	N/A
	Co-60 (15)	130	All < LLD			All < LLD	N/A

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				Name Distance/Direction	Mean (f) <sup>2</sup> Range		
Fish/Invertebrates (pCi/kg wet) (continued)	Zn-65 (15)	260	All < LLD			All < LLD	N/A
	Cs-134 (15)	130	All < LLD			All < LLD	N/A
	Cs-137 (15)	160	All < LLD			All < LLD	N/A
Vegetation (pCi/kg wet)	K-40 <sup>5</sup> (11)	None Required	3368 (6/10) 1398 - 5389	G2 1.3 km NW	3368 (6/10) 1398 - 5389	3768 single value	N/A
	I-131 (75)	60	All < LLD <sup>7</sup>			All < LLD	N/A
	Cs-134 (76)	60	All < LLD			All < LLD	N/A
	Cs-137 (76)	80	97 (4/43) 59 - 120	G1 1 km WNW	97 (4/43) 59 - 120	All < LLD	N/A

NOTES:

- (1) Lower Limit of Detection (LLD) as defined in RBS Technical Specifications (NUREG-1172).
- (2) Mean and range based on detectable measurements only. The fraction of detectable measurements at specified locations is indicated in parentheses (f).
- (3) For each of the TLD locations in 1985, a value equal to one-third of its 4th Quarter gamma exposure is used to simulate a "quarterly" measurement for October, 1985.
- (4) Beginning in January, 1985, groundwater was sampled from one upgradient (WU - control) and one downgradient (WD - indicator) well; previously, groundwater was sampled from construction dewatering (well-point) wells.
- (5) The upstream surface water sampling location (SWU) is used as a "control" for drinking water comparisons.
- (6) The values listed for K-40 were derived from the incipient in-house analytical program.
- (7) The values listed for the control location for milk were derived from the incipient in-house analytical program. Training of personnel in calibration and analytical methods delayed sample preparation and counting. As a result, the required LLDs were not met (by the in-house analytical program during this training period) in 2 out of 8 I-131 analyses; 1 out of 9 Cs-134 analyses; 1 out of 9 of Cs-137 analyses; 2 out of 9 Ba-140 analyses; and 4 out of 9 La-140 analyses. Similarly, the required LLD for I-131 in broadleaf vegetation was not met in 1 out of 11 analyses. (See discussion of Program Exceptions in the Preoperational Radiological Environmental Monitoring Report for 1985.)
- (8) The LLD for one downstream fish sample (catfish, analyzed in-house) was 265 pCi/kg (wet). The LLD for one upstream fish sample (largemouth bass, analyzed in-house) was 263 pCi/kg (wet).