



Entergy Operations, Inc.
River Bend Station
5485 U.S. Highway 61
P. O. Box 220
St. Francisville, LA 70775
Tel 225 336 6225
Fax 225 635 5068

Rick J. King
Director
Nuclear Safety Assistant

April 24, 2001

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Subject: Radiological Environmental Operating Report for 2000
River Bend Station
License No. NPF-47
Docket No. 50-458

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

RBG-45717
RBF1-01-0092

Ladies and Gentlemen:

Enclosed is the River Bend Station (RBS) Annual Radiological Environmental Operating Report for the period January 1, 2000 through December 31, 2000. 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 black ink, appearing to read "Rick J. King".

RJK/DNL
enclosure

Cool

Radiological Environmental Operating Report for 2000

April 24, 2001

RBG-45717

RBF1-00-0092

Page 2 of 2

**cc: U.S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011**

**NRC Resident Inspector
PO Box 1050
St. Francisville, LA 70775**

**Mr. Robert E. Moody, Project Manager
U.S. Nuclear Regulatory Commission
Mail Stop 0-7D1
Washington, DC 20555**

RIVER BEND STATION

**ANNUAL RADIOLOGICAL ENVIRONMENTAL
OPERATING REPORT FOR 2000**

TABLE OF CONTENTS

SUMMARY	1
1.0 INTRODUCTION	5
1.1 Radiological Environmental Monitoring Program	5
1.2 Pathways Monitored	5
1.3 Land Use Census	5
2.0 INTERPRETATION AND TRENDS OF RESULTS	16
2.1 Air Particulate and Radioiodine Sample Results	16
2.2 Thermoluminescent Dosimetry Sample Results	16
2.3 Water Sample Results	16
2.4 Sediment Sample Results	17
2.5 Milk Sample Results	17
2.6 Fish and Invertebrate Sample Results	18
2.7 Food Product Sample Results	18
2.8 Land Use Census Results	18
2.9 Interlaboratory Comparison Results	18
3.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY	21
3.1 2000 Program Results Summary	21

LIST OF TABLES

TABLE 1.1	RADIOLOGICAL ENVIRONMENTAL SAMPLING PROGRAM	7
TABLE 2.1	LAND USE CENSUS RESULTS	19
TABLE 3.1	RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY	22

LIST OF FIGURES

FIGURE 1-1	EXPOSURE PATHWAYS	13
FIGURE 1-2	SAMPLE COLLECTION SITES – NEAR FIELD	14
FIGURE 1-3	SAMPLE COLLECTION SITES – FAR FIELD	15
FIGURE 2-1	TLD RADIATION DOSE	20

LIST OF ATTACHMENTS

ATTACHMENT 1	2000 RADIOLOGICAL MONITORING REPORT SUMMARY OF MONITORING RESULTS	27
---------------------	--	-----------

Summary

The Annual Radiological Environmental Operating Report presents data obtained through analyses of environmental samples collected for River Bend Station (RBS) Radiological Environmental Monitoring Program (REMP) for the period January 1, 2000 through December 31, 2000. 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 2000, REMP results remained at background levels, as has been the case in previous years.

Tritium was detected in the indicator (SWD) and control (SWU) surface water locations, and in the indicator (WD) and control (WU) groundwater locations during 2000. However, the activities detected were well below the Lower Limits of Detection (LLD) specified in RBS TRM, and are considered background.

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 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 2000, 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 2000 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 2000. 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, 2000 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 2000. 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 an 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 2000 due to unavailability. 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 within the acceptable limits required by the technical specifications.

◆ **Air Samples**

Listed below are air sampler deviations that occurred during 2000 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
ANI	03/21/2000 – 04/04/2000	Weather Outage	Sample period shortened by 5.7 hours resulting in 2% loss of sample volume.
AP1			Sample period shortened by 5.8 hours resulting in 2% loss of sample volume.
AQS2			Sample period shortened by 11.9 hours resulting in 4% loss of sample volume.
AGC			Sample period shortened by 1 hour resulting in 0.3% loss of sample volume.
ANI	06/13/2000 – 06/27/2000	Weather Outage	Sample period shortened by 67 hours resulting in 20% loss of sample volume.
AP1			Sample period shortened by 3.2 hours resulting in 0.9% loss of sample volume.
ANI	07/25/2000 – 08/07/2000	Power Outage	Sample period shortened by 5 – 6 hours resulting in <2% loss of sample volume.
AP1			Sample period shortened by 5 – 6 hours resulting in <2% loss of sample volume.
ANI	07/07/2000 – 08/21/2000	Weather Outage	Sample period shortened by 1.1 hours resulting in 0.3% loss of sample volume.
AP1			Sample period shortened by 2.9 hours resulting in 0.9 loss of sample volume.
AP1	08/21/2000 – 09/05/2000	Sampler Failure	Sample period shortened by 328.8 hours resulting in 91% loss of sample volume.

◆ **Missed Samples**

No missed samples occurred during the 2000 sampling period.

◆ **Unavailable Results**

There were no unavailable results during the year 2000.

Program Modifications

RBS made no modifications to the REMP during the year 2000.

Attachments

Attachment 1 contains results of air, TLD, water, sediment, fish, food products and special samples collected in 2000. 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 2000.

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 2000 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 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 m² (500 ft²) 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	<u>Radioiodine and Particulates</u> 2 samples from close to the 2 SITE BOUNDARY locations, in different sectors, of the highest calculated annual average groundlevel D/Q.	AN1 (0.9 km W) - RBS site Hwy 965; 0.4 km south of Activity Center. AP1 (0.9 km WNW) - Behind River Bend Station Activity Center.	Continuous sampler operation with sample collection every two weeks, or more frequently if required by dust loading.	Radioiodine Cannisters - I-131 analysis every two weeks. Particulate Sampler - Gross beta radioactivity analysis following filter change.
	<u>Radioiodine and Particulates</u> 1 sample from the vicinity of a community having the highest calculated annual average groundlevel D/Q.	AQS2 (5.8 km NW) - St. Francis Substation on US Hwy. (Bus.) 61 in St. Francisville.		
	<u>Radioiodine and Particulates</u> 1 sample from a control location, as for example 15 - 30 km distance and in the least prevalent wind direction.	AGC (17.0 km SE) - Entergy Service Center compound in Zachary. (Control)		
Direct Radiation	<u>TLDs</u> One ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY.	TA1 (1.7 km N) - River Bend Training Center. TB1 (0.5 km NNE) - Utility pole near River Bend Station cooling tower yard area. TC1 (1.7 km NE) - 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><u>TLDs</u> One ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY.</p>	<p>TD1 (1.6 km ENE) – Stub pole along WF7, 150m S of Jct. WF7 and US Hwy. 61.</p> <p>TE1 (1.3 km E) – Stub pole along WF7, 1 km S of Jct. WF7 and US Hwy. 61.</p> <p>TF1 (1.3 km ESE) – Stub pole along WF7, 1.6 km S of Jct. WF7 and US Hwy. 61.</p> <p>TG1 (1.6 km SE) – Stub pole along WF7, 2 km S of Jct. WF7 and US Hwy. 61.</p> <p>TH1 (1.7 km SSE) – Stub pole at power line crossing of WF7 (near Grants Bayou).</p> <p>TJ1 (1.5 km S) – Stub pole near River Bend Station Gate #23 on Powell Station Road (LA Hwy. 965).</p> <p>TK1 (0.9 km SSW) – Utility pole on Powell Station Road (LA Hwy. 965), 20 m S of River Bend Station River Access Road.</p> <p>TL1 (1.0 km SW) – 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>TLDs One ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY.</p>	<p>TM1 (0.9 km WSW) - Third utility pole on Powell Station Road (LA Hwy. 965) N of former Illinois Central Gulf RR crossing.</p> <p>TN1 (0.9 km W) - Utility pole along Powell Station Road (LA Hwy. 965), near garden and AN1 air sampler location.</p> <p>TP1 (0.9 km WNW) - Behind River Bend Station Activity Center at AP1 air sampler location.</p> <p>TQ1 (0.6 km NW) - Access from MA-1 on RBS North Access Road.</p> <p>TR1 (0.8 km NNW) - River Bend Station North Access Road across from Main Plant entrance.</p>	Quarterly	mR exposure quarterly.
	<p>TLDs The balance of the stations (8) to be placed in special interest areas such as population centers, nearby residences, schools, and in 1 or 2 areas to serve as control locations.</p>	<p>TAC (15.8 km N) - Utility pole at Jct. of US Hwy. 61 and LA Hwy. 421, 7.9 km north of Bains. (Control)</p> <p>TCS (12.3 km NE) - Utility pole at gate to East Louisiana State Hospital in Jackson. (Special)</p> <p>TEC (16.0 km E) - 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

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

Table 1.1

Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Waterborne	<u>Groundwater</u> Samples from 1 or 2 sources only if likely to be affected.	WU (~470 m NNE) - Upland Terrace Aquifer well upgradient from plant. WD (~470 m SW) - Upland Terrace Aquifer well downgradient from plant.	Semiannually	Gamma isotopic and tritium analysis semiannually.
	<u>Sediment From Shoreline</u> 1 sample from downstream area with existing or potential recreational value.	SEDD (7.75 km S) - Mississippi River about 4 km downstream from plant liquid discharge outfall, near paper mill.	Annually	Gamma isotopic analysis annually.
Ingestion	<u>Milk</u> 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.
	<u>Fish and Invertebrates</u> 1 sample of a commercially and/or recreationally important species in vicinity of plant discharge area. 1 sample of similar species in area not influenced by plant discharge.	FD (7.75 km S) - One sample of a commercially and/or recreationally important species from downstream area influenced by plant discharge. FU (4.0 km WSW) - One sample of a commercially and/or recreationally important species from upstream area not influenced by plant discharge.	Annually	Gamma isotopic analysis on edible portions annually

Table 1.1

Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Ingestion	<p>Food Products</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>GN1 (0.9 km W) – Sampling will be performed in accordance with Table 3.12.1-1 Section 4.a of the Technical Requirements Manual.</p> <p>GQC (32.0 km NW) - One sample of similar vegetables from LA State Penitentiary at Angola. (Control)</p>	Quarterly during the growing season.	Gamma isotopic and I-131 analysis quarterly.

FIGURE 1-1
EXPOSURE PATHWAYS

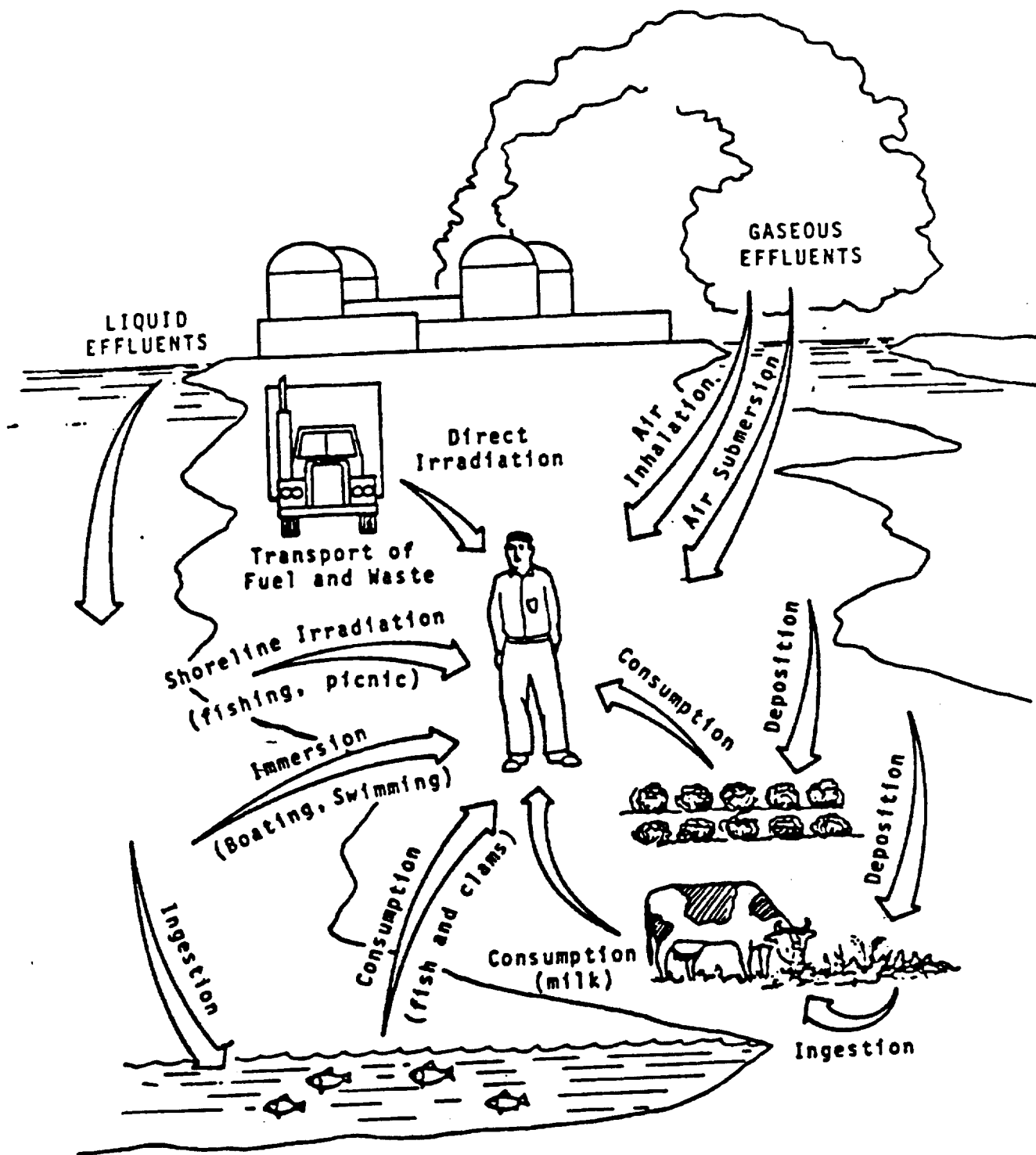


FIGURE 1-2
SAMPLE COLLECTION SITES - NEAR FIELD

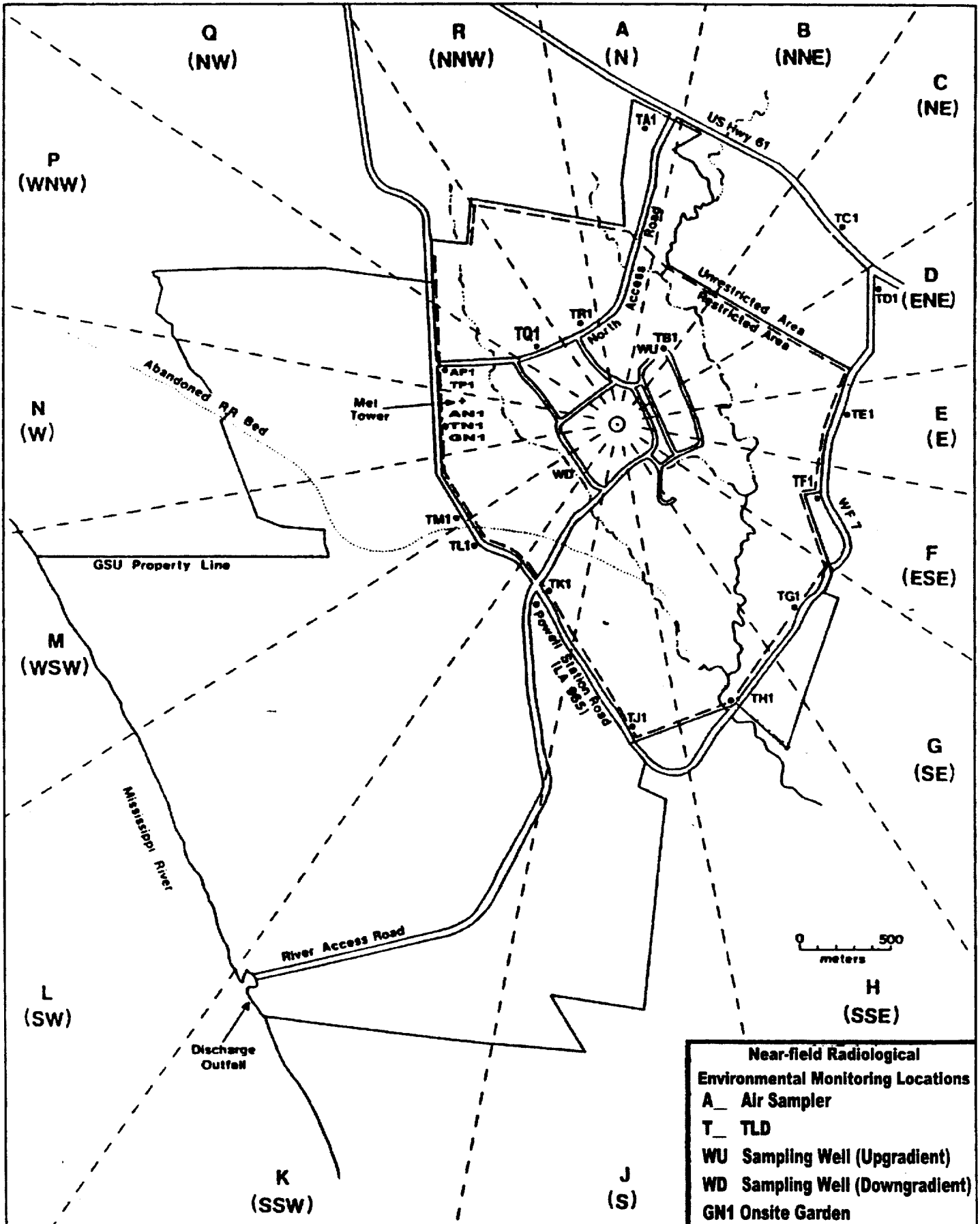
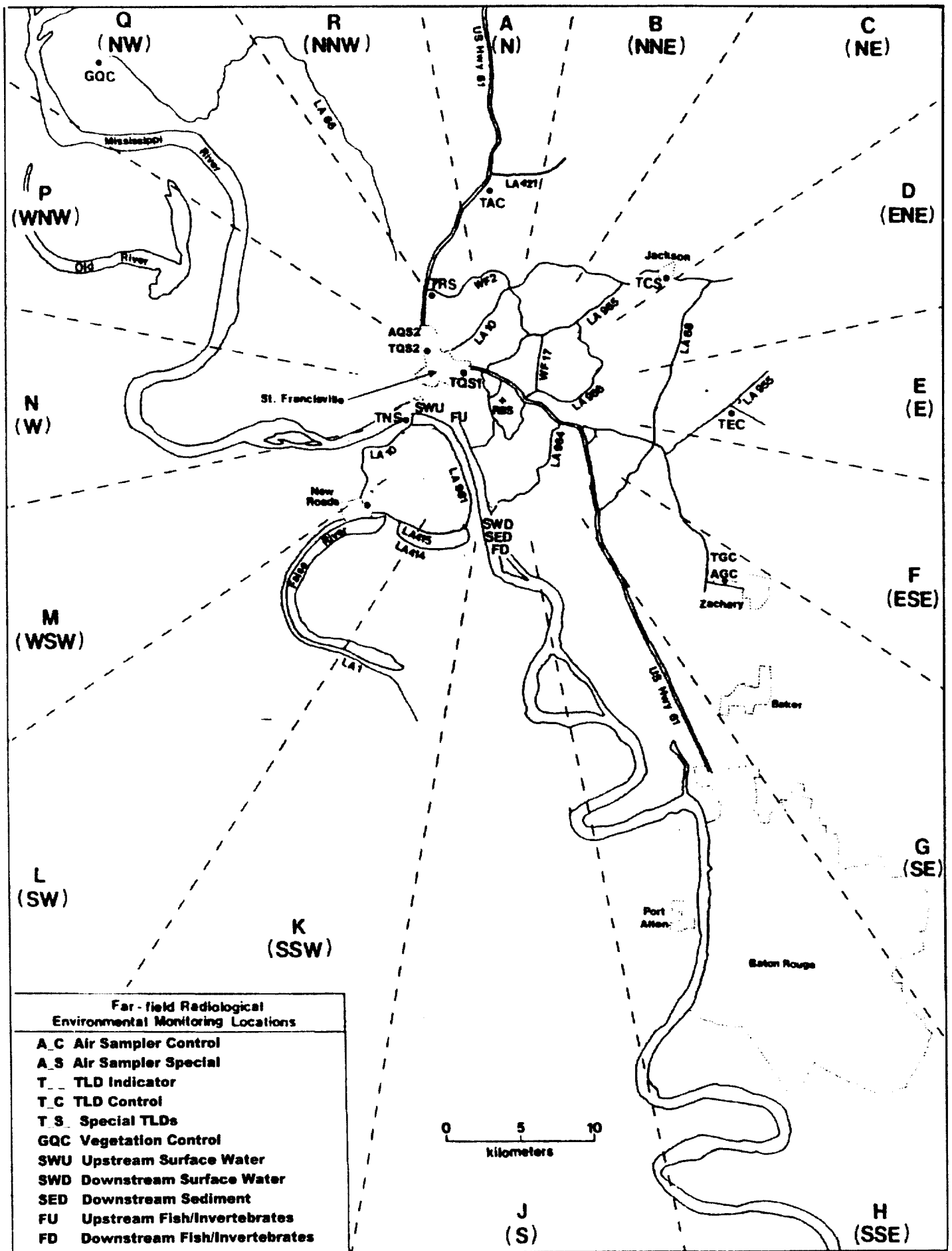


FIGURE 1-3
SAMPLE COLLECTION SITES - FAR FIELD



2.0 Interpretation and Trends of Results

2.1 Air Particulate and Radioiodine Sample Results

Iodine-131 was not detected in the radioiodine cartridges during 2000, as has been the case in previous years. Indicator gross beta air particulate results for 2000 were similar to preoperational and operational levels as seen below. Results are reported as annual average pCi/m³.

<u>Monitoring Period</u>	<u>Result</u>
Preoperational	0.03
1999	0.02
2000	0.02

Table 3.1, which includes gross beta concentrations, provides a comparison of the indicator and control means, further emphasizes that the airborne pathway continues to remain at background levels.

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 - 2000 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 2000 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 with tritium detected at background levels at both locations. Listed below is a comparison of 2000 results from the indicator location as compared to the preoperational and operational years. Results are reported as annual average pCi/l.

<u>Radionuclide</u>	<u>2000</u>	<u>1995 - 1999</u>	<u>Preoperational</u>
Gammas	<LLD	<LLD	<LLD
Tritium	367.0	213.7	<LLD

Groundwater 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, with tritium detected at background levels at both locations. Listed below is a comparison of 2000 results from the indicator location as compared to the preoperational and operational years. Results are reported as annual average pCi/l.

<u>Radionuclide</u>	<u>2000</u>	<u>1995 - 1999</u>	<u>Preoperational</u>
Gammas	<LLD	<LLD	<LLD
Tritium	325.0	<LLD	<LLD

Based on these comparisons, the operation of RBS had no impact on this pathway during 2000, 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 2000 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 2000 and analyzed for gamma radionuclides. In 2000, 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 2000 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 2000 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 2000.

2.6 Fish and Invertebrate Sample Results

Fish samples were collected from two locations (indicator and control) and analyzed for gamma radionuclides. In 2000, 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 2000 and analyzed for Iodine-131 and gamma radionuclides. The 2000 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, 2000 Radiological Environmental Monitoring Report, contains these results. RBS's review of interlaboratory comparison indicated that 96% of the sample results for accuracy and precision 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

Item	Sector	Direction	Nearest Residence	Range (km)	Nearest Milk Animal	Range (km)
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 ¹	2.9	-	-
7	G	SE	Mills	6.6	-	-
8	H	SSE	Hubbard	1.7	-	-
9	J	S	Knecht ²	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 ³	1.7	-	-

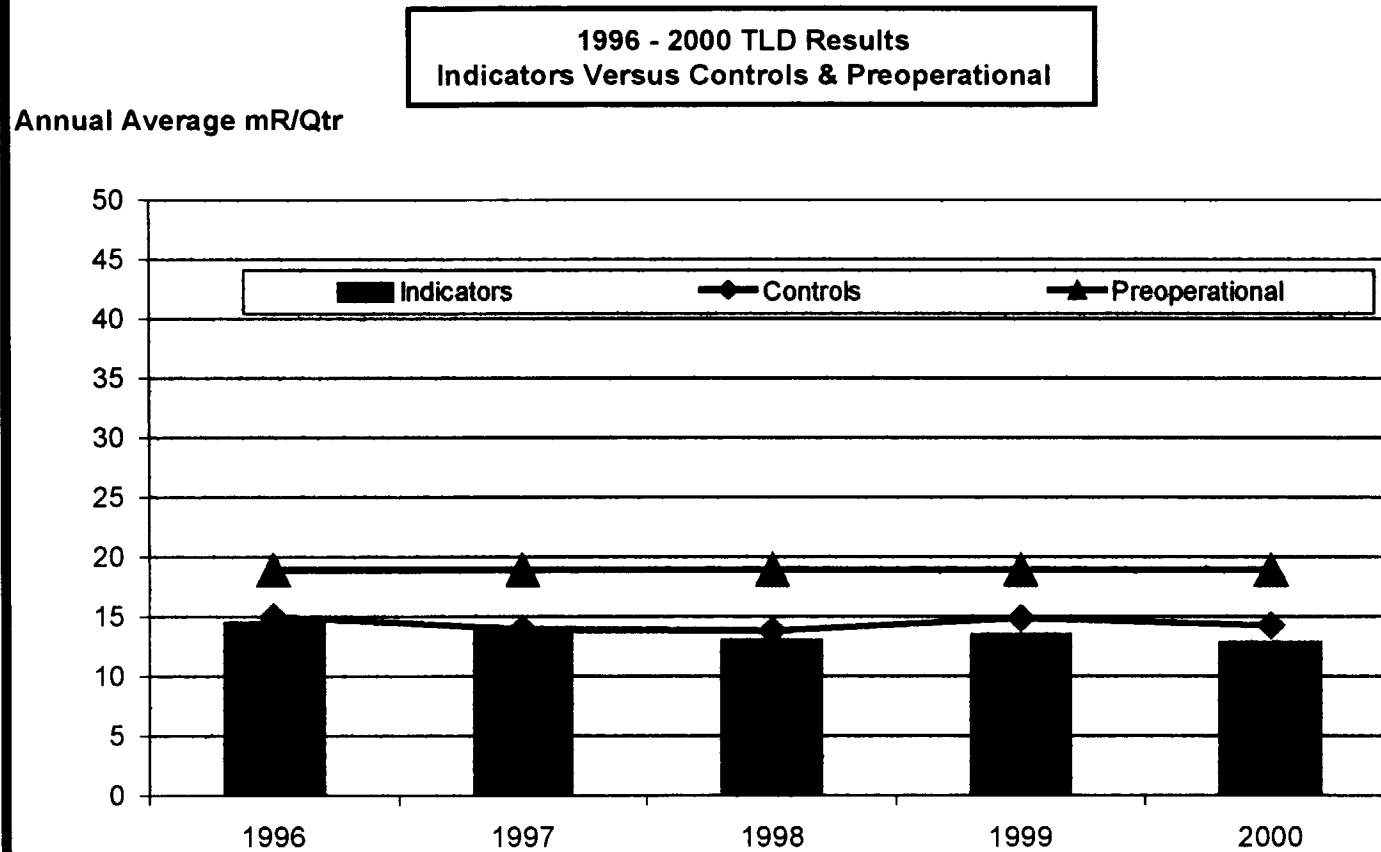
¹ New range calculated for resident in sector F; 2.9 km compared to 2.1 km.

² New resident in sector J, with no change in range.

³ New resident at same location in sector R.

Figure 2-1

TLD Radiation Dose



3.0 Radiological Environmental Monitoring Program Summary

3.1 2000 Program Results Summary

Table 3.1 summarizes the 2000 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: **50-458**Location of Facility: **West Feliciana Parish, Louisiana** Reporting Period: **January - December 2000**

Sample Type (Units)	Type & Number of Analyses ^a	LLD ^b	Indicator Locations Mean (F) ^c [Range]	Location with Highest Annual Mean		Control Locations Mean (F) ^c [Range]	Number of Nonroutine Results ^e
				Location ^d	Mean (F) ^c [Range]		
Air Particulates (pCi/m ³)	GB 104	0.01	0.02 (52 / 52) [0.01 - 0.05]	AN1 (0.99 km W)	0.02 (26 / 26) [0.01 - 0.05]	0.03 (52 / 52) [0.01 - 0.05]	0
				AP1 (0.9 km WNW)	0.02 (26 / 26) [0.01 - 0.05]		
Airborne Iodine (pCi/m ³)	I-131 104	0.07	<LLD	N/A	N/A	<LLD	0
Inner Ring TLDs (mR/Qtr)	Gamma 64	(f)	12.83 (64 / 64) [9.02 – 16.67]	TG1 (1.6 km SE)	15.37 (4 / 4) [14.55 – 16.67]	N/A	0
Special Interest TLDs (mR/Qtr)	Gamma 20	(f)	13.20 (20 / 20) [11.49 – 15.34]	TRS (9.2 km NNW)	14.56 (4 / 4) [14.26 – 14.94]	N/A	0
Control TLDs (mR/Qtr)	Gamma 12	(f)	N/A	N/A	N/A	14.31 (12 / 12) [12.16 – 16.98]	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 2000

Sample Type (Units)	Type & Number of Analyses ^a	LLD ^b	Indicator Location Mean (F) ^c [Range]	Location with Highest Annual Mean		Control Locations Mean (F) ^c [Range]	Number of Nonroutine Results ^e
				Location ^d	Mean (F) ^c [Range]		
Surface Water (pCi/l)	H-3 8	3000	367.0 (1 / 4) [N/A]	SWD (7.75 km S)	367.0 (1 / 4) [N/A]	313.0 (1 / 4) [N/A]	0
	GS 8						
	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 2000

Sample Type (Units)	Type & Number of Analyses ^a	LLD ^b	Indicator Locations Mean (F) ^c [Range]	Location with Highest Annual Mean		Control Locations Mean (F) ^c [Range]	Number of Nonroutine Results ^e
				Location ^d	Mean (F) ^c [Range]		
Groundwater (pCi/l)	H-3 4	3000	290.0 (2 / 2) [255.0 – 325.0]	WD (~470 m SW)	290.0 (2 / 2) [255.0 – 325.0]	259.0 (1 / 2) [N/A]	0
	GS 4						
	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
Bottom Sediment (pCi/kg)	GS 1						
	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 2000

Sample Type (Units)	Type & Number of Analyses ^a	LLD ^b	Indicator Location Mean (F) ^c [Range]	Location with Highest Annual Mean		Control Locations Mean (F) ^c [Range]	Number of Nonroutine Results ^c
				Location ^d	Mean (F) ^c [Range]		
Fish (pCi/kg)	GS 2						
	Mn-54	130	<LLD	N/A	N/A	<LLD	0
	Fe-59	260	<LLD	N/A	N/A	<LLD	0
	Co-58	130	<LLD	N/A	N/A	<LLD	0
	Co-60	130	<LLD	N/A	N/A	<LLD	0
	Zn-65	260	<LLD	N/A	N/A	<LLD	0
	Cs-134	130	<LLD	N/A	N/A	<LLD	0
	Cs-137	150	<LLD	N/A	N/A	<LLD	0
Food Products (pCi/kg)	I-131 8	60	<LLD	N/A	N/A	<LLD	0
	GS 8						
	Cs-134	60	<LLD	N/A	N/A	<LLD	0
	Cs-137	80	<LLD	N/A	N/A	<LLD	0
Special Sediment (East & West Creek) (pCi/kg)	GS 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 2000

Sample Type (Units)	Type & Number of Analyses ^a	LLD ^b	Indicator Location Mean (F) ^c [Range]	Location with Highest Annual Mean		Control Locations Mean (F) ^c [Range]	Number of Nonroutine Results ^e
				Location ^d	Mean (F) ^c [Range]		
Special Wastewater (Sewage Plant Effluent) (pCi/l)	GS 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

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

Attachment 1

2000 Radiological Monitoring Report

Summary of Monitoring Results

TABLE OF CONTENTS

TABLE 1.1	AIR PARTICULATE FILTER	29
TABLE 1.2	RADIOIODINE CARTRIDGE	30
TABLE 2.1	THERMOLUMINESCENT DOSIMETERS	31
TABLE 2.2	THERMOLUMINESCENT DOSIMETERS	32
TABLE 3.1	SURFACE WATER	33
TABLE 4.1	GROUNDWATER	34
TABLE 5.1	SEDIMENT	35
TABLE 6.1	FISH	36
TABLE 7.1	FOOD PRODUCTS	37
TABLE 8.1	SEDIMENT (SPECIAL)	38
TABLE 9.1	SEWAGE EFFLUENT WASTEWATER (SPECIAL)	39
TABLE 10.1	INTERLABORATORY COMPARISON	40

Table I.1

Sample Type: Air Particulate Filter

Analysis: Gross Beta

Units: pCi/m³

Start Date	End Date	AN1 (Indicator)	AP1 (Indicator)	AQS2 (Control)	AGC (Control)
<u>Required LLD</u> →		<u>0.01</u>	<u>0.01</u>	<u>0.01</u>	<u>0.01</u>
12/27/1999	01/10/2000	0.02	0.03	0.03	0.03
01/10/2000	01/24/2000	0.02	0.02	0.02	0.02
01/24/2000	02/07/2000	0.03	0.03	0.04	0.04
02/07/2000	02/21/2000	0.03	0.03	0.03	0.03
02/21/2000	03/06/2000	0.02	0.02	0.02	0.02
03/06/2000	03/21/2000	0.01	0.01	0.02	0.01
03/21/2000	04/04/2000	0.02	0.02	0.02	0.02
04/04/2000	04/18/2000	0.01	0.01	0.02	0.02
04/18/2000	05/01/2000	0.02	0.02	0.02	0.02
05/01/2000	05/15/2000	0.02	0.02	0.02	0.02
05/15/2000	05/30/2000	0.02	0.02	0.02	0.02
05/30/2000	06/13/2000	0.01	0.02	0.02	0.02
06/13/2000	06/27/2000	0.01	0.02	0.02	0.02
06/27/2000	07/12/2000	0.02	0.02	0.02	0.02
07/12/2000	07/25/2000	0.03	0.03	0.03	0.03
07/25/2000	08/07/2000	0.02	0.02	0.02	0.02
08/07/2000	08/21/2000	0.02	0.03	0.03	0.03
08/21/2000	09/05/2000	0.03	0.04	0.03	0.03
09/05/2000	09/18/2000	0.02	0.01	0.02	0.01
09/18/2000	10/03/2000	0.02	0.01	0.02	0.01
10/03/2000	10/17/2000	0.03	0.02	0.03	0.02
10/17/2000	10/31/2000	0.05	0.04	0.05	0.05
10/31/2000	11/14/2000	0.04	0.03	0.03	0.03
11/14/2000	11/27/2000	0.03	0.03	0.03	0.03
11/27/2000	12/12/2000	0.04	0.05	0.04	0.03
12/12/2000	12/27/2000	0.03	0.03	0.03	0.03

Table 1.2

Sample Type: Radioiodine Cartridge

Analysis: Iodine-131

Units: pCi/m³

Start Date	End Date	AN1 (Indicator)	AP1 (Indicator)	AQS2 (Control)	AGC (Control)
<u>Required LLD</u> →		<u>0.07</u>	<u>0.07</u>	<u>0.07</u>	<u>0.07</u>
12/27/1999	01/10/2000	<0.01	<0.01	<0.01	<0.01
01/10/2000	01/24/2000	<0.01	<0.01	<0.01	<0.01
01/24/2000	02/07/2000	<0.01	<0.01	<0.01	<0.01
02/07/2000	02/21/2000	<0.01	<0.01	<0.01	<0.01
02/21/2000	03/06/2000	<0.01	<0.01	<0.01	<0.01
03/06/2000	03/21/2000	<0.01	<0.01	<0.01	<0.01
03/21/2000	04/04/2000	<0.01	<0.01	<0.01	<0.01
04/04/2000	04/18/2000	<0.01	<0.01	<0.01	<0.01
04/18/2000	05/01/2000	<0.01	<0.01	<0.01	<0.01
05/01/2000	05/15/2000	<0.01	<0.01	<0.01	<0.01
05/15/2000	05/30/2000	<0.01	<0.01	<0.01	<0.01
05/30/2000	06/13/2000	<0.01	<0.01	<0.01	<0.01
06/13/2000	06/27/2000	<0.01	<0.01	<0.01	<0.01
06/27/2000	07/12/2000	<0.01	<0.01	<0.01	<0.01
07/12/2000	07/25/2000	<0.01	<0.01	<0.01	<0.01
07/25/2000	08/07/2000	<0.01	<0.01	<0.01	<0.01
08/07/2000	08/21/2000	<0.01	<0.01	<0.01	<0.01
08/21/2000	09/05/2000	<0.01	<0.07	<0.01	<0.01
09/05/2000	09/18/2000	<0.01	<0.01	<0.01	<0.01
09/18/2000	10/03/2000	<0.01	<0.01	<0.01	<0.01
10/03/2000	10/17/2000	<0.01	<0.01	<0.01	<0.01
10/17/2000	10/31/2000	<0.01	<0.01	<0.01	<0.01
10/31/2000	11/14/2000	<0.01	<0.01	<0.01	<0.01
11/14/2000	11/27/2000	<0.00	<0.00	<0.00	<0.00
11/27/2000	12/12/2000	<0.01	<0.01	<0.01	<0.01
12/12/2000	12/27/2000	<0.01	<0.01	<0.01	<0.01

Table 2.1
Sample Type: Thermoluminescent Dosimeters
Analysis: mR Exposure
Units: mrem/Qtr

Inner Ring (Indicators)					
Station	1st Qtr '00	2nd Qtr '00	3rd Qtr '00	4th Qtr '00	Annual Mean '00
TA1	11.08	9.31	9.68	10.45	10.13
TB1	15.33	14.11	13.89	13.70	14.25
TC1	15.43	13.63	13.89	14.85	14.45
TD1	15.53	14.36	14.57	15.14	14.90
TE1	13.77	13.54	13.59	13.73	13.66
TF1	14.29	12.44	12.91	13.54	13.29
TG1 *	16.67	14.55	14.57	15.70	15.37
TH1	12.43	10.87	11.15	11.57	11.51
TJ1	14.39	11.88	11.93	12.98	12.80
TK1	13.98	12.44	13.40	13.45	13.32
TL1	16.15	13.26	14.18	14.48	14.52
TM1	12.53	10.87	12.03	12.14	11.89
TN1	12.33	11.15	12.03	11.95	11.86
TP1	14.50	11.70	12.32	12.79	12.83
TQ1	10.88	9.02	10.00	11.01	10.23
TR1	11.29	9.57	9.81	10.54	10.30

* Location with highest annual mean.

Table 2.2

Sample Type: **Thermoluminescent Dosimeters**

Analysis: mR Exposure

Units: mrem/Qtr

Special Interest Areas - (Population Centers & Schools)					
Station	1st Qtr '00	2nd Qtr '00	3rd Qtr '00	4th Qtr '00	Annual Mean '00
TCS	13.91	12.12	11.49	12.98	12.62
TNS	12.69	11.84	12.42	12.18	12.28
TQS1	15.34	13.91	13.37	14.95	14.39
TQS2	12.48	11.61	11.68	12.89	12.17
TRS *	14.94	14.46	14.26	14.57	14.56

* Location with highest annual mean.

Special Interest Areas - (Controls)				
Station	1st Qtr '00	2nd Qtr '00	3rd Qtr '00	4th Qtr '00
TAC	13.26	12.16	12.57	13.64
TEC	15.14	13.51	13.49	14.48
TGS	16.98	14.81	15.25	16.35

Table 3.1

Sample Type: Surface Water

Analysis: Gamma Isotopic and Tritium

Units: pCi/l

Location	Collection Date	H-3	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-95	Nb-95	I-131	Cs-134	Cs-137	Ba-140	La-140
	<u>Required LLD</u> →	<u>2000</u>	<u>15</u>	<u>30</u>	<u>15</u>	<u>15</u>	<u>30</u>	<u>30</u>	<u>15</u>	<u>15</u>	<u>15</u>	<u>18</u>	<u>60</u>	<u>15</u>
SWD (Indicator)	02/14/2000	<537	<3.78	<2.89	<4.41	<2.97	<9.21	<8.23	<4.11	<4.26	<4.60	<4.91	<11.60	<3.19
SWU (Control)	02/14/2000	<535	<7.19	<11.30	<4.77	<5.19	<9.20	<8.78	<5.65	<5.97	<4.86	<5.79	<19.30	<4.20
SWD (Indicator)	05/16/2000	<526	<3.44	<6.01	<4.65	<3.25	<6.03	<6.56	<2.95	<3.65	<4.98	<4.92	<12.90	<3.26
SWU (Control)	05/16/2000	245	<4.49	<8.01	<4.30	<3.18	<8.26	<8.81	<4.55	<5.34	<4.90	<5.56	<14.70	<3.94
SWD (Indicator)	08/07/2000	<527	<4.27	<8.08	<5.31	<5.03	<9.92	<8.26	<6.48	<6.05	<4.32	<4.58	<17.90	<4.72
SWU (Control)	08/07/2000	<527	<2.63	<6.96	<3.85	<4.01	<7.30	<3.85	<4.17	<4.46	<4.27	<3.76	<15.90	<4.33
SWD (Indicator)	11/09/2000	367	<2.90	<7.58	<3.17	<5.14	<8.94	<4.44	<3.74	<4.38	<3.59	<3.58	<16.73	<2.72
SWU (Control)	11/09/2000	313	<3.97	<9.16	<4.67	<5.03	<9.92	<9.24	<3.45	<5.26	<5.50	<3.93	<19.21	<4.88

Table 4.1

Sample Type: Groundwater

Analysis: Gamma Isotopic and Tritium

Units: pCi/l

Location	Collection Date	H-3	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-95	Nb-95	I-131	Cs-134	Cs-137	Ba-140	La-140
<u>Required LLD</u> →		<u>2000</u>	<u>15</u>	<u>30</u>	<u>15</u>	<u>15</u>	<u>30</u>	<u>30</u>	<u>15</u>	<u>15</u>	<u>15</u>	<u>18</u>	<u>60</u>	<u>15</u>
WD (Indicator)	05/17/2000	255	<4.94	<10.90	<3.75	<4.15	<11.50	<7.94	<6.22	<4.52	<3.31	<5.30	<17.10	<4.63
WU (Control)	05/17/2000	<523	<5.86	<9.15	<5.46	<2.25	<9.52	<12.10	<6.82	<6.59	<6.32	<6.42	<21.30	<8.16
WD (Indicator)	11/21/2000	325	<5.54	<11.10	<7.12	<6.24	<4.41	<8.24	<6.75	<5.92	<5.65	<5.31	<15.90	<7.95
WU (Control)	11/21/2000	259	<6.63	<15.90	<7.60	<6.16	<16.10	<11.70	<10.20	<7.26	<6.94	<6.44	<27.20	<11.50

Table 5.1

Sample Type: Sediment
 Analysis: Gamma Isotopic
 Units: pCi/kg

Location	Collection Date	Cs-134	Cs-137
	<u>Required LLD</u> →	<u>150</u>	<u>180</u>
SEDD (Indicator)	12/15/2000	<21.9	<24.8

Table 6.1

Sample Type: **Fish**

Analysis: Gamma Isotopic

Units: pCi/kg

Location	Collection Date	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Cs-134	Cs-137
<u>Required LLD</u> →		<u>130</u>	<u>260</u>	<u>130</u>	<u>130</u>	<u>260</u>	<u>130</u>	<u>150</u>
FD (Indicator)	12/27/2000	<27.7	<64.3	<18.5	<39.5	<65.3	<28.1	<24.2
FU (Control)	12/12/2000	<16.0	<41.8	<16.8	<23.0	<45.9	<15.1	<18.3

Table 7.1

Sample Type: **Food Products**

Analysis: Iodine-131 and Gamma Isotopic

Units: pCi/kg

Location	Collection Date	I-131	Cs-134	Cs-137
	<u>Required LLD</u> →	<u>60</u>	<u>60</u>	<u>80</u>
GN1 (Indicator)	01/07/2000	<41.30	<44.70	<46.10
GQC (Control)	01/14/2000	<45.90	<43.50	<53.80
GN1 (Indicator)	04/06/2000	<35.80	<31.70	<41.60
GQC (Control)	04/14/2000	<23.50	<24.60	<33.60
GN1 (Indicator)	07/10/2000	<48.30	<30.60	<38.20
GQC (Control)	07/20/2000	<30.00	<28.90	<39.50
GN1 (Indicator)	10/11/2000	<42.60	<38.80	<41.00
GQC (Control)	10/27/2000	<46.00	<31.30	<32.70

Table 8.1

Sample Type: **Sediment (Special)**

Analysis: Gamma Isotopic

Units: pCi/kg

Location	Collection Date	Cs-134	Cs-137
	<u>Required LLD</u> →	<u>150</u>	<u>180</u>
East Creek (Indicator)	02/08/2000	<16.6	<17.7
West Creek (indicator)	02/08/2000	<13.5	<17.6
East Creek (Indicator)	05/18/2000	<12.7	<11.1
West Creek (indicator)	05/18/2000	<15.0	<12.1
East Creek (Indicator)	08/10/2000	<15.7	<18.5
West Creek (indicator)	08/10/2000	<16.9	<20.5
East Creek (Indicator)	11/09/2000	<14.9	<9.9
West Creek (indicator)	11/09/2000	<14.1	<14.7

Table 9.1

Sample Type: Sewage Effluent Wastewater (Special)

Analysis: Gamma Isotopic

Units: pCi/l

Collection Date	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-95	Nb-95	I-131	Cs-134	Cs-137	Ba-140	La-140
<u>Required LLD</u> →	<u>15</u>	<u>30</u>	<u>15</u>	<u>15</u>	<u>30</u>	<u>30</u>	<u>15</u>	<u>15</u>	<u>15</u>	<u>18</u>	<u>60</u>	<u>15</u>
01/26/2000	<3.35	<6.25	<3.27	<3.73	<7.58	<6.28	<3.26	<3.42	<3.13	<3.05	<10.10	<2.62
02/23/2000	<3.05	<6.33	<2.70	<4.32	<6.38	<8.11	<4.03	<4.07	<3.78	<4.82	<11.50	<6.10
03/30/2000	<6.52	<9.98	<4.71	<6.92	<7.80	<9.78	<6.35	<6.33	<4.71	<8.06	<11.60	<4.26
04/15/2000	<6.31	<12.90	<7.26	<5.43	<14.00	<9.09	<7.59	<14.80	<6.77	<5.04	<33.10	<10.60
06/01/2000	<4.81	<9.21	<3.24	<5.46	<11.60	<8.37	<2.86	<7.90	<4.69	<5.40	<19.40	<6.26
06/29/2000	<4.27	<7.22	<4.58	<5.40	<12.60	<7.52	<3.66	<5.93	<4.94	<4.82	<15.60	<5.35
07/27/2000	<12.20	<13.30	<12.50	<9.33	<23.30	<15.10	<8.97	<11.90	<9.97	<11.90	<28.00	<14.60
08/30/2000	<3.30	<6.90	<3.20	<4.01	<7.50	<7.63	<4.14	<4.12	<3.33	<3.18	<10.70	<4.62
09/15/2000	<2.67	<6.82	<2.80	<2.60	<4.96	<6.39	<4.24	<14.90	<2.87	<3.33	<27.30	<9.57
10/25/2000	<5.12	<10.20	<3.64	<4.66	<10.50	<8.17	<4.41	<5.45	<5.57	<5.41	<15.00	<6.45
11/29/2000	<3.76	<7.15	<3.44	<3.33	<9.14	<5.44	<2.49	<4.23	<4.39	<4.79	<13.40	<5.07
12/27/2000	<4.00	<12.40	<3.72	<4.70	<30.00	<8.12	<4.56	<6.29	<5.53	<5.63	<23.10	<4.60

Table 10.1

Sample Type: **Interlaboratory Comparison**

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

Sample Type (units)	Study	Date	Analysis	Known Value ^a	RBS Value	RBS N-Dev ^b	RBS N-Range ^c
Air Filter (pCi/filter)	E2375-125	09/21/00	BETA	72.0 ± 17.3	78.7	1.15	0.118
Charcoal Cartridge (pCi/cartridge)	E2219-125	06/22/00	I-131	72.0 ± 12.5	75.4	0.82	0.139
	E2483-125	12/07/00	I-131	63.0 ± 10.9	67.6	1.26	0.272
Water (pCi/liter)	E2081-125	03/23/00	BETA	112 ± 29.1	80.2	-3.27 ^d	0.042
	E2079-125	03/10/00	CR-51	238 ± 20.6	246	1.16	1.390
			MN-54	159 ± 13.8	152	-1.45	0.223
			CO-58	44.0 ± 8.66	43.1	-0.31	0.307
			FE-59	92 ± 8.7	91.1	-0.31	0.284
			CO-60	116 ± 10.0	112	-1.29	0.407
			ZN-65	196 ± 33.9	185	-0.97	0.211
			I-131	74.0 ± 12.8	68.0	-1.40	0.231
			CS-134	139 ± 12.0	132	-1.66	0.340
			CS-137	128 ± 11.1	126	-0.45	0.185
			CE-141	427 ± 37.0	425	0.19	0.194
	E2080-125 (Duplicate)	03/10/00	CR-51	238 ± 20.6	250	1.75	2.085
			MN-54	159 ± 13.8	156	-0.58	0.371
			CO-58	44.0 ± 8.66	43.0	-0.36	0.272
			FE-59	92.0 ± 8.66	92.3	0.10	0.815
			CO-60	116 ± 10.0	111	-1.49	0.509
			ZN-65	196 ± 33.9	182	-1.21	0.271
			I-131	74.0 ± 12.8	67.0	-1.63	0.327
			CS-134	139 ± 12.0	134	-1.25	0.680
			CS-137	128 ± 11.1	128	0.09	0.369
			CE-141	427 ± 37.0	423	-0.35	1.079

Table 10.1

Sample Type: **Interlaboratory Comparison**

Analysis: Tritium and Gamma Isotopic

Sample Type (units)	Study	Date	Analysis	Known Value ^a	RBS Value	RBS N-Dev ^b	RBS N-Range ^c
Water (pCi/liter)	E2220-125	06/22/00	H-3	11400 ± 1975	10683	-1.09	0.070
	E2373-125	09/21/00	CR-51	230 ± 23.9	209	-2.68	0.514
			MN-54	89.0 ± 8.66	90.0	0.23	1.122
			CO-58	60.0 ± 8.66	67.0	2.41	0.378
			FE-59	54.0 ± 8.66	57.0	0.88	1.134
			CO-60	246 ± 21.3	229	-2.35	0.480
			ZN-65	134 ± 23.2	128	-0.82	0.573
			I-131	75 ± 13.0	72	-0.59	0.197
			CS-134	128 ± 22.2	109	-2.57	0.508
			CS-137	218 ± 18.9	219	0.21	0.054
			CE-141	191 ± 16.54	175	-2.96	0.495
	E2374-125 (Duplicate)	9/21/00	CR-51	230 ± 23.9	211	-2.34	1.284
			MN-54	89.0 ± 8.66	94	1.59	1.689
			CO-58	60.0 ± 8.66	62	0.54	1.040
			FE-59	54.0 ± 8.66	63	3.04 ^d	0.484
			CO-60	246 ± 21.3	228	-2.49	0.240
			ZN-65	134 ± 23.2	131	-0.39	0.529
			I-131	75 ± 13.0	74	-0.15	0.480
			CS-134	128 ± 22.2	114	-1.94	0.461
			CS-137	218 ± 18.9	215	-0.53	0.271
			CE-141	191 ± 16.54	179	-2.12	0.557

Table 10.1

Sample Type: **Interlaboratory Comparison**Analysis: **Gamma Isotopic**

Sample Type (units)	Study	Date	Analysis	Known Value ^a	RBS Value	RBS N-Dev ^b	RBS N-Range ^c
Sediment (pCi/gram)	E2484-125	12/07/00	CR-51	0.917 ± 0.079	0.959	1.58	1.278
			MN-54	0.278 ± 0.034	0.307	2.59	0.613
			CO-58	0.139 ± 0.012	0.137	-0.49	1.071
			FE-59	0.149 ± 0.018	0.132	-2.82	1.353
			CO-60	0.336 ± 0.029	0.335	-0.06	0.475
			ZN-65	0.269 ± 0.047	0.293	1.57	0.077
			CS-134	0.155 ± 0.013	0.161	1.29	0.122
			CS-137	0.490 ± 0.042	0.508	1.30	0.338
			CE-141	0.649 ± 0.056	0.670	1.14	0.120

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; ±2.000 is the warning limit and ±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 were two results outside the control limits (3 sigma) for accuracy in the 2000 cross check program. One result was related to a gamma isotopic analysis of a water sample and the other related to a gross beta analysis of a water sample.

The nuclide, Fe-59, was bias high in a gamma isotopic analysis, with a normalized deviation of 3.04, with control limits of ± 3.00 . This result is considered conservative. Other Fe-59 analyses during the year were all within acceptable limits.

The gross beta result was bias low with a normalized deviation of -3.27 , with control limits of ± 3.00 . Gross beta results have shown a downward trend in past analyses. A system efficiency calibration was performed with the water standard on the alpha-beta counter as corrective action.

There is no impact assessed on previously reported data due to these results. 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-six percent of RBS environmental crosscheck results were within control limits for accuracy and precision during 2000.