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April 29, 2002

U.S. Nuclear Regulatory Commission  
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Subject: Radiological Environmental Operating Report for 2001  
River Bend Station  
License No. NPF-47  
Docket No. 50-458

File Nos.: G9.5, G9.25.1.5, G10.6

RBG-45938  
RBF1-02-0069

Ladies and Gentlemen:

Enclosed is the River Bend Station (RBS) Annual Radiological Environmental Operating Report for the period January 1, 2001 through December 31, 2001. This report is submitted in accordance with the RBS Technical Specifications, Section 5.6.2.

Should you have any questions regarding the enclosed information, please contact Mr. Bill Fountain of my staff at (225) 381-4625.

Sincerely,

A handwritten signature in cursive script, appearing to read "Rick J. King".

RJK/WJF  
enclosure

IE25

Radiological Environmental Operating Report for 2001  
April 29, 2002  
RBG-45938  
Page 2 of 2

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**RIVER BEND STATION**

**ANNUAL RADIOLOGICAL ENVIRONMENTAL  
OPERATING REPORT FOR 2001**

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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, 2001 through December 31, 2001. 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 2001, 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 2001. No measurable levels of radiation above baseline levels were detected in the vicinity of River Bend Station. The 2001 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 approximately 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 2001, 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 2001 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 2001. Therefore, no analysis or planned course of action to alleviate problems was necessary.



### **Reporting Levels**

RBS's review indicates that no samples 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, 2001 results did not trigger any Radiological Monitoring Program Special Reports.

### **Radioactivity Not Attributable to RBS**

The RBS REMP detected no radioactivity attributable to other sources during year 2001. Following the radioactive plume release due to reactor core degradation at the Chernobyl Nuclear Power Plant in 1986, RBS REMP detected I-131 in water, vegetation, and air samples. I-131 was also detected during 1998 in the wastewater treatment plant effluent. This was attributed to the medical treatment of a RBS employee.

### **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 Direct Radiation Monitoring Network and the Environmental Radiological Laboratory – Department of Environmental Quality Laboratory Services Division (ERL-DEQLSD).

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

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

### **Sample Deviations**

#### **◆ Milk**

The REMP did not include milk sampling within five miles (8 km) of RBS in 2001 due to unavailability of milk-producing animals used for human consumption. RBS's Technical Requirements Manual requires collection of milk samples if available commercially within 8 km (5 miles) of the plant. RBS personnel collected vegetation samples to monitor the ingestion pathway, as specified in RBS Technical Requirements Manual Table 3.12.1-1, because of milk unavailability.

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

All LLDs during this reporting period were less than the acceptable limits required by the RBS Technical Requirement Manual (TRM).

◆ **Air Samples**

Listed below are air sampler deviations that occurred during 2001 due to mechanical or electrical failures. These deviations did not result in a missed sample and no LLD values were exceeded. As described in footnote (a) to RBS Technical Requirements Manual Table 3.12.1-1, deviations are permitted from the required sampling schedule due to malfunction of equipment or other legitimate reasons.

Station	Sampling Period	Problem Description	Comment
AGC	12/27/00 – 1/9/01	Sampler Failure	Loss of sample volume unknown; sampler replaced same day 1/9/01.
AN1	6/26/01 – 7/9/01	Weather Outage	Loss of 58% of sample volume.
AP1 & AN1	7/23/01 – 8/6/01	Power Outage	Loss of 3.6 hours or 1% of sample volume.
AN1	8/20/01 – 9/4/01	Tripped Breaker	Loss of 101 hours or 28% of sample volume.
AN1	9/4/01 – 9/17/01	Tripped Breaker	Loss of 181 hours or 58% of sample volume.
AP1 & AQS2	9/30/01	Calibration Due Date	Samplers replaced 10/1/01, one day past calibration due date; as found data indicated that replaced samplers were within calibration tolerances.

◆ **Missed Samples**

No missed samples occurred during the 2001 sampling period.

◆ **Unavailable Results**

There were no unavailable results during the year 2001.

### **Program Modifications**

RBS made no modifications to the REMP during the year 2001.

### **Attachments**

Attachment 1 contains results of air, TLD, water, sediment, fish, food products and special samples collected in 2001. TLDs were analyzed by Waterford-3 Dosimetry. All remaining samples were analyzed by RBS Environmental Laboratory. Attachment 1 also contains RBS' participation in the interlaboratory comparison program during the year 2001.

## **1.0 Introduction**

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

RBS 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:

- 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 2001 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 next land use census will be performed in 2002. The purpose of this census is to identify changes in uses of land within five miles of RBS that would require modifications to the REMP or the Technical Requirements Manual. The most important criteria during this census is to determine location in each sector of the nearest:

- 1) Residence
- 2) Animal milked for human consumption
- 3) Garden of greater than 50 m<sup>2</sup> (500 ft<sup>2</sup>) producing broadleaf vegetation \*

The method used by RBS personnel for conducting this land use census is as follows:

- RBS personnel conduct door-to-door field surveys and/or aerial surveys in each meteorological sector out to five miles in order to locate the nearest resident and milk animal.
- Consultation with local agricultural authorities is used in instances when personal contact cannot be made.
- As a result of these surveys, the following information is obtained in each meteorological sector:
  - 1) Nearest permanent residence
  - 2) Nearest milking animal
- RBS personnel identify locations on the map, measure distances to RBS and record results.
- Locations, if any, are identified which yield a calculated dose or dose commitments greater than those currently calculated in the Technical Requirements Manual.
- RBS personnel compare results to previous census.

- \* RBS personnel do not perform a garden census since Technical Requirements Manual 3.12.2 allows the routine sampling of broadleaf vegetation in the highest D/Q sector near the site boundary in lieu of the garden 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	<b><u>Radioiodine and Particulates</u></b> 2 samples from close to the 2 SITE BOUNDARY locations, in different sectors, of the highest calculated annual average groundlevel D/Q.	<b>AN1 (0.9 km W)</b> - RBS site Hwy 965; 0.4 km south of Activity Center.  <b>AP1 (0.9 km WNW)</b> – Behind River Bend Station Activity Center.	Continuous sampler operation with sample collection every two weeks, or more frequently if required by dust loading.	Radioiodine Cannisters – I-131 analysis every two weeks.  Air Particulate – Gross beta radioactivity analysis following filter change.
	<b><u>Radioiodine and Particulates</u></b> 1 sample from the vicinity of a community having the highest calculated annual average groundlevel D/Q.	<b>AQS2 (5.8 km NW)</b> - St. Francis Substation on US Hwy. (Bus.) 61 in St. Francisville.		
	<b><u>Radioiodine and Particulates</u></b> 1 sample from a control location, as for example 15 - 30 km distance and in the least prevalent wind direction.	<b>AGC (17.0 km SE)</b> – Entergy Service Center compound in Zachary. (Control)		
Direct Radiation	<b><u>TLDs</u></b> One ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY.	<b>TA1 (1.7 km N)</b> - River Bend Training Center.  <b>TB1 (0.5 km NNE)</b> - Utility pole near River Bend Station cooling tower yard area.  <b>TC1 (1.7 km NE)</b> - Stub pole at Jct. US Hwy. 61 and Old Highway 61.	Quarterly	mR exposure quarterly.

Table 1.1

Radiological Environmental Sampling Program

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

Table 1.1

Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Direct Radiation	<p><b><u>TLDs</u></b> One ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY.</p>	<p><b>TM1 (0.9 km WSW)</b> - Third utility pole on Powell Station Road (LA Hwy. 965) N of former Illinois Central Gulf RR crossing.</p> <p><b>TN1 (0.9 km W)</b> – Utility pole along Powell Station Road (LA Hwy. 965), near garden and AN1 air sampler location.</p> <p><b>TP1 (0.9 km WNW)</b> - Behind River Bend Station Activity Center at AP1 air sampler location.</p> <p><b>TQ1 (0.6 km NW)</b> – Access from MA-1 on RBS North Access Road.</p> <p><b>TR1 (0.8 km NNW)</b> – River Bend Station North Access Road across from Main Plant entrance.</p>	Quarterly	mR exposure quarterly.
	<p><b><u>TLDs</u></b> The balance of the stations (8) to be placed in special interest areas such as population centers, nearby residences, schools, and in 1 or 2 areas to serve as control locations.</p>	<p><b>TAC (15.8 km N)</b> – Utility pole at Jct. of US Hwy. 61 and LA Hwy. 421, 7.9 km north of Bains. (Control)</p> <p><b>TCS (12.3 km NE)</b> – Utility pole at gate to East Louisiana State Hospital in Jackson. (Special)</p> <p><b>TEC (16.0 km E)</b> – Stub pole at jct. of Hwy. 955 and Midway Road, 4.8 km North of Jct. of Hwys 955 and 964. (Control)</p>		



**Table 1.1**

**Radiological Environmental Sampling Program**

<b>Exposure Pathway</b>	<b>Requirement</b>	<b>Sample Point Description, Distance and Direction</b>	<b>Sampling and Collection Frequency</b>	<b>Type and Frequency Of Analyses</b>
Direct Radiation	<p><b><u>TLDs</u></b>  The balance of the stations (8) to be placed in special interest areas such as population centers, nearby residences, schools, and in 1 or 2 areas to serve as control locations.</p>	<p><b>TGS (17.0 km SE)</b> – Entergy Service Center compound in Zachary. (Special)</p> <p><b>TNS (6.0 km W)</b> – Utility pole with electrical meter at west bank ferry landing (LA Hwy. 10). (Special)</p> <p><b>TQS1 (4.0 km NW)</b> – Utility pole front of Pentecostal church (opposite West Feliciana Parish Hospital) near Jct. US Hwy. 61 and Ferdinand Street. (Special)</p> <p><b>TQS2 (5.8 km NW)</b> – St. Francis Substation on business US Hwy. 61 in St. Francisville. (Special)</p> <p><b>TRS (9.2 km NNW)</b> - Stub pole at Jct. of US Hwy. 61 and WF2 near Bains (West Feliciana High School). (Special)</p>	Quarterly	mR exposure quarterly.
Waterborne	<p><b><u>Surface Water</u></b>  1 sample upstream and 1 sample downstream.</p>	<p><b>SWU (5.0 km W)</b> - Mississippi River about 4 km upstream from the plant liquid discharge outfall, near LA Hwy. 10 ferry crossing.</p> <p><b>SWD (7.75 km S)</b> - Mississippi River about 4 km downstream from plant liquid discharge outfall, near paper mill.</p>	Grab samples quarterly	Gamma isotopic analysis quarterly, tritium analysis

Table 1.1

## Radiological Environmental Sampling Program

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

**Table 1.1**

**Radiological Environmental Sampling Program**

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

FIGURE 1-1  
EXPOSURE PATHWAYS

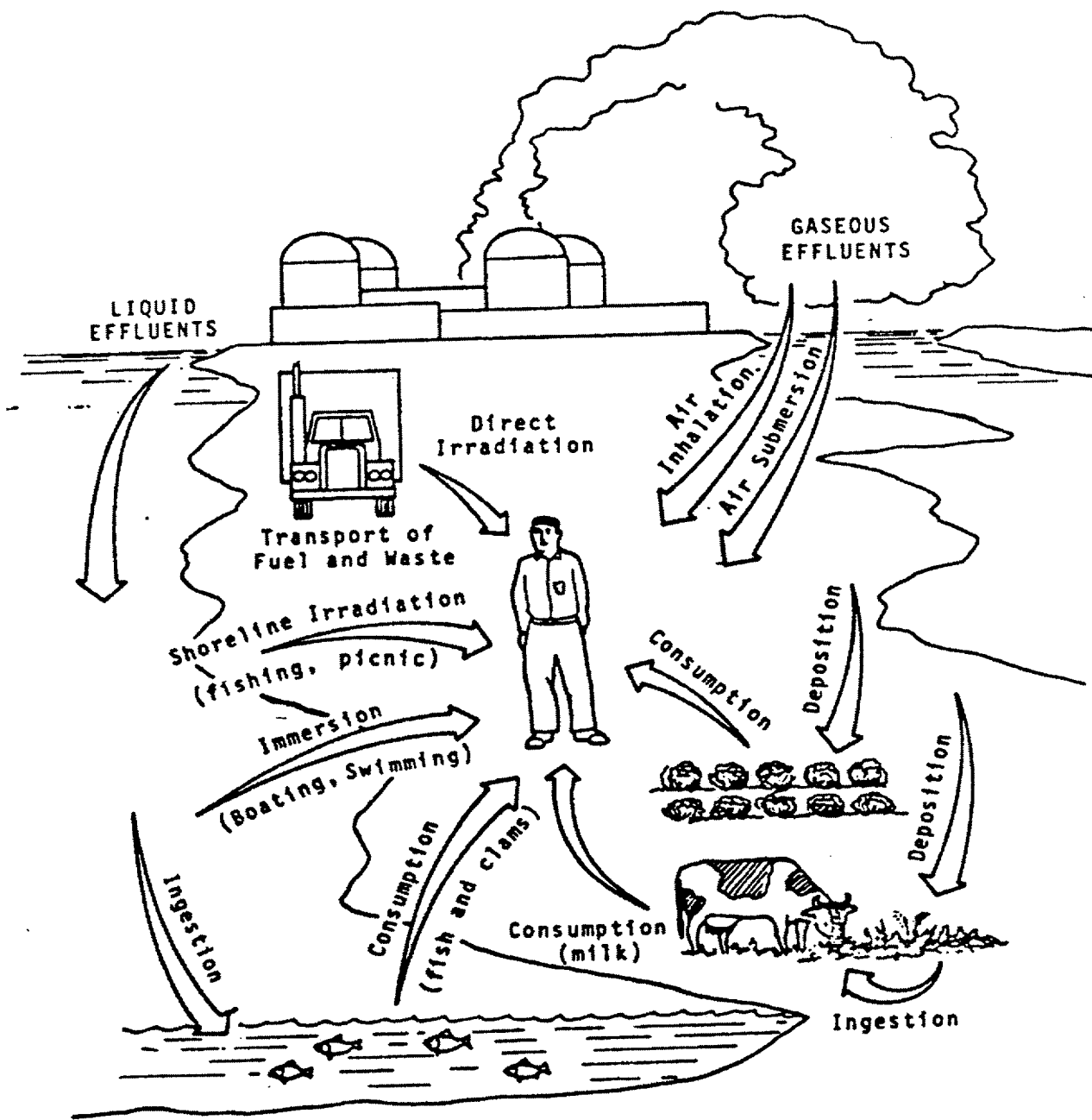


FIGURE 1-2  
SAMPLE COLLECTION SITES - NEAR FIELD

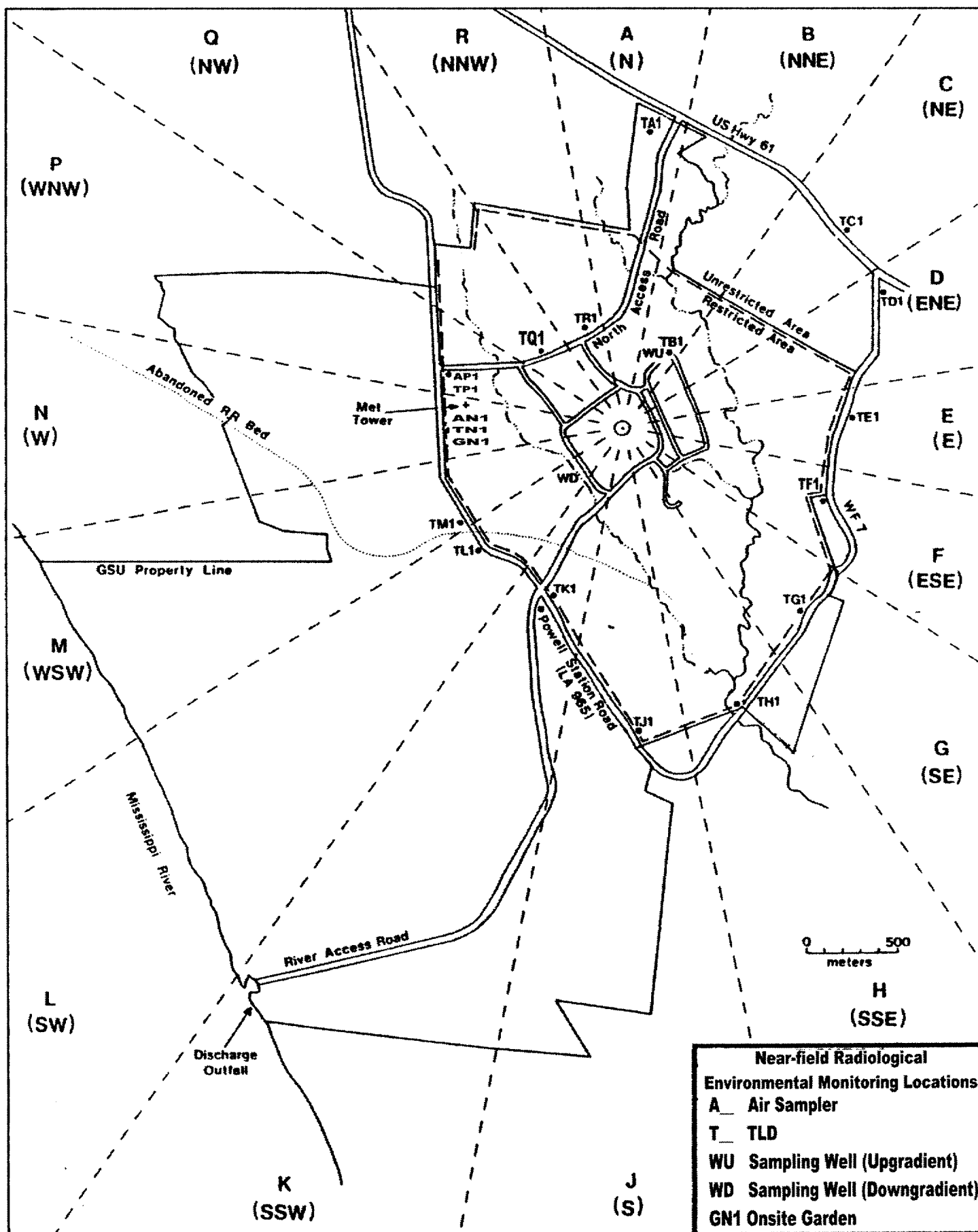
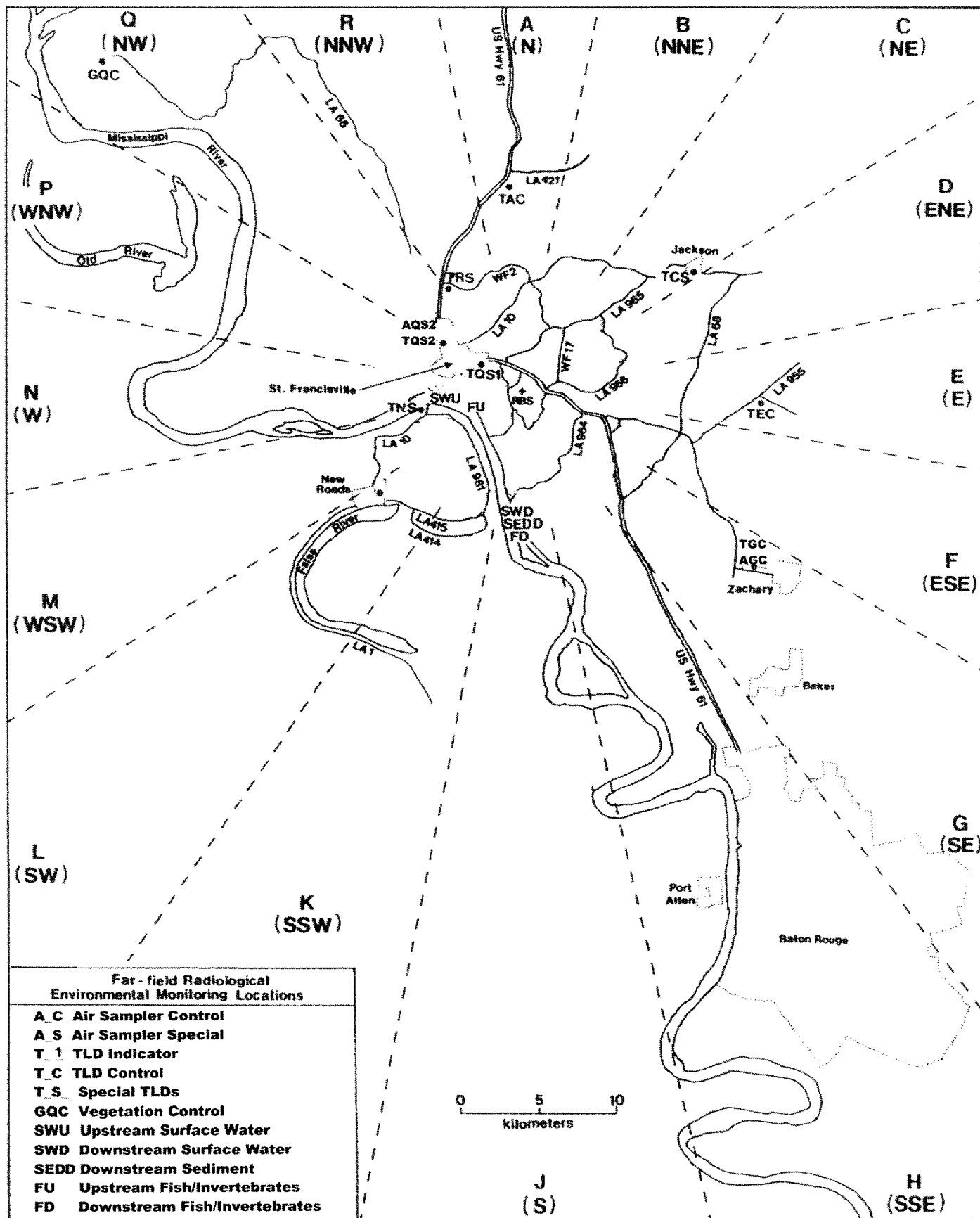


FIGURE I-3  
SAMPLE COLLECTION SITES – FAR FIELD



## 2.0 Interpretation and Trends of Results

### 2.1 Air Particulate and Radioiodine Sample Results

Iodine-131 was not detected in the radioiodine cartridges during 2001, as has been the case in previous years. Indicator gross beta air particulate results for 2001 were similar to preoperational and operational levels as seen below. Results are reported as annual average pCi/m<sup>3</sup>.

<u>Monitoring Period</u>	<u>Result</u>
Preoperational	0.03
2000	0.02
2001	0.02

Table 3.1 provides a comparison of the indicator and control location mean values, which further emphasizes that the airborne pathway continues to remain at background levels. Figure 2-2 also shows a comparison of indicator versus control and pre-operational beta activities.

### 2.2 Thermoluminescent Dosimetry Sample Results

Gamma radiation dose in the reporting period compares to previous years as shown in Figure 2-1. This figure, which indicates that ambient radiation levels have remained at or near background levels, shows 1996 - 2001 annual average results for indicator locations compared to preoperational levels and the controls.

RBS normalizes measured doses 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 inner ring 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.

### 2.3 Water Sample Results

Analytical results for 2001 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 2001 results from the indicator location as compared to the preoperational and operational years. Results are reported as annual average pCi/l.

<b><u>Radionuclide</u></b>	<b><u>2001</u></b>	<b><u>1996 – 2000</u></b>	<b><u>Preoperational</u></b>
Gammas	<LLD	<LLD	<LLD
Tritium	<LLD	258	<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 2001 results from the indicator location as compared to the preoperational and operational years. Results are reported as annual average pCi/l.

<b><u>Radionuclide</u></b>	<b><u>2001</u></b>	<b><u>1996 – 2000</u></b>	<b><u>Preoperational</u></b>
Gammas	<LLD	<LLD	<LLD
Tritium	<LLD	290	<LLD

Based on these comparisons, the operation of RBS had no impact on this pathway during 2001, and levels of radionuclides monitored for this pathway continue to remain similar to those obtained in operational and preoperational years.

RBS personnel also collected special effluent wastewater samples from the sewage treatment plant during 2001 to supplement the REMP. RBS did not detect any gamma radionuclides in these samples.

## **2.4 Sediment Sample Results**

Sediment samples were collected from the indicator location in 2001 and analyzed for gamma radionuclides. In 2001, gamma radionuclides were below detectable limits, which is 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.

RBS personnel also collected special sediment samples from East Creek and West Creek during 2001 to supplement the REMP. RBS did not detect any gamma radionuclides in these samples.

## **2.5 Milk Sample Results**

Milk samples were not collected during 2001 due to the unavailability of indicator locations within 5 miles (8 km) of RBS. Since there are no dairies within five miles of the RBS site, it is concluded RBS's operation had no impact on this pathway in 2001.



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

Fish samples were collected from two locations (indicator and control) and analyzed for gamma radionuclides. In 2001, gamma radionuclides were below detectable limits, which is consistent with the preoperational and operational monitoring periods. Therefore, based on these measurements, RBS operations had no significant radiological impact upon the environment or public by this pathway.

## **2.7 Food Product Sample Results**

Food product samples were collected when available from two locations (indicator and control) in 2001 and analyzed for Iodine-131 and gamma radionuclides. The 2001 levels remained undetectable, which is consistent with previous operational years. Therefore, since levels continue to remain at background, it can be concluded that plant operations is not impacting this pathway.

## **2.8 Land Use Census Results**

The land use census was conducted during the 2000 growing season in accordance with RBS Technical Requirements Manual 3.12.2. Although there were some minor changes between the 1998 and 2000 census as seen in Table 2.1, the land use census did not identify any location(s) that yields a calculated dose or dose commitment greater than the values currently being calculated in requirement TSR 3.11.2.3.1. In addition, no dairy animals were found within 8 km of RBS during the 2000 census.

RBS personnel did not perform a garden census since Technical Requirements Manual 3.12.2 allows the routine sampling of broadleaf vegetation in the highest D/Q sector near the site boundary in lieu of the garden census.

## **2.9 Interlaboratory Comparison Results**

RBS' Environmental Laboratory analyzed interlaboratory comparison samples to fulfill the requirements of Technical Requirements Manual 3.12.3. Attachment 1, 2001 Radiological Environmental Monitoring Report, contains these results. RBS's review of interlaboratory comparison results indicated that 98% of the sample results for accuracy were within the acceptable control limits of the three normalized deviations. For those sample results outside the acceptable control limits, RBS's review indicated no impact on previously reported data. Attachment 1 also provides additional discussion regarding sample results outside the acceptable control limits.

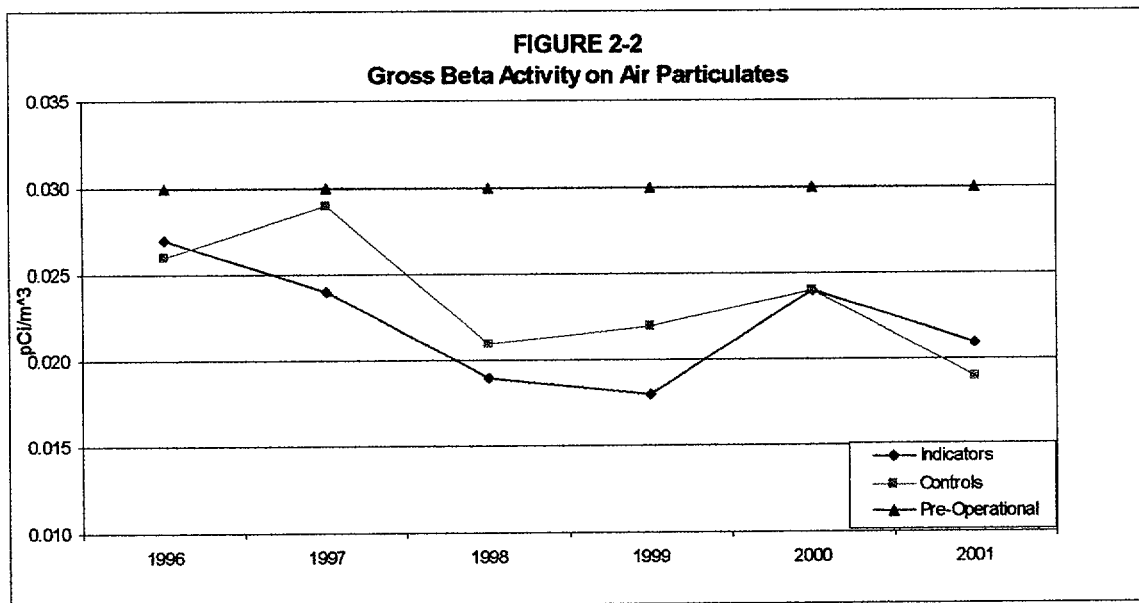
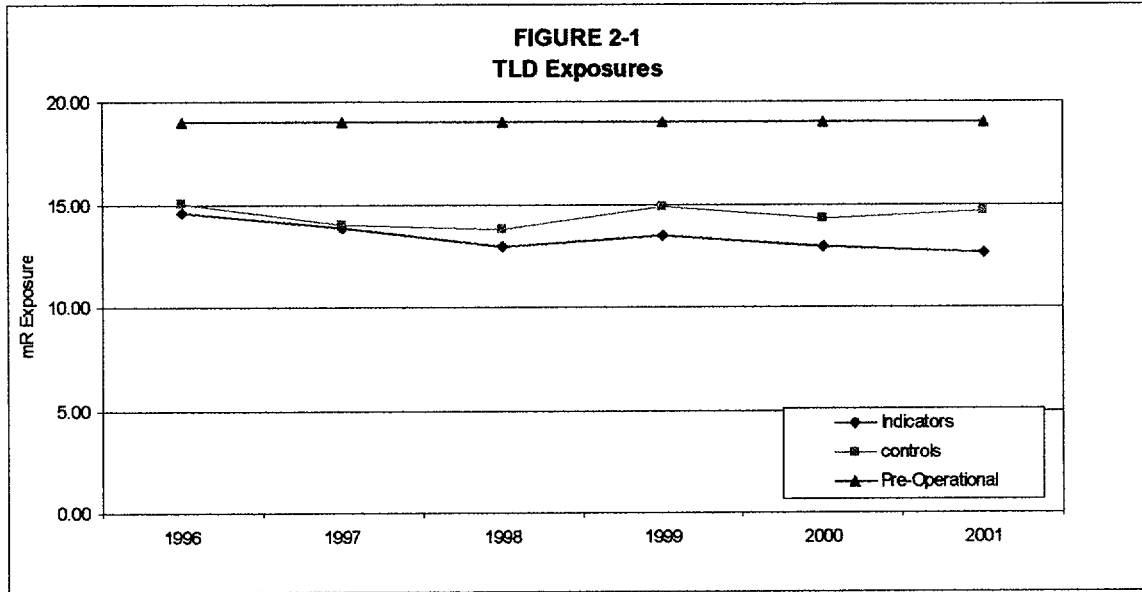
**Table 2-1**  
**Land Use Census Results**

<b>Item</b>	<b>Sector</b>	<b>Direction</b>	<b>Nearest Residence</b>	<b>Range (km)</b>	<b>Nearest Milk Animal</b>	<b>Range (km)</b>
1	A	N	Jones	1.8	-	-
2	B	NNE	Dreher	1.6	-	-
3	C	NE	Bickham, J.	1.4	-	-
4	D	ENE	Goulette	1.4	-	-
5	E	E	Bickham, S.	2.2	-	-
6	F	ESE	Hilburn <sup>1</sup>	2.9	-	-
7	G	SE	Mills	6.6	-	-
8	H	SSE	Hubbard	1.7	-	-
9	J	S	Knecht <sup>2</sup>	1.8	-	-
10	K	SSW	Guillory	7.4	-	-
11	L	SW	Fountain	7.9	-	-
12	M	WSW	-	-	-	-
13	N	W	Lacost	6.1	-	-
14	P	WNW	Hermann	3.4	-	-
15	Q	NW	Stokes	1.3	-	-
16	R	NNW	Young <sup>3</sup>	1.7	-	-

<sup>1</sup> New range calculated for resident in sector F; 2.9 km compared to 2.1 km.

<sup>2</sup> New resident in sector J, with no change in range.

<sup>3</sup> New resident at same location in sector R.



### **3.0 Radiological Environmental Monitoring Program Summary**

#### **3.1 2001 Program Results Summary**

Table 3.1 summarizes the 2001 REMP results. RBS personnel did not use values reported as less than the lower limit of detection (<LLD) when determining ranges and means for indicator and control locations.

TABLE 3.1

Radiological Environmental Monitoring Program SummaryName of Facility: River Bend Station      Docket No: 50-458Location of Facility: West Feliciana Parish, Louisiana      Reporting Period: January - December 2001

Sample Type ( Units )	Type & Number of Analyses <sup>a</sup>	LLD <sup>b</sup>	Indicator Locations Mean ( F ) <sup>c</sup> [ Range ]	Location with Highest Annual Mean		Control Locations Mean ( F ) <sup>c</sup> [ Range ]	Number of Nonroutine Results <sup>e</sup>
				Location <sup>d</sup>	Mean ( F ) <sup>c</sup> [ Range ]		
Air Particulates ( pCi/m <sup>3</sup> )	Gross Beta 104	0.01	0.021 ( 78 / 78 ) [ 0.007 - 0.044 ]	AQS2 ( 5.8 km NW )	0.022 ( 26 / 26 ) [ 0.010 - 0.044 ]	0.019 ( 26 / 26 ) [ 0.008 - 0.039 ]	0
Airborne Iodine ( pCi/m <sup>3</sup> )	I-131    104	0.07	<LLD	N/A	N/A	<LLD	0
Inner Ring TLDs ( mR/Qtr )	Gamma    64	(f)	12.60 ( 64 / 64 ) [ 8.98 – 16.04 ]	TB1 ( 0.5 km NNE )	14.60 ( 4 / 4 ) [ 13.53 – 16.04 ]	N/A	0
Special Interest TLDs ( mR/Qtr )	Gamma    20	(f)	13.15 ( 20 / 20 ) [ 11.16 – 15.36 ]	TRS ( 9.2 km NNW )	14.53 ( 4 / 4 ) [ 13.53 – 15.36 ]	N/A	0
Control TLDs ( mR/Qtr )	Gamma    12	(f)	N/A	N/A	N/A	14.66 ( 12 / 12 ) [ 13.24 – 16.16 ]	0

TABLE 3.1

Radiological Environmental Monitoring Program SummaryName of Facility: River Bend Station Docket No: 50-458Location of Facility: West Feliciana Parish, Louisiana Reporting Period: January - December 2001

Sample Type ( Units )	Type & Number of Analyses <sup>a</sup>	LLD <sup>b</sup>	Indicator Location Mean ( F ) <sup>c</sup> [ Range ]	Location with Highest Annual Mean		Control Locations Mean ( F ) <sup>c</sup> [ Range ]	Number of Nonroutine Results <sup>e</sup>
				Location <sup>d</sup>	Mean ( F ) <sup>c</sup> [ Range ]		
Surface Water ( pCi/l )	H-3 8	3000	<LLD	N/A	N/A	<LLD	0
	Gamma 8					<LLD	
	Mn-54	15	<LLD	N/A	N/A	<LLD	0
	Fe-59	30	<LLD	N/A	N/A	<LLD	0
	Co-58	15	<LLD	N/A	N/A	<LLD	0
	Co-60	15	<LLD	N/A	N/A	<LLD	0
	Zn-65	30	<LLD	N/A	N/A	<LLD	0
	Zr-95	30	<LLD	N/A	N/A	<LLD	0
	Nb-95	15	<LLD	N/A	N/A	<LLD	0
	I-131	15	<LLD	N/A	N/A	<LLD	0
	Cs-134	15	<LLD	N/A	N/A	<LLD	0
	Cs-137	18	<LLD	N/A	N/A	<LLD	0
	Ba-140	60	<LLD	N/A	N/A	<LLD	0
	La-140	15	<LLD	N/A	N/A	<LLD	0

TABLE 3.1

Radiological Environmental Monitoring Program SummaryName of Facility: River Bend Station      Docket No: 50-458Location of Facility: West Feliciana Parish, Louisiana      Reporting Period: January - December 2001

Sample Type ( Units )	Type & Number of Analyses <sup>a</sup>	LLD <sup>b</sup>	Indicator Locations Mean ( F ) <sup>c</sup> [ Range ]	Location with Highest Annual Mean		Control Locations Mean ( F ) <sup>c</sup> [ Range ]	Number of Nonroutine Results <sup>e</sup>
				Location <sup>d</sup>	Mean ( F ) <sup>c</sup> [ Range ]		
Groundwater ( pCi/l )	H-3      4	3000	<LLD	N/A	N/A	<LLD	0
	Gamma      4					<LLD	
	Mn-54      15		<LLD	N/A	N/A	<LLD	0
	Fe-59      30		<LLD	N/A	N/A	<LLD	0
	Co-58      15		<LLD	N/A	N/A	<LLD	0
	Co-60      15		<LLD	N/A	N/A	<LLD	0
	Zn-65      30		<LLD	N/A	N/A	<LLD	0
	Zr-95      30		<LLD	N/A	N/A	<LLD	0
	Nb-95      15		<LLD	N/A	N/A	<LLD	0
	I-131      15		<LLD	N/A	N/A	<LLD	0
	Cs-134      15		<LLD	N/A	N/A	<LLD	0
	Cs-137      18		<LLD	N/A	N/A	<LLD	0
	Ba-140      60		<LLD	N/A	N/A	<LLD	0
	La-140      15		<LLD	N/A	N/A	<LLD	0
Shoreline Sediment ( pCi/kg )	Gamma      1						
	Cs-134      150		<LLD	N/A	N/A	<LLD <sup>g</sup>	0
	Cs-137      180		<LLD	N/A	N/A	<LLD	0

TABLE 3.1

Radiological Environmental Monitoring Program SummaryName of Facility: River Bend Station      Docket No: 50-458Location of Facility: West Feliciana Parish, Louisiana      Reporting Period: January - December 2001

Sample Type ( Units )	Type & Number of Analyses <sup>a</sup>	LLD <sup>b</sup>	Indicator Location Mean ( F ) <sup>c</sup> [ Range ]	Location with Highest Annual Mean		Control Locations Mean ( F ) <sup>c</sup> [ Range ]	Number of Nonroutine Results <sup>e</sup>
				Location <sup>d</sup>	Mean ( F ) <sup>c</sup> [ Range ]		
Fish ( pCi/kg )	Gamma      2						
	Mn-54	130	<LLD	N/A	N/A	<LLD	0
	Fe-59	260	<LLD	N/A	N/A	<LLD	0
	Co-58	130	<LLD	N/A	N/A	<LLD	0
	Co-60	130	<LLD	N/A	N/A	<LLD	0
	Zn-65	260	<LLD	N/A	N/A	<LLD	0
	Cs-134	130	<LLD	N/A	N/A	<LLD	0
	Cs-137	150	<LLD	N/A	N/A	<LLD	0
Food Products ( pCi/kg )	I-131      8	60	<LLD	N/A	N/A	<LLD	0
	Gamma      8						
	Cs-134	60	<LLD	N/A	N/A	<LLD	0
	Cs-137	80	<LLD	N/A	N/A	<LLD	0
Special Sediment (East & West Creek) ( pCi/kg )	Gamma      8						
	Cs-134	150	<LLD	N/A	N/A	N/A	0
	Cs-137	180	<LLD	N/A	N/A	N/A	0



TABLE 3.1

Radiological Environmental Monitoring Program SummaryName of Facility: River Bend Station Docket No: 50-458Location of Facility: West Feliciana Parish, Louisiana Reporting Period: January - December 2001

Sample Type ( Units )	Type & Number of Analyses <sup>a</sup>	LLD <sup>b</sup>	Indicator Location Mean ( F ) <sup>c</sup> [ Range ]	Location with Highest Annual Mean		Control Locations Mean ( F ) <sup>c</sup> [ Range ]	Number of Nonroutine Results <sup>e</sup>
				Location <sup>d</sup>	Mean ( F ) <sup>c</sup> [ Range ]		
Special Wastewater (Sewage Plant Effluent) ( pCi/l )	Gamma 12						
	Mn-54	15	<LLD	N/A	N/A	N/A	0
	Fe-59	30	<LLD	N/A	N/A	N/A	0
	Co-58	15	<LLD	N/A	N/A	N/A	0
	Co-60	15	<LLD	N/A	N/A	N/A	0
	Zn-65	30	<LLD	N/A	N/A	N/A	0
	Zr-95	30	<LLD	N/A	N/A	N/A	0
	Nb-95	15	<LLD	N/A	N/A	N/A	0
	I-131	15	<LLD	N/A	N/A	N/A	0
	Cs-134	15	<LLD	N/A	N/A	N/A	0
	Cs-137	18	<LLD	N/A	N/A	N/A	0
	Ba-140	60	<LLD	N/A	N/A	N/A	0
	La-140	15	<LLD	N/A	N/A	N/A	0

<sup>a</sup> I-131 = Iodine-131; H-3 = Tritium<sup>b</sup> LLD = Required lower limit of detection based on RBS Technical Requirements Manual Table 3.12.1-3.<sup>c</sup> Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parenthesis (F).<sup>d</sup> Locations are specified (1) by name and (2) direction and distance relative to reactor site.<sup>e</sup> Non-routine results are those which exceed ten times the control station value. If no control station value is available, the result is considered non-routine if it exceeds ten times the preoperational value for the location.<sup>f</sup> LLD is not defined in RBS Technical Requirements Manual Table 3.12.1-3.<sup>g</sup> Control location for sediment is upstream surface water sample.

**Attachment 1**

**2001 Radiological Monitoring Report**

**Summary of Monitoring Results**

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Table 1.1

Sample Type: Air Particulate and Charcoal Cartridge – Indicator Location AN1

Analysis: Gross Beta and Iodine

Units: pCi/m<sup>3</sup>

LLD (pCi/m <sup>3</sup> )			0.07	0.01
LAB ID	START DATE	END DATE	I-131	GROSS BETA
20010015	12/27/2000	1/9/2001	< 0.007	0.036 +/-0.002
20010056	1/9/2001	1/23/2001	< 0.008	0.020 +/-0.001
20010093	1/23/2001	2/5/2001	< 0.012	0.029 +/-0.002
20010121	2/5/2001	2/19/2001	< 0.009	0.017 +/-0.001
20010153	2/19/2001	3/6/2001	< 0.009	0.018 +/-0.001
20010191	3/6/2001	3/20/2001	< 0.008	0.020 +/-0.001
20010234	3/20/2001	4/3/2001	< 0.009	0.021 +/-0.001
20010302	4/3/2001	4/17/2001	< 0.007	0.018 +/-0.001
20010357	4/17/2001	5/1/2001	< 0.008	0.025 +/-0.001
20010407	5/1/2001	5/15/2001	< 0.008	0.023 +/-0.001
20010441	5/15/2001	5/29/2001	< 0.009	0.022 +/-0.001
20010477	5/29/2001	6/12/2001	< 0.007	0.012 +/-0.001
20010533	6/12/2001	6/26/2001	< 0.009	0.020 +/-0.001
20010573	6/26/2001	7/9/2001	< 0.021	0.018 +/-0.002
20010618	7/9/2001	7/23/2001	< 0.010	0.019 +/-0.001
20010651	7/23/2001	8/6/2001	< 0.007	0.017 +/-0.001
20010679	8/6/2001	8/20/2001	< 0.009	0.015 +/-0.001
20010708	8/20/2001	9/4/2001	< 0.012	0.023 +/-0.002
20010742	9/4/2001	9/17/2001	< 0.024	0.007 +/-0.002
20010803	9/17/2001	10/1/2001	< 0.009	0.027 +/-0.001
20010863	10/1/2001	10/15/2001	< 0.010	0.020 +/-0.001
20010915	10/15/2001	10/29/2001	< 0.009	0.019 +/-0.001
20010960	10/29/2001	11/13/2001	< 0.007	0.036 +/-0.002
20010991	11/13/2001	11/27/2001	< 0.010	0.018 +/-0.001
20011028	11/27/2001	12/10/2001	< 0.009	0.023 +/-0.001
20011077	12/10/2001	12/20/2001	< 0.009	0.023 +/-0.002
Average:				0.021
Maximum:				0.036
Minimum:				0.007

Table 1.2

Sample Type: **Air Particulate and Charcoal Cartridge – Indicator Location AP1**

Analysis: Gross Beta and Iodine

Units: pCi/m<sup>3</sup>

LLD (pCi/m <sup>3</sup> )			0.07	0.01
LAB ID	START DATE	END DATE	I-131	GROSS BETA
20010014	12/27/2000	1/9/2001	< 0.010	0.035 +/-0.002
20010055	1/9/2001	1/23/2001	< 0.007	0.021 +/-0.001
20010092	1/23/2001	2/5/2001	< 0.010	0.028 +/-0.001
20010120	2/5/2001	2/19/2001	< 0.008	0.018 +/-0.001
20010152	2/19/2001	3/6/2001	< 0.008	0.017 +/-0.001
20010190	3/6/2001	3/20/2001	< 0.008	0.017 +/-0.001
20010233	3/20/2001	4/3/2001	< 0.007	0.017 +/-0.001
20010301	4/3/2001	4/17/2001	< 0.007	0.017 +/-0.001
20010356	4/17/2001	5/1/2001	< 0.006	0.021 +/-0.001
20010406	5/1/2001	5/15/2001	< 0.008	0.021 +/-0.001
20010440	5/15/2001	5/29/2001	< 0.008	0.018 +/-0.001
20010476	5/29/2001	6/12/2001	< 0.009	0.009 +/-0.001
20010532	6/12/2001	6/26/2001	< 0.008	0.017 +/-0.001
20010572	6/26/2001	7/9/2001	< 0.008	0.011 +/-0.001
20010617	7/9/2001	7/23/2001	< 0.007	0.015 +/-0.001
20010650	7/23/2001	8/6/2001	< 0.007	0.014 +/-0.001
20010678	8/6/2001	8/20/2001	< 0.009	0.016 +/-0.001
20010707	8/20/2001	9/4/2001	< 0.006	0.017 +/-0.001
20010741	9/4/2001	9/17/2001	< 0.007	0.018 +/-0.001
20010802	9/17/2001	10/1/2001	< 0.008	0.027 +/-0.001
20010862	10/1/2001	10/15/2001	< 0.005	0.024 +/-0.001
20010914	10/15/2001	10/29/2001	< 0.007	0.020 +/-0.001
20010959	10/29/2001	11/13/2001	< 0.009	0.044 +/-0.002
20010990	11/13/2001	11/27/2001	< 0.007	0.029 +/-0.001
20011027	11/27/2001	12/10/2001	< 0.008	0.025 +/-0.001
20011076	12/10/2001	12/20/2001	< 0.011	0.025 +/-0.002
Average:				0.021
Maximum:				0.044
Minimum:				0.009

Table 1.3

Sample Type: **Air Particulate and Charcoal Cartridge – Indicator Location AQS2**

Analysis: Gross Beta and Iodine

Units: pCi/m<sup>3</sup>

LLD (pCi/m <sup>3</sup> )			0.07	0.01
LAB ID	START DATE	END DATE	I-131	GROSS BETA
20010016	12/27/2000	1/9/2001	< 0.011	0.039 +/-0.002
20010057	1/9/2001	1/23/2001	< 0.009	0.023 +/-0.001
20010094	1/23/2001	2/5/2001	< 0.013	0.030 +/-0.002
20010122	2/5/2001	2/19/2001	< 0.008	0.021 +/-0.001
20010154	2/19/2001	3/6/2001	< 0.008	0.019 +/-0.001
20010192	3/6/2001	3/20/2001	< 0.009	0.021 +/-0.001
20010235	3/20/2001	4/3/2001	< 0.008	0.021 +/-0.001
20010303	4/3/2001	4/17/2001	< 0.008	0.018 +/-0.001
20010358	4/17/2001	5/1/2001	< 0.009	0.024 +/-0.001
20010408	5/1/2001	5/15/2001	< 0.008	0.023 +/-0.001
20010442	5/15/2001	5/29/2001	< 0.007	0.022 +/-0.001
20010478	5/29/2001	6/12/2001	< 0.008	0.010 +/-0.001
20010534	6/12/2001	6/26/2001	< 0.008	0.021 +/-0.001
20010574	6/26/2001	7/9/2001	< 0.008	0.012 +/-0.001
20010619	7/9/2001	7/23/2001	< 0.009	0.019 +/-0.001
20010652	7/23/2001	8/6/2001	< 0.009	0.016 +/-0.001
20010680	8/6/2001	8/20/2001	< 0.008	0.016 +/-0.001
20010709	8/20/2001	9/4/2001	< 0.009	0.018 +/-0.001
20010743	9/4/2001	9/17/2001	< 0.008	0.019 +/-0.001
20010804	9/17/2001	10/1/2001	< 0.007	0.029 +/-0.001
20010864	10/1/2001	10/15/2001	< 0.009	0.021 +/-0.001
20010916	10/15/2001	10/29/2001	< 0.007	0.019 +/-0.001
20010961	10/29/2001	11/13/2001	< 0.008	0.044 +/-0.002
20010992	11/13/2001	11/27/2001	< 0.008	0.025 +/-0.001
20011029	11/27/2001	12/10/2001	< 0.009	0.024 +/-0.001
20011078	12/10/2001	12/20/2001	< 0.009	0.023 +/-0.002
Average:				0.022
Maximum:				0.044
Minimum:				0.010

Table 1.4

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

LLD (pCi/m <sup>3</sup> )			0.07	0.01
LAB ID	START DATE	END DATE	I-131	GROSS BETA
20010017	12/27/2000	1/9/2001	< 0.009	0.008 +/-0.001
20010058	1/9/2001	1/23/2001	< 0.006	0.020 +/-0.001
20010095	1/23/2001	2/5/2001	< 0.011	0.023 +/-0.001
20010123	2/5/2001	2/19/2001	< 0.006	0.018 +/-0.001
20010155	2/19/2001	3/6/2001	< 0.007	0.017 +/-0.001
20010193	3/6/2001	3/20/2001	< 0.006	0.017 +/-0.001
20010236	3/20/2001	4/3/2001	< 0.006	0.018 +/-0.001
20010304	4/3/2001	4/17/2001	< 0.005	0.018 +/-0.001
20010359	4/17/2001	5/1/2001	< 0.006	0.020 +/-0.001
20010409	5/1/2001	5/15/2001	< 0.008	0.019 +/-0.001
20010443	5/15/2001	5/29/2001	< 0.006	0.018 +/-0.001
20010479	5/29/2001	6/12/2001	< 0.007	0.009 +/-0.001
20010535	6/12/2001	6/26/2001	< 0.006	0.016 +/-0.001
20010575	6/26/2001	7/9/2001	< 0.005	0.011 +/-0.001
20010620	7/9/2001	7/23/2001	< 0.007	0.016 +/-0.001
20010653	7/23/2001	8/6/2001	< 0.007	0.017 +/-0.001
20010681	8/6/2001	8/20/2001	< 0.007	0.014 +/-0.001
20010710	8/20/2001	9/4/2001	< 0.007	0.018 +/-0.001
20010744	9/4/2001	9/17/2001	< 0.007	0.018 +/-0.001
20010805	9/17/2001	10/1/2001	< 0.007	0.030 +/-0.001
20010865	10/1/2001	10/15/2001	< 0.006	0.022 +/-0.001
20010917	10/15/2001	10/29/2001	< 0.007	0.019 +/-0.001
20010962	10/29/2001	11/13/2001	< 0.008	0.039 +/-0.002
20010993	11/13/2001	11/27/2001	< 0.007	0.027 +/-0.001
20011030	11/27/2001	12/10/2001	< 0.008	0.023 +/-0.001
20011079	12/10/2001	12/20/2001	< 0.006	0.024 +/-0.002
Average:				0.019
Maximum:				0.039
Minimum:				0.008

Table 2.1

Sample Type: **Thermoluminescent Dosimeters**  
 Analysis: mR Exposure  
 Units: mrem/Qtr

<b><u>INDICATORS</u></b>	<b><u>1ST QTR</u></b>	<b><u>2ND QTR</u></b>	<b><u>3RD QTR</u></b>	<b><u>4TH QTR</u></b>	<b><u>MEAN</u></b>
TA1	11.54	9.98	9.87	9.70	10.27
TB1	16.04	14.43	13.53	14.39	14.60
TC1	15.45	14.34	13.14	14.00	14.23
TD1	15.21	14.80	13.83	14.10	14.49
TE1	14.74	13.87	13.14	13.71	13.86
TF1	13.67	13.13	12.35	12.73	12.97
TG1	15.57	14.61	13.43	14.68	14.58
TH1	12.02	11.83	11.16	10.87	11.47
TJ1	14.62	12.85	12.35	12.04	12.97
TK1	14.86	13.78	12.64	13.51	13.70
TL1	13.44	13.69	12.74	14.00	13.47
TM1	12.61	12.20	10.47	11.36	11.66
TN1	11.78	11.55	10.76	10.87	11.24
TP1	13.20	12.20	11.26	11.65	12.08
TQ1	10.60	9.98	9.28	9.89	9.94
TR1	10.95	10.62	8.98	9.89	10.11
MAX	16.04	14.80	13.83	14.68	14.60
AVG	13.52	12.74	11.81	12.34	12.60
MIN	10.60	9.98	8.98	9.70	9.94

<b><u>SPECIALS</u></b>	<b><u>1ST QTR</u></b>	<b><u>2ND QTR</u></b>	<b><u>3RD QTR</u></b>	<b><u>4TH QTR</u></b>	<b><u>MEAN</u></b>
TCS	14.03	12.30	11.85	12.04	12.55
TNS	12.85	12.11	11.65	12.04	12.16
TQS1	15.33	14.15	13.43	13.61	14.13
TQS2	13.44	12.48	11.16	12.34	12.35
TRS	15.33	15.36	13.53	13.90	14.53
MAX	15.33	15.36	13.53	13.90	14.53
AVG	14.20	13.28	12.33	12.79	13.15
MIN	12.85	12.11	11.16	12.04	12.16

<b><u>CONTROLS</u></b>	<b><u>1ST QTR</u></b>	<b><u>2ND QTR</u></b>	<b><u>3RD QTR</u></b>	<b><u>4TH QTR</u></b>	<b><u>MEAN</u></b>
TAC	14.15	14.89	14.92	14.78	14.69
TEC	14.50	13.97	13.24	14.00	13.93
TGS	16.16	15.17	14.72	15.37	15.36
MAX	16.16	15.17	14.92	15.37	15.36
AVG	14.94	14.68	14.29	14.72	14.66
MIN	14.15	13.97	13.24	14.00	13.93

	<b><u>INDICATOR</u></b>	<b><u>CONTROL</u></b>	<b><u>SPECIAL</u></b>
MAX	16.04	16.16	15.36
AVG	12.60	14.66	13.15
MIN	8.98	13.24	11.16



Table 3.1

Sample Type: Surface Water

Analysis: Gamma Isotopic and Tritium

Units: pCi/l

LLD (pCi/l)			15	15	30	15	30	15	30	15	15	18	60	15
LAB ID	LOCATION	DATE	MN-54	CO-58	FE-59	CO-60	ZN-65	NB-95	ZR-95	I-131	CS-134	CS-137	BA-140	LA-140
20010096	SWD	2/5/2001	< 5.25	< 3.43	< 5.46	< 4.00	< 6.33	< 3.93	< 5.69	< 4.52	< 3.46	< 4.39	< 11.1	< 2.17
20010098	SWU	2/5/2001	< 4.66	< 4.54	< 7.59	< 5.04	< 6.03	< 4.01	< 7.79	< 3.79	< 5.98	< 5.02	< 16.7	< 5.58
20010319	SWD	4/23/2001	< 3.33	< 3.21	< 8.10	< 4.00	< 6.33	< 5.64	< 6.66	< 3.78	< 4.82	< 3.58	< 14.7	< 4.59
20010320	SWU	4/23/2001	< 4.01	< 5.44	< 9.74	< 4.49	< 7.96	< 3.21	< 8.58	< 5.70	< 4.98	< 4.32	< 14.9	< 4.70
20010622	SWD	7/23/2001	< 6.75	< 4.99	< 6.02	< 5.97	< 11.7	< 4.47	< 9.45	< 5.83	< 5.44	< 7.48	< 21.1	< 7.02
20010623	SWU	7/23/2001	< 7.08	< 5.79	< 8.45	< 6.07	< 6.57	< 4.45	< 9.47	< 5.27	< 4.79	< 5.71	< 18.9	< 5.23
20010898	SWU	10/23/2001	< 5.47	< 6.15	< 7.24	< 5.93	< 4.54	< 4.55	< 6.87	< 5.13	< 5.05	< 6.47	< 15.6	< 3.48
20010900	SWD	10/23/2001	< 5.13	< 4.98	< 8.25	< 5.54	< 8.56	< 4.09	< 8.06	< 4.06	< 4.67	< 5.42	< 16.6	< 6.02

LLD (pCi/l)

3000

LAB ID	LOCATION	DATE	TRITIUM
20010097	SWD	2/5/2001	< 550
20010099	SWU	2/5/2001	< 555
20010321	SWD	4/23/2001	< 548
20010322	SWU	4/23/2001	< 562
20010622	SWD	7/23/2001	< 541
20010623	SWU	7/23/2001	< 540
20010899	SWU	10/23/2001	< 554
20010901	SWD	10/23/2001	< 557

Table 4.1

Sample Type: Groundwater

Analysis: Gamma Isotopic and Tritium

Units: pCi/l

LLD (pCi/l)			15	15	30	15	30	15	30	15	15	18	60	15
LAB ID	LOCATION	DATE	MN-54	CO-58	FE-59	CO-60	ZN-65	NB-95	ZR-95	I-131	CS-134	CS-137	BA-140	LA-140
20010448	WU	5/31/2001	< 5.21	< 3.81	< 8.81	< 3.51	< 7.39	< 5.42	< 8.74	< 5.66	< 4.30	< 4.71	< 15.6	< 6.00
20010450	WD	5/31/2001	< 4.92	< 6.30	< 13.1	< 5.57	< 10.8	< 7.02	< 8.35	< 6.34	< 5.37	< 6.80	< 22.2	< 5.22
20011057	WD	12/17/2001	< 6.80	< 7.12	< 14.0	< 5.06	< 12.8	< 6.79	< 10.4	< 7.30	< 6.23	< 7.51	< 22.0	< 4.56
20011059	WU	12/17/2001	< 6.56	< 6.14	< 10.8	< 4.61	< 18.6	< 7.97	< 11.9	< 6.16	< 7.71	< 5.44	< 23.1	< 9.53

LLD(pCi/l)			3000	
LAB ID	LOCATION	DATE	TRITIUM	
20010449	WU (Control)	5/31/2001	< 543	
20010451	WD (Indicator)	5/31/2001	< 544	
20011058	WD (Indicator)	12/17/2001	< 535	
20011060	WU (Control)	12/17/2001	< 539	

Table 5.1

Sample Type: Shoreline Sediment

Analysis: Gamma Isotopic

Units: pCi/kg, dry

LLD (pCi/kg)		150	180
LAB ID	DATE	CS-134	CS-137
20020029	1/14/2002*	< 25.2	< 37.5

\* Sample collected during January, 2002, due to high river stages during scheduled collection period

Table 6.1

Sample Type: Food Products

Analysis: Gamma Isotopic

Units: pCi/kg, wet

LLD(pCi/kg, wet)			60	60	80
LAB ID	DATE	LOCATION	I-131	CS-134	CS-137
20010029	1/11/2001	GN1 (Indicator)	< 27.1	< 26.5	< 30.0
20010070	1/30/2001	GQC (Control)	< 40.9	< 30.8	< 44.8
20010318	4/23/2001	GN1 (Indicator)	< 31.1	< 32.4	< 37.2
20010410	5/15/2001	GQC (Control)	< 46.3	< 37.2	< 46.7
20010621	7/23/2001	GN1 (Indicator)	< 28.5	< 22.4	< 32.1
20010659	8/13/2001	GQC (Control)	< 24.3	< 24.4	< 24.8
20010897	10/23/2001	GN1 (Indicator)	< 45.6	< 58.1	< 36.7
20010970	11/20/2001	GQC (Control)	< 30.5	< 26.7	< 28.9'

Table 7.1

Sample Type: **Fish**

Analysis: Gamma Isotopic

Units: pCi/kg, wet

LLD(pCi/kg, wet)			130	130	260	130	260	130	150
LAB ID	DATE	LOCATION	MN-54	C0-58	FE-59	CO-60	ZN-65	CS-134	CS-137
20011096	12/31/2001	FU (Control)	< 89.6	< 67.1	< 165	< 68.0	< 165	< 88.6	< 89.2
20011097	12/31/2001	FD (Indicator)	< 78.9	< 110	< 159	< 130	< 201	< 87.2	< 90.6

Table 8.1

Sample Type: **Sediments (Special)**

Analysis: Gamma Isotopic

Units: pCi/kg, dry

LLD (pCi/kg, dry)			150	180
LAB ID	DATE	LOCATION	CS-134	CS-137
20010180	3/7/2001	WEST CREEK	< 17.6	< 18.7
20010181	3/7/2001	EAST CREEK	< 13.9	< 12.0
20010413	5/16/2001	EAST CREEK	< 12.7	< 15.0
20010414	5/16/2001	WEST CREEK	< 16.2	< 17.4
20010662	8/14/2001	WEST CREEK	< 17.6	< 22.7
20010663	8/14/2001	EAST CREEK	< 14.8	< 12.4
20010936	11/5/2001	WEST CREEK	< 15.6	< 13.1
20010937	11/5/2001	EAST CREEK	< 16.9	< 17.6

Table 9.1

Sample Type: **Wastewater Treatment Plant Effluent (Special)**

Analysis: Gamma Isotopic

Units: pCi/l

LLD (pCi/l)		15	15	30	15	30	15	30	15	15	18	60	15
LAB ID	DATE	MN-54	CO-58	FE-59	CO-60	ZN-65	NB-95	ZR-95	I-131	CS-134	CS-137	BA-140	LA-140
20010084	1/31/2001	< 3.91	< 4.49	< 12.0	< 4.41	< 8.12	< 6.12	< 3.85	< 6.47	< 6.73	< 4.51	< 24.6	< 4.84
20010150	2/28/2001	< 6.20	< 5.54	< 11.1	< 4.58	< 7.14	< 4.37	< 7.31	< 5.50	< 5.30	< 4.95	< 13.5	< 6.38
20010231	3/28/2001	< 3.02	< 3.87	< 8.85	< 5.52	< 8.53	< 4.85	< 6.99	< 5.23	< 5.10	< 3.24	< 20.0	< 8.00
20010337	4/25/2001	< 4.01	< 2.96	< 8.62	< 5.42	< 8.71	< 3.53	< 9.32	< 5.96	< 6.15	< 6.01	< 14.7	< 4.36
20010452	5/30/2001	< 4.20	< 3.71	< 7.58	< 4.08	< 7.78	< 2.53	< 7.00	< 4.58	< 3.74	< 4.93	< 13.1	< 3.96
20010544	6/28/2001	< 4.04	< 2.89	< 5.39	< 4.07	< 6.59	< 3.65	< 5.62	< 3.71	< 4.11	< 3.32	< 12.4	< 5.29
20010627	7/26/2001	< 3.57	< 4.23	< 6.86	< 5.54	< 10.5	< 4.60	< 7.07	< 3.36	< 4.91	< 5.52	< 15.3	< 5.61
20010706	8/30/2001	< 3.67	< 2.61	< 4.24	< 4.49	< 10.3	< 4.06	< 6.93	< 3.21	< 4.04	< 4.28	< 12.5	< 4.53
20010796	9/26/2001	< 3.22	< 3.68	< 8.31	< 4.67	< 7.35	< 4.58	< 7.63	< 4.77	< 4.51	< 4.11	< 13.3	< 5.31
20010944	10/31/2001	< 7.78	< 6.28	< 20.1	< 8.40	< 15.1	< 10.2	< 11.0	< 14.8	< 8.91	< 8.48	< 37.0	< 11.0
20011001	11/29/2001	< 6.88	< 7.71	< 12.0	< 9.85	< 12.8	< 5.04	< 7.52	< 4.55	< 6.57	< 5.72	< 22.1	< 4.62
20011087	12/26/2001	< 4.63	< 5.43	< 10.7	< 4.35	< 11.3	< 6.03	< 4.81	< 4.71	< 4.76	< 5.45	< 21.0	< 6.11

Table 10.1

Sample Type: **Interlaboratory Comparison**

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

Sample Type (units)	Study	Date	Analysis	Known Value <sup>a</sup>	RBS Value	RBS N-Dev <sup>b</sup>	RBS N-Range <sup>c</sup>
Air Filter (pCi/filter)	E2818-125	9/20/01	BETA	90.0 ± 17.3	93.0	0.60	0.065
Charcoal Cartridge (pCi/cartridge)	E2673A-125	6/14/01	I-131	80.0 ± 13.9	79.8	-0.04	0.148
	E2908-125	12/6/01	I-131	91.0 ± 15.8	90.8	-0.03	0.467
Water (pCi/liter)	E2576-125	3/22/01	BETA	168 ± 43.7	162	-0.44	0.211
	E2574-125	3/22/01	CR-51	242 ± 21.0	240	-0.29	0.391
			MN-54	101 ± 8.75	104	1.03	0.234
			CO-58	48.0 ± 8.66	47.2	-0.28	0.189
			FE-59	84.0 ± 8.66	89.5	1.91	0.992
			CO-60	147 ± 12.7	144	-0.63	0.643
			ZN-65	186 ± 32.2	180	-0.59	0.064
			I-131	90.0 ± 15.6	89.6	-0.08	0.965
			CS-134	129 ± 11.2	132	0.90	0.733
			CS-137	102 ± 8.83	101	-0.37	0.845
			CE-141	94.0 ± 8.66	93.4	-0.21	0.697
	E2575-125 (Duplicate)	3/22/01	CR-51	242 ± 21.0	251	1.24	2.734
			MN-54	101 ± 8.75	103	0.57	0.234
			CO-58	48.0 ± 8.66	52.3	1.48	0.295
			FE-59	84.0 ± 8.66	91.6	2.63	0.697
			CO-60	147 ± 12.7	140	-1.57	0.321
			ZN-65	186 ± 32.2	187	0.09	0.349
			I-131	90.0 ± 15.6	93.7	0.72	1.523
			CS-134	129 ± 11.2	128.7	-0.09	0.733
			CS-137	102 ± 8.83	99.8	-0.76	0.220
			CE-141	94.0 ± 8.66	94.9	0.32	0.591

Table 10.1

Sample Type: **Interlaboratory Comparison**

Analysis: Tritium and Gamma Isotopic

Sample Type (units)	Study	Date	Analysis	Known Value <sup>a</sup>	RBS Value	RBS N-Dev <sup>b</sup>	RBS N-Range <sup>c</sup>
Water (pCi/liter)	E2674-125	6/14/01	H-3	7494 ± 1298	7635	0.33	0.130
	E2816-125	9/20/01	CR-51	265 ± 23.0	269	0.48	1.382
			MN-54	149 ± 12.9	155	1.39	0.000
			CO-58	128 ± 11.1	127	-0.27	0.369
			FE-59	62.0 ± 8.66	70.0	2.84	0.473
			CO-60	193 ± 16.7	197	0.78	0.551
			ZN-65	184 ± 31.9	185	0.06	0.032
			I-131	60.0 ± 10.4	59.0	-0.19	0.276
			CS-134	116 ± 10.1	109	-2.09	0.204
			CS-137	232 ± 20.1	233	0.15	0.815
			CE-141	88.0 ± 8.66	91.0	1.17	1.004
	E2817-125 (Duplicate)	9/20/01	CR-51	265 ± 23.0	269	0.57	0.401
			MN-54	149 ± 12.9	155	1.47	0.159
			CO-58	128 ± 11.1	128	0.09	0.646
			FE-59	62.0 ± 8.66	71	3.24 <sup>d</sup>	0.366
			CO-60	193 ± 16.7	195	0.30	0.796
			ZN-65	184 ± 31.9	189	0.44	0.225
			I-131	60.0 ± 10.4	59.7	-0.09	0.226
			CS-134	116 ± 10.1	111	-1.39	0.306
			CS-137	232 ± 20.1	230	-0.35	0.153
			CE-141	88.0 ± 8.66	94	2.24	0.236



Table 10.1

Sample Type: **Interlaboratory Comparison**

Analysis: Gamma Isotopic

Sample Type (units)	Study	Date	Analysis	Known Value <sup>a</sup>	RBS Value	RBS N-Dev <sup>b</sup>	RBS N-Range <sup>c</sup>
<b>Sediment</b> (pCi/gram)	E2909-125	12/6/01	CR-51	0.631 ± 0.055	0.613	-0.97	0.600
			MN-54	0.189 ± 0.033	0.207	1.69	0.241
			Co-58	0.115 ± 0.010	0.117	0.68	0.267
			FE-59	0.129 ± 0.022	0.145	2.10	0.545
			CO-60	0.449 ± 0.039	0.465	1.21	0.465
			ZN-65	0.262 ± 0.045	0.288	1.70	0.187
			CS-134	0.252 ± 0.022	0.250	-0.29	0.319
			CS-137	0.531 ± 0.046	0.537	0.39	0.707
			CE-141	0.481 ± 0.042	0.498	1.20	0.069

**NOTES:**

- (a) The "known" values are listed with a range reflecting control (3 sigma) limits.
- (b) The normalized deviation from the "known" value is computed from the deviation and the standard error of the mean;  $\pm 2.000$  is the warning limit and  $\pm 3.000$  is the control limit. This is a measure of accuracy of the analytical methods.
- (c) The normalized range is computed 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. This is a measure of precision of the analytical methods.
- (d) The results reported were out of the control limits.

**Interlaboratory Comparison Program Exceptions:**

There was one result outside the control limits (3 sigma) for accuracy in the 2001 cross check program. This result was related to a gamma isotopic analysis of a water sample.

The nuclide, Fe-59, was bias high in a gamma isotopic analysis, with a normalized deviation of 3.24, with control limits of  $\pm 3.00$ . This result is considered conservative. The bias high results for Fe-59 is contributed to coincidence summing effects. A summing correction was employed in the past, but was discontinued due to the production of non-conservative low bias results. Other Fe-59 analyses during the year were all within acceptable limits.

There is no impact assessed on previously reported data due to the bias high result of Fe-59. Environmental samples are analyzed and reported with a ninety-five percent confidence level that the analytical result with its associated error encompasses the "true" value. Ninety-eight percent of RBS environmental crosscheck results were within control limits for accuracy during 2001.