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Subject: Radiological Environmental Operating Report for 1999
River Bend Station
License No. NPF-47
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Ladies and Gentlemen:

Enclosed is the River Bend Station (RBS) Annual Radiological Environmental Operating Report for the period January 1, 1999, through December 31, 1999. 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,

JW Leavines
for

RJK/WJF
enclosure

IE25

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RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

RIVER BEND STATION

FOR THE OPERATING PERIOD

January 1, 1999 - December 31, 1999

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RIVER BEND STATION
RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 1999

Abstract

During 1999, the Radiological Environmental Monitoring Program (REMP) was conducted in the vicinity of River Bend Station (RBS). In January 1999, the Technical Requirements Manual (TRM) was revised to reduce the sampling and analysis frequencies of the monitoring program. As part of the monitoring program, the RBS REMP laboratory participated in a performance evaluation environmental cross check program with 92 percent of analytical results within control limits for accuracy and precision. The last performed land use census of 1998 revealed two changes in receptor locations since 1997. Three monitoring exceptions, involving TRM required samples, occurred out of a total effort of 321 samples collected and 406 subsequent analyses performed. None of the exceptions had any impact on program quality. All TRM required lower limit of detection (LLD) capabilities were achieved in all sample analyses. The 1999 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.

RIVER BEND STATION
RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 1999

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1.0 INTRODUCTION

This Annual Radiological Environmental Operating Report for the period of January 1 through December 31, 1999, is submitted in accordance with Technical Requirements Manual (TR 5.6.2) as required by Technical Specification (5.6.2) of Appendix A to River Bend Station License Number NPF-47.

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

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

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

During 1999, radiological environmental monitoring in the vicinity of RBS was performed by the River Bend Station Environmental Services Group, a part of the plant Chemistry Department, with support from the plant Radiation Control Department in maintaining/calibrating air samplers. The Entergy Operations, Inc. (EOI) CENTRAL TLD Processing Facility located at Waterford Three (W3) performed the processing of environmental dosimeters.

2.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM (REMP)

2.1 Purpose/Bases

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

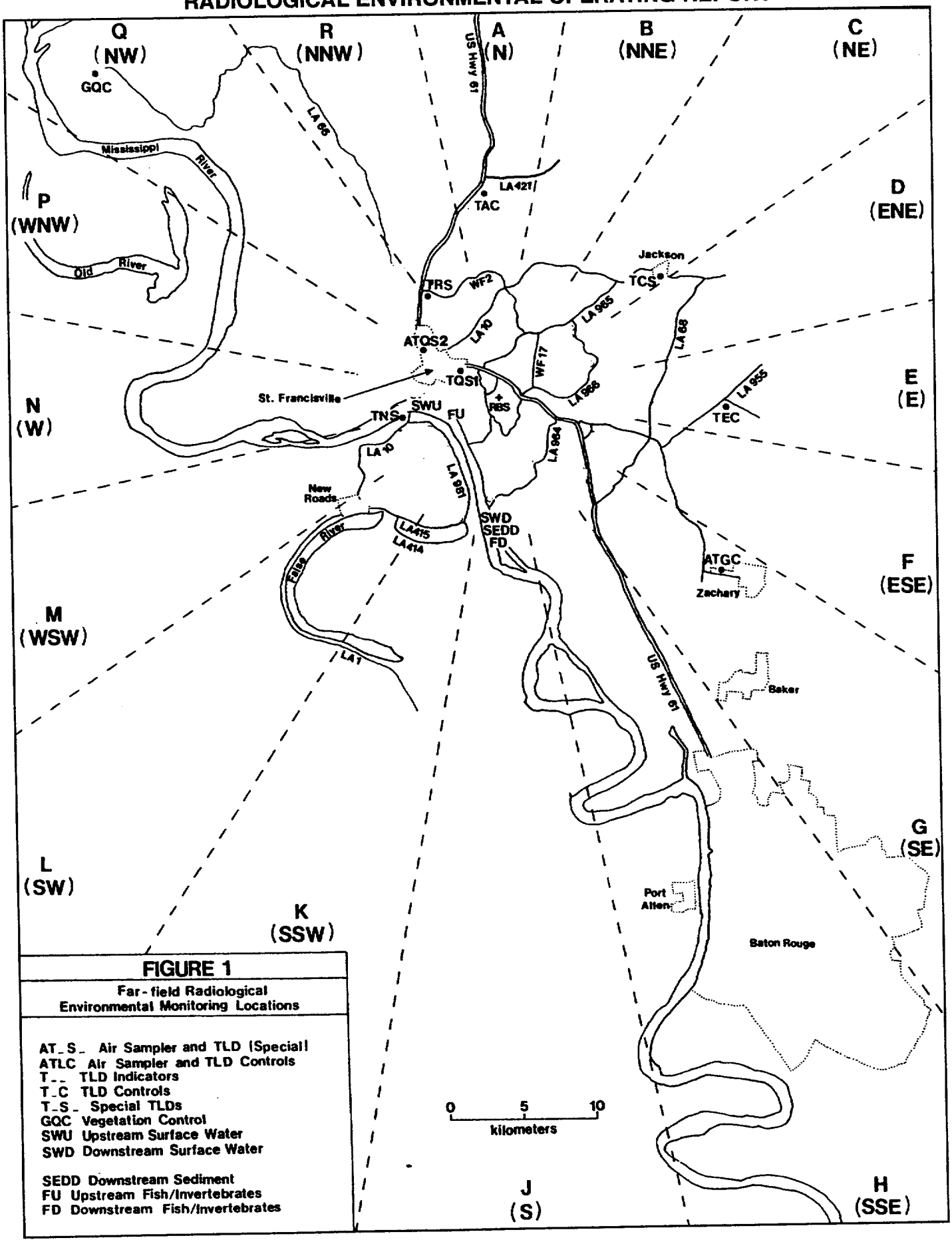
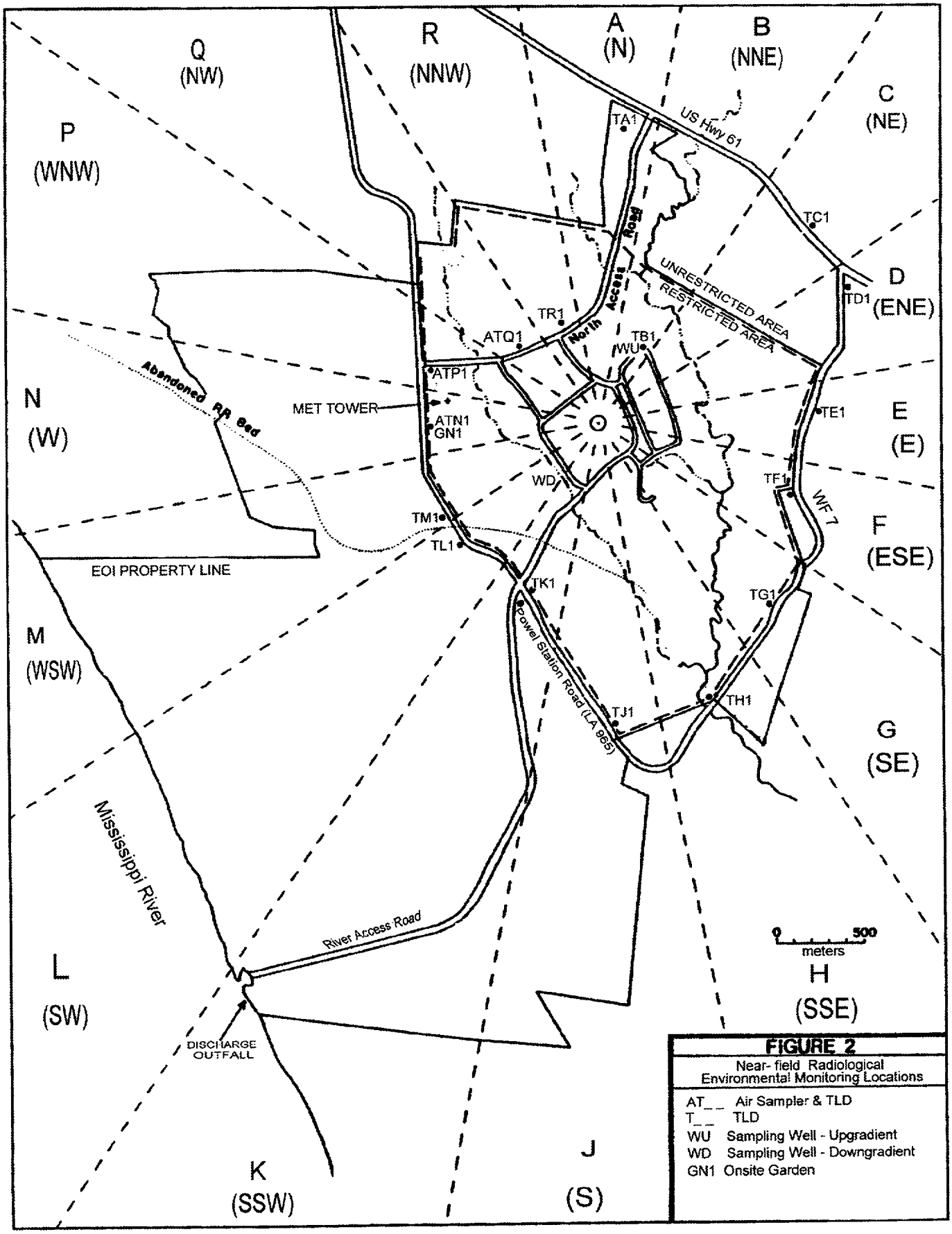


FIGURE 1

Far-field Radiological Environmental Monitoring Locations

AT_S_ Air Sampler and TLD (Special)
ATLC Air Sampler and TLD Controls
T__ TLD Indicators
T_C TLD Controls
T_S_ Special TLDs
GQC Vegetation Control
SWU Upstream Surface Water
SWD Downstream Surface Water

SEDD Downstream Sediment
FU Upstream Fish/Invertebrates
FD Downstream Fish/Invertebrates


Q
(NW)
R
(NNW)
A
(N)
B
(NNE)
C
(NE)
P
(WNW)
D
(ENE)
N
(W)
E
(E)
F
(ESE)
M
(WSW)
G
(SE)
L
(SW)
H
(SSE)
K
(SSW)
J
(S)
US Hwy 61
TA1
TC1
TD1
TE1
TF1
TR1
ATQ1
ATP1
ATN1
GN1
TB1
WU
WD
TM1
TL1
TK1
TG1
TH1
TJ1
MET TOWER
North Access Road
UNRESTRICTED AREA
RESTRICTED AREA
Abandoned RR Bed
WF 1
EOI PROPERTY LINE
Prowel Station Road (LA 965)
River Access Road
Mississippi River
DISCHARGE OUTFALL
0
500
meters
FIGURE 2
Near- field Radiological Environmental Monitoring Locations
AT_ _ Air Sampler & TLD
T_ _ TLD
WU Sampling Well - Upgradient
WD Sampling Well - Downgradient
GN1 Onsite Garden

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

The REMP applies the concepts of indicator vs. control and preoperational vs. operational comparisons to verify the adequacy of source controls and resultant human radiation doses. In addition to 10CFR50, Appendix I, the program is based on guidance provided in the Nuclear Regulatory Commission's Radiological Branch Technical Position, Revision 1, November 1979, as well as NRC Regulatory Guides 4.1, 4.8, and 4.15. In accordance with this regulatory guidance, a monitoring program reduction was enacted at RBS in January 1999. This program reduction was allowed based on historical REMP data that documents no discernible increase in radioactivity and dose to the environment, due to the operation of RBS nuclear power plant.

2.2 Environmental Radiation Exposure Pathways

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

HUMAN EXPOSURE PATHWAYS

(A) Airborne Pathway	Monitoring Media
Inhalation Dose (internal)	Air Samples (Particulates and Radioiodines)
Ground Plane Dose (external)	Thermoluminescence Dosimetry (TLD)
Immersion Dose (external)	Thermoluminescence Dosimetry (TLD)
Ingestion Dose (internal)	Vegetation/Food Crop Samples

(B) Direct Exposure Pathway	Monitoring Media
External Dose	Thermoluminescence Dosimetry (TLD)

(C) Waterborne Pathway	Monitoring Media
Ingestion Dose (internal)	Surface Water Samples Groundwater Samples Fish/Invertebrate Samples Shoreline Sediment Samples
Immersion Dose (external)	Surface Water Samples Shoreline Sediment Samples

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

The program that evolved during the preoperational (baseline) monitoring phase incorporated all of the elements in the RBS Technical Specifications (3/4.12.1, 3/4.12.2, 3/4.12.3), now contained in the RBS Technical Requirements Manual (TRM), including special study criteria, and is illustrated in Table 1 and Figures 1 and 2. The monitoring program reduction in January of 1999 was implemented by a revision of the RBS TRM.

2.3 Land Use Census

The land use census, which implements Section IV.B.3 of Appendix I of 10CFR50, was conducted during the 1998 growing season in accordance with RBS Technical Requirements Manual (TR 3.12.2). No land use census was conducted during 1999 due the monitoring program reduction in frequency of performance. Table 2 summarizes the results of the 1998 census, and notes changes in nearest receptor locations within 8 km from those identified in the Radiological Environmental Operating Report for 1997. The annual 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.

The 1998 census identified residences within 8 km of the RBS reactor containment in all sectors except M (WSW). The two changes in the 1998 census involved nearer residents in sectors J and N. The nearest resident in sector J (S) was 1.8 km, compared to 1.9 km in 1997; and the nearest resident in sector N (W) was 6.1 km, compared to no resident in 1997.

No dairy animals were found within 8 km of RBS during the 1998 census. Historically, there has not been enough dairy sites to accommodate the minimum RBS Technical Specification requirements for analysis of milk, so monitoring of broadleaf vegetation has been performed from onsite gardens.

The garden census was discontinued in 1996, based on the note in the TRM (TRCO 3.12.2) that allows the routine sampling of broadleaf vegetation in the highest D/Q sectors near site boundary in lieu of the annual garden census. Two site gardens were maintained in sectors P (WNW) and Q (NW) for fourteen years, and a third garden was located in sector N (W) in December of 1996, although samples were not available from this garden until July of 1997. The site garden located in sector Q (NW) was discontinued in June 1998 after a year of baseline data was collected from the newly established garden in sector N (W). The garden in sector P (WNW) was discontinued with the monitoring program reduction in January 1999.

2.4 Environmental Cross Check Program Results for 1999

The RBS REMP Laboratory participated in an approved performance evaluation cross check study program during 1999 in accordance with RBS Technical Requirements Manual (TR 3.12.3). RBS results (Table 3) were within the control limits for the normalized range (precision) for all analyses, and within the "known" value (accuracy) for all but eight nuclide analyses. The discrepancy for these analyses is discussed below.

The United States Environmental Protection Agency (USEPA) discontinued providing cross check sample media to NRC licensees in December of 1995. RBS began purchasing environmental cross check samples from Analytics, Inc. (NRC approved program) in January of 1996. The statistical calculations provided by the USEPA in their study reports have been adopted and continued by RBS as acceptance criteria in evaluating the results of the cross check samples provided by Analytics, Inc. Acceptance criteria (as used by Analytics for demonstrating tracability with NIST) for evaluating results have been recommended by Analytics, Inc, and are under consideration by RBS and others for future use.

There were eight results out of control limits (3 sigma) for accuracy in the 1999 cross check program. Of these eight results, all were analyzed by gamma spectroscopy (8 nuclides in two matrices). Seven of the results in question were in liquid cross check samples; one in a sediment sample. All eight results in question were bias high.

There was one nuclide, Fe-59, slightly bias high (+3.24) in sediment. It had a low bias with a slight upward trend indicated by previous results of sediment analysis. Prior to 1999, all Fe-59 results in sediments have been within warning limits. Fe-59 was also bias high (+3.06, +5.15, +4.16, +4.62) in four water analyses. Trending of past Fe-59 cross check results in waters indicates a high bias, upward trend. Cr-51 was bias high (+3.07 & +3.77) in the last two water analyses this year; in spite of the fact, that trending of past Cr-51 results in water indicates a low bias with a slight downward trend. Mn-54 was bias high (+3.04) in one water sample. Past results for Mn-54 indicate bias high with a slight upward trend.

The third quarter water samples (sample and duplicate) were analyzed three times each, per detector, to note any statistical variation between detectors. This resulted in twelve analyses each for the sample and duplicate. No obvious variations were noted in the average nuclide results between detectors.

Investigation of high bias results in the past indicated it was due to coincidence summing effects of Y-88 and Co-60 on the efficiency curve in the effected regions. To minimize the coincidence summing effects on the efficiency curve, RBS committed to adding two additional nuclide lines (Mn-54 and Zn-65) to the calibration source mix. This was only a step to the fix of the summing effects. A multiplicative correction factor to convert a measured gamma-ray efficiency with summing effects to an efficiency with no summing effects had to be established. This correction factor is the ratio of the calculated non-summing efficiency of the 1173 keV (Co-60) gamma ray to the measured efficiency of the 1173 keV gamma ray. An efficiency curve (equation) is generated with no summing effects by deleting the Y-88 and Co-60 peaks and using only the gamma ray efficiencies with no summing effects, including Mn-54 and Zn-65, in the calibration. This approach for correcting the measured efficiencies of gamma rays from Y-88 and Co-60 for cascade summing effects is now in progress.

Results out of control limits were conservatively biased, therefore there is no impact on past data. 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-two percent of RBS environmental cross check results were within control limits for accuracy and precision during 1999.

2.5 Monitoring Program Exceptions

Certain samples and analyses were unavoidably omitted or altered during the 1999 operating period. These exceptions and the reasons for the omissions/alterations are discussed below. In accordance with the RBS TRM, deviations are permitted from the required sampling schedule if samples are unobtainable due to legitimate reasons.

Air Particulates and Radioiodines

Three program exceptions, with loss of sample or sample volume, occurred involving air particulate and radioiodine sampling. Two were caused by power outages, due to inclement weather, and one was the result of sampler failure. Samples were collected and analyzed from all locations with adequate volumes to achieve all TRM required detection limits (LLD), except at one location.

Location AP1 loss entire sample volume during period 1/25/99 to 2/8/99 due to failure of air sampler caused by a faulty switch. The sampler was repaired and placed back in service on 2/8/99. Joint frequency report indicated 10% winds from the opposite sector during period of outage.

Location AN1 (W) suffered 64% loss of sample volume during the period 3/8/99 to 3/22/99, due to power failure from thunderstorms in area. The joint frequency report indicated only 6.5% winds from the opposite sector during the entire period. The same location had a 19% volume loss, during the period of 8/9/99 to 8/23/99, also due to lighting from thunderstorms in the area. During the actual outage period, only 2% winds from the opposite sector were indicated by joint frequency report.

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

Sediment Samples

Although not a RBS TRM required sample, the east and west creek sediment samples for the third quarter 1999 were not collected or analyzed due to improper scheduling device. First and second quarter samples, as well as fourth quarter samples, were collected and analyzed meeting required LLD's with no contamination indicated. Years of analytical data indicates no contamination present in the sediments of east or west creek. This sampling requirement has since been placed on a computer scheduling program.

TABLE 1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
(Page 1 of 4)

Exposure Pathway and/or Sample	Sample Point Description, Distance, and Direction	Sampling and Collection Frequency	Type and Frequency of Analysis
Airborne	Samples from 4 Locations:		
	INDICATOR STATIONS	Continuous air sampler with filter collection every two weeks, or as required by dust loading, whichever is more frequent	Charcoal cartridge: Analysis every two weeks for radioiodine Particulate filter: Analysis every two weeks for gross beta.
	AP1. Behind Activity Center off Hwy. 965; 0.9 km WNW.		
	AN1. River Bend Station site Hwy. 965, south of Activity Center; 0.9 km W.		
	CONTROL AND SPECIAL INTEREST STATIONS		
	AQS2. St. Francis Substation on U.S. Hwy. (Bus.) 61 in St. Francisville; 5.8 km NW (nearest community location).		
	AGC. GSU Service Center compound in Zachary; 17 km SE. (control)		
Direct Radiation	Measurements from 24 locations:		
	INDICATOR STATIONS	Thermoluminescence dosimeters (TLDs); deployment / retrieval quarterly	Exposure quarterly
	TA1. River Bend Training Center 1.7 km N.		
	TB1. Utility pole near River Bend Station cooling tower yard; 0.5 km NNE.		
	TC1. Stub pole at Jct. Of U.S. Hwy. 61 and Old Highway 61; 1.7 km NE.		
	TD1. Stub pole along WF 7, 150 meters south of Jct. of WF 7 and U.S. Hwy. 61; 1.6 km ENE.		
	TE1. Stub pole along WF 7, 1 km south of Jct. of WF 7 and U.S. Hwy. 61; 1.3 km E.		
	TF1. Stub pole along WF 7, 1.6 km south of Jct. of WF 7 and U.S. Hwy. 61; 1.3 km ESE.		
	TG1. Stub pole along WF 7, 2 km south of Jct. of WF 7 and U.S. Hwy. 61; 1.6 km SE.		

TABLE 1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
(Page 2 of 4)

Exposure Pathway and/or Sample	Sample Point Description, Distance, and Direction	Sampling and Collection Frequency	Type and Frequency of Analysis
Direct Radiation (continued)	**TH1**. Stub pole at Illinois Central Gulf Railroad crossing of WF 7 (near Grants Bayou); 1.7 km SSE.	Thermoluminescence dosimeters (TLDs); deployment / retrieval quarterly	Exposure quarterly
	TJ1. Stub pole near River Bend Station gate #23 on La. Hwy. 965; 1.5 km S.		
	TK1. GSU utility pole #L10178 on La. Hwy. 965, 20 meters south of RBS River Access Road; 0.9 km SSW.		
	TL1. Second utility pole on La. Hwy. 965 south of former Illinois Central Gulf Railroad crossing; 1.0 km SW.		
	TM1. First utility pole on La. Hwy. 965 north of former Illinois Central Gulf Railroad crossing; 0.9 km WSW.		
	TN1. On fence at site garden and AN1 air sampler location; 0.9 km W.		
	TP1. Utility pole at AP1 Air Sampler; 0.9 km WNW.		
	TQ1. On fence at previous AQ1 air sampler location on North Access Road; 0.6 km NW.		
	TR1. RBS North Access Road across from plant entrance; 0.8 km NNW.		
	CONTROL AND SPECIAL INTEREST STATIONS[1]		
	TAC. Utility pole at junction of U.S. Hwy. 61 and LA. Hwy. 421, 7.9 km. north of Bains; 15.8 km N. (Control)		
	TEC. Stub pole at Jct. of La. Hwy. 955 and Midway Road, 4.8 km north of Jct. Of La. Hwys. 955 and 964; 16 km E. (Control)		
	TGS. Entergy Service Center compound in Zachary; 17 km SE		
	TCS. Utility pole at gate to East Louisiana State Hospital in Jackson; 12.3 km NE.		
	TNS Utility pole with electrical meter near west bank ferry landing (La. Hwy. 10); 6 km W.		
	TQS1. Utility pole front of Pentecostal Church (opposite West Feliciana Parish Hospital) near Jct. of U.S. Hwy. 61 and Ferdinand Street; 4 km NW.		
	TQS2. St. Francis Substation on U.S. Hwy. (Business) 61 in St. Francisville; 5.8 km NW.		

TABLE 1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
(Page 3 of 4)

Exposure Pathway and/or Sample	Sample Point Description, Distance, and Direction	Sampling and Collection Frequency	Type and Frequency of Analysis
Direct Radiation (continued)	**TRS**. Stub pole at Jct. of WF 2 and U.S. Hwy. 61, near Bains (West Feliciana High School); 9.2 km NNW.	Thermoluminescence dosimeters (TLDs) deployment / retrieval quarterly.	Exposure quarterly.
Waterborne[3]	SURFACE WATER[2]	Quarterly grab	Gamma isotopic quarterly, Tritium analysis quarterly.
	SWU. Mississippi River about 4 km upstream from the RBS liquid discharge, near La. Hwy. 10 ferry crossing. (Control)		
	SWD. Mississippi River about 4 km downstream from the RBS liquid discharge, near the Crown Vantage Paper Plant.		
	GROUNDWATER	Semiannual grab	Gamma isotopic, and tritium analyses semiannually.
	WD. Upland Terrace Aquifer well, downgradient from the plant, about 470 meters SW.		
	WU. Upland Terrace Aquifer well, upgradient from the plant, about 470 meters NNE (Control).		
	SHORELINE SEDIMENT	Annual grab	Gamma isotopic analysis annually.
	SEDD. East shore of the Mississippi River, about 4 km downstream from RBS liquid discharge, near the Crown Vantage paper plant.		
Ingestion	FISH AND INVERTEBRATES	Annually	Gamma isotopic analysis on edible portions annually .
	FD .One sample of a commercially and/or recreationally important species from the downstream area influenced by the RBS liquid discharge.[4]		
	FU One sample of similar species from the upstream area not influenced by the RBS liquid discharge (control).[4]		
	FOOD PRODUCTS[5]	Quarterly during the growing season	Gamma isotopic and I-131 analyses quarterly.
	GN1. One sample of leafy vegetation from onsite garden near the site boundary in area of highest calculated average ground-level D/Q; 0.9 km W.		
	GQC. One sample of leafy vegetation from the Louisiana State Penitentiary at Angola; 32 km NW (control).		

TABLE 1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
(Page 4 of 4)

NOTES:

(1) For purposes of data summary, comparisons, and discussion, the sampling locations designated as "Special Interest" are treated as indicator stations, except location TGS, due to distance from site.

(2) The upstream (control) sample is taken at a distance beyond influence of the plant discharge. The downstream (indicator) sample is taken in an area beyond but near the mixing zone.

(3) Drinking water sampling/analyses not required by RBS Technical Requirements Manual and ODCM. No drinking water pathway exists due to extreme distance to nearest intake.

(4) Preferred species are river shrimp (Macrobracium ohione), blue catfish (Ictalurus furcatus), and freshwater drum (Aplodinotus grunniens); if these are unavailable, other edible species may be substituted.

(5) No irrigation pathway exists due to the extreme distance of nearest domestic water intake; leafy vegetables are sampled and analyzed because of limited availability of milk samples.

TABLE 2

RESULTS OF LAND USE CENSUS

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	2.1	-	-
7	G	SE	Mills	6.6	-	-
8	H	SSE	Hubbard	1.7	-	-
9	J	S	Bliss[1]	1.8	-	-
10	K	SSW	Guillory	7.4	-	-
11	L	SW	Fountain	7.9	-	-
12	M	WSW	-	-	-	-
13	N	W	Lacost[2]	6.1	-	-
14	P	WNW	Hermann	3.4	-	-
15	Q	NW	Stokes	1.3	-	-
16	R	NNW	Young	1.7	-	-

Notes:

(1) Nearer resident at 1.8 km compared to 1.9 km in the 1997 census.
(2) Nearer resident at 6.1 km compared to no resident in the 1997 census.

TABLE 3

ENVIRONMENTAL CROSS CHECK PROGRAM PARTICIPATION RESULTS

Sample Type (units)	Study	Date	Analysis	"Known" Value[a]	RBS Value	RBS N-DEV[b]	RBS N-RANGE[c]
Air Filter (pCi/filter)	E1885-125	9/23/99	BETA	49.0 ± 8.66	48.7	-0.09	0.071
Charcoal Cartridge (pCi/cartridge)	E1759-125	6/24/99	I-131	76 ± 13.2	76.8	0.17	0.155
	E2001-125	12/9/99	I-131	86.0± 14.9	87.9	0.38	0.192
Water (pCi/liter)	E1662-125	3/18/99	BETA	201 ± 52.2	179	-1.24	0.059
	E1660-125	3/18/99	CR-51	398 ± 34.5	381	-1.48	1.929
			MN-54	152 ± 13.2	162	2.35	0.233
			FE-59	79 ± 8.66	87.8	3.06[d]	0.307
			CO-60	181 ± 15.7	182	0.19	0.653
			ZN-65	195 ± 33.8	196	0.06	0.424
			I-131	91 ± 15.8	84.3	-1.28	0.591
			CS-134	114 ± 9.87	107	-2.13	0.725
			CS-137	240 ± 20.8	240	0.00	0.345
			CE-141	177 ± 15.3	186	1.83	0.734
	E1661-125 (Duplicate)	3/18/99	CR-51	398 ± 34.5	377	-1.86	0.416
			MN-54	152 ± 13.2	165	3.04[d]	0.311
			FE-59	79 ± 8.66	93.9	5.15[d]	1.890
			CO-60	181 ± 15.7	184	0.64	0.457
			ZN-65	195 ± 33.8	212	1.54	0.091
			I-131	91 ± 15.8	86.0	-0.95	0.149
			CS-134	114 ± 9.87	106	-2.43	0.207
			CS-137	240 ± 20.8	242	0.24	0.098
			CE-141	177 ± 15.3	187	1.96	0.601
	E1760-125	6/24/99	H-3	9349 ± 1619	9427	0.15	0.028
	E1883-125	9/23/99	CR-51	184 ± 15.9	200	3.07[d]	2.311
			MN-54	210 ± 18.2	224	2.31	0.113
			FE-59	94.0 ± 8.66	106	4.16[d]	0.591
			CO-60	159 ± 13.8	166	1.60	0.371
			ZN-65	202 ± 35	205	0.26	0.439
			I-131	77.0 ± 13.3	79.3	0.52	0.061
			CS-134	119 ± 10.3	116	-0.78	0.397
			CS-137	268 ± 23.2	281	1.68	0.309
			CE-141	244 ± 21.1	248	0.52	0.290

TABLE 3

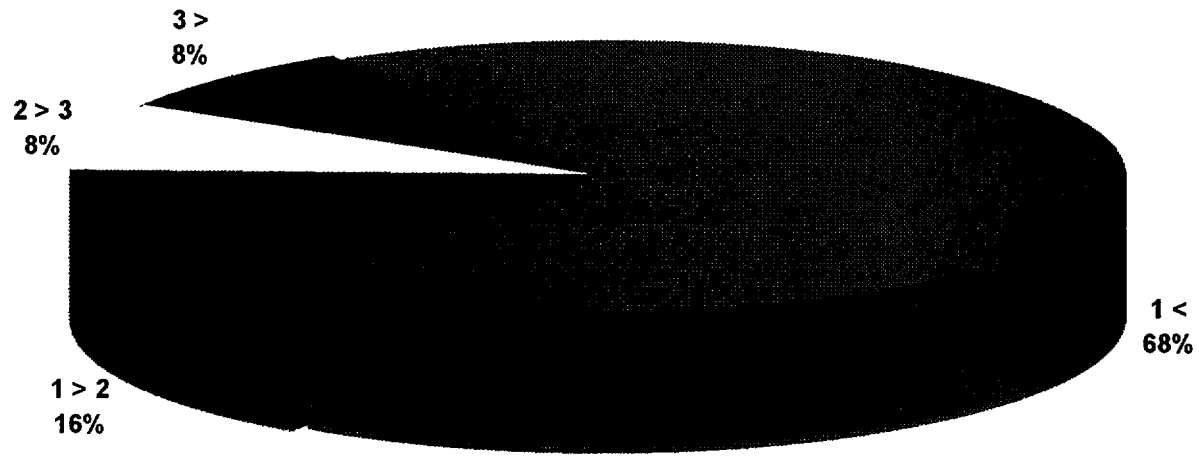
ENVIRONMENTAL CROSS CHECK PROGRAM PARTICIPATION RESULTS

Sample Type (units)	Study	Date	Analysis	"Known" Value[a]	RBS Value	RBS N-DEV[b]	RBS N-RANGE[c]
	E1884-125 (Duplicate)	9/23/99	CR-51	184 ± 15.9	204	3.77[d]	0.642
			MN-54	210 ± 18.2	223	2.20	0.169
			FE-59	94.0 ± 8.66	107	4.62[d]	0.709
			CO-60	159 ± 13.8	163	0.94	0.669
			ZN-65	202 ± 35	199	-0.23	0.175
			I-131	77.0 ± 13.3	76.7	-0.07	0.453
			CS-134	119 ± 10.3	117	-0.49	0.397
			CS-137	268 ± 23.2	280	1.59	0.485
			CE-141	244 ± 21.1	249	0.71	0.726
Sediment (pCi/gram)	E2002-125	12/9/99	CR-51	0.845± 0.027	0.864	0.79	1.097
			MN-54	0.292± 0.025	0.314	2.61	0.129
			Co-58	0.319± 0.028	0.313	-0.63	0.448
			FE-59	0.274± 0.024	0.300	3.24[d]	0.172
			CO-60	0.383± 0.033	0.410	2.46	0.154
			ZN-65	0.541± 0.094	0.558	0.55	0.158
			CS-134	0.363± 0.031	0.345	-1.69	0.260
			CS-137	0.407± 0.035	0.391	-1.34	0.360
			CE-141	0.306± 0.027	0.322	1.77	0.954

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.

FIGURE 3
Environmental Cross-Check Program Results
Per Normalized Deviation Control Limits



3.0 INTERPRETATION OF REMP RESULTS

3.1 Summary of Operational REMP Results

Monitoring results for the exposure pathways are itemized in Appendix A and summarized in Table 5. For purposes of data summary, comparison, and discussion, the sampling locations designated "Special Interest" in Table 1 are treated as indicator stations if they are within 16 km of RBS and control stations if they are beyond 16 km.

3.1.1 Airborne Exposure Pathway – Location AQ1(NW) was discontinued and the sampling frequency was increased to two weeks in January 1999 due to REMP reduction. Measurements of radioiodine at the four sampling locations were all below their respective LLDs -- that is, "undetectable" at the required analytical sensitivities. Gross beta activities on air particulate filter residues averaged 0.018 pCi/m^3 at the three indicator locations, and was 0.022 pCi/m^3 at the control location. Figure 4 displays the average gross beta activity since the preoperational period, with the indicator values trending consistently with the control values.

3.1.2 Direct Exposure Pathway – The outer ring of TLD stations, 6-8 km from site, was discontinued with the REMP reduction, leaving 24 routine monitoring stations. Quarterly exposures, normalized over a ninety day period, averaged 13.46 mR total at indicator locations and 14.91 mR total at control locations. Average exposures measured in both indicator and control stations in 1999 were slightly higher than the previous year. Little difference is noticed between exposure averages of indicator and control locations; with the control averages actually higher than the indicator averages. These trends are displayed in Figure 5 showing average exposures since preoperational period.

3.1.3 Waterborne Exposure Pathway – The discharge line sample was discontinued with the REMP reduction. Sampling frequency for surface water samples was increased to quarterly grabs; groundwater sample frequency to semiannual; and sediment sample frequency to annual. No gamma-emitters were measured in any waterborne pathway samples during 1999. All measurements in surface waters, groundwaters, and sediments were below their respective LLDs. Quarterly tritium (H-3) results in surface waters and groundwater were also below their respective LLD's at all locations. Naturally occurring gamma-emitters, such as K-40, were measured in Mississippi River shoreline sediments.

3.1.4 Ingestion Exposure Pathway - No milk sample was available within 8 km during 1999. Due to the reduction of the monitoring program, the number and frequency of fish samples was changed to one indicator and one control sample, annually. Broadleaf vegetation samples were reduced to one indicator and one control sample, quarterly. TRM required nuclides were all below the required LLD in the ingestion pathway monitoring media consisting of vegetation and fish during 1999. Only naturally occurring gamma-emitters, such as K-40 and Be-7, were measured.

FIGURE 4
Average Gross Beta on Air Particulates

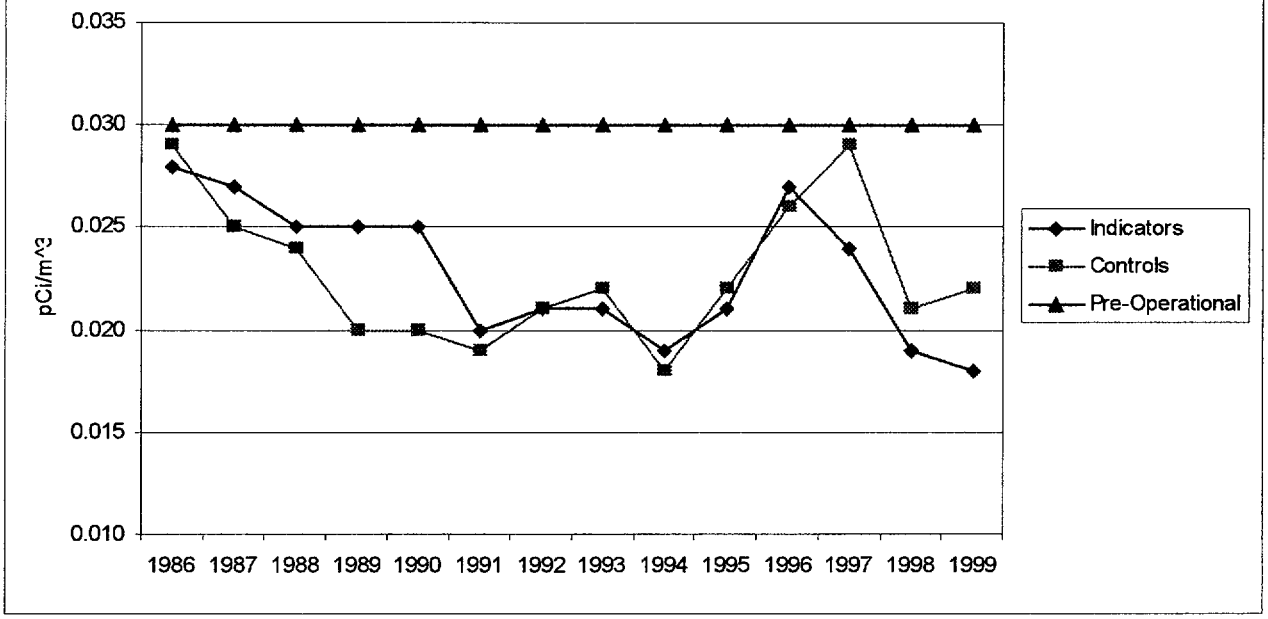


FIGURE 5
Average TLD EXposures

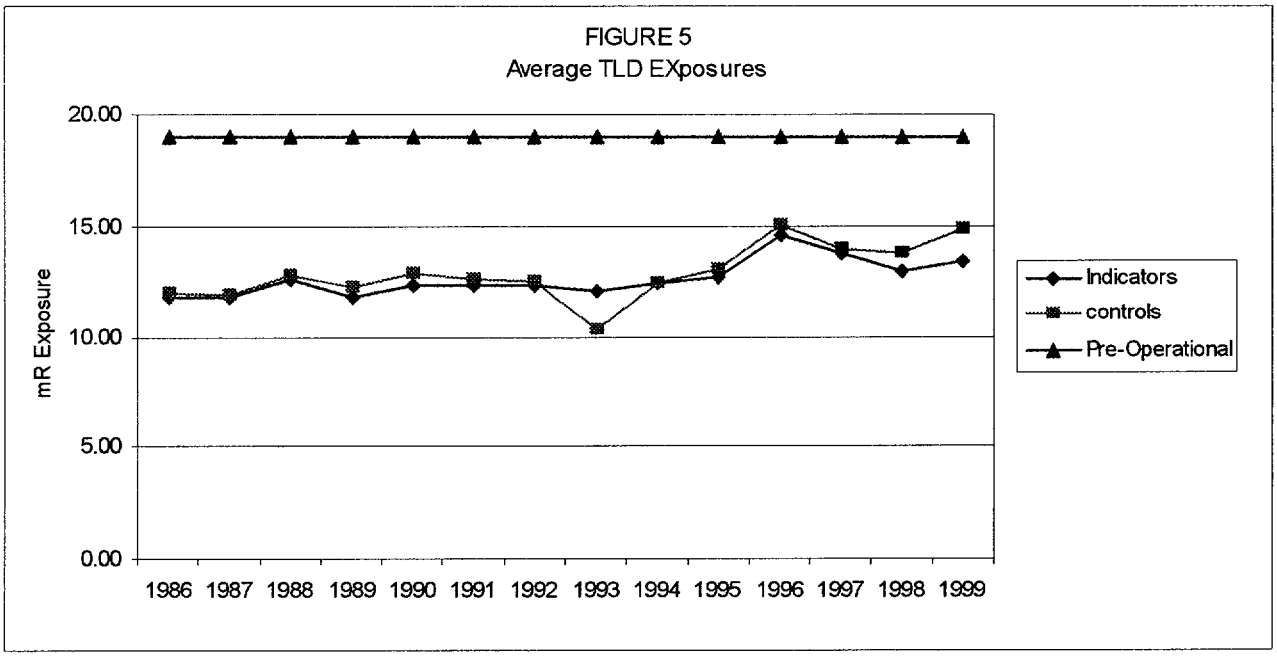


TABLE 4

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

(Page 1 of 3)

River Bend Station
West Feliciana Parish, Louisiana

Docket Number: 50-458
Reporting Period 1/1/99 to 12/31/99

Medium or Pathway Sampled (Unit of Measure)	Type and Total Number of Analyses Performed	Lower Limit of Detection [1] (LLD)	All Indicator Stations Mean (f)[2] Range	Location with Highest Annual Mean		Control Locations Mean (f)[2] Range	Number of Nonroutine Reported Results
				Name Dist./Dir.	Mean (f)[2] Range		
Air Particulate (pCi/m^3)	Gross Beta (109)	0.01	0.018 (82/82) 0.007 – 0.042	AGC 17 km SE	0.022 (27/27) 0.013 - 0.039	0.022 (27/27) 0.013 - 0.039	0
Air Radioiodine (pCi /m^3)	I-131 (109)	0.07	All < LLD			All < LLD	0
Direct (TLD)[4] (mR total)	Gamma Quarterly (96)		13.46 (84/84) 10.22 – 15.77	TGS 17 km SE	16.28 (4/4) 14.69 –17.32	14.91 (12/12) 11.40 – 17.32	0
Surface Water (pCi/liter)	H-3 (8)	3000	All < LLD			All < LLD	0
	Mn-54 (8)	15	All < LLD			All < LLD	0
	Co-58 (8)	15	All < LLD			All < LLD	0
	Fe-59 (8)	30	All < LLD			All < LLD	0
	Co-60 (8)	15	All < LLD			All < LLD	0
	Zn-65 (8)	30	All < LLD			All < LLD	0
	Nb-95 (8)	15	All < LLD			All < LLD	0
	Zr-95 (8)	30	All < LLD			All < LLD	0
	I-131 (8)	15	All < LLD			All < LLD	0
	Cs-134 (8)	15	All < LLD			All < LLD	0
	Cs-137 (8)	18	All < LLD			All < LLD	0
	Ba-140 (8)	60	All < LLD			All < LLD	0
	La-140 (8)	15	All < LLD			All < LLD	0

TABLE 4

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

(Page 2 of 3)

River Bend Station
West Feliciana Parish, Louisiana

Docket Number: 50-458
Reporting Period 1/1/99 to 12/31/99

Medium or Pathway Sampled (Unit of Measure)	Type and Total Number of Analyses Performed	Lower Limit of Detection [1] (LLD)	All Indicator Stations Mean (f)[2] Range	Location with Highest Annual Mean		Control Locations Mean (f)[2] Range	Number of Nonroutine Reported Results
				Name Dist./Dir.	Mean (f)[2] Range		
Groundwater (pCi/liter)	H-3 (4)	3000	All < LLD			All < LLD	0
	Mn-54 (4)	15	All < LLD			All < LLD	0
	Co-58 (4)	15	All < LLD			All < LLD	0
	Fe-59 (4)	30	All < LLD			All < LLD	0
	Co-60 (4)	15	All < LLD			All < LLD	0
	Zn-65 (4)	30	All < LLD			All < LLD	0
	Nb-95 (4)	15	All < LLD			All < LLD	0
	Zr-95 (4)	30	All < LLD			All < LLD	0
	I-131 (4)	15	All < LLD			All < LLD	0
	Cs-134 (4)	15	All < LLD			All < LLD	0
	Cs-137 (4)	18	All < LLD			All < LLD	0
	Ba-140 (4)	60	All < LLD			All < LLD	0
	La-140 (4)	15	All < LLD			All < LLD	0
Sediment (pCi/kg dry)	Cs-134 (1)	150	All < LLD			All < LLD	0
	Cs-137 (1)	180	All < LLD			All < LLD	0
Fish/Invertebrate (pCi/kg wet)	Mn-54 (2)	130	All < LLD			All < LLD	0
	Co-58 (2)	130	All < LLD			All < LLD	0
	Fe-59 (2)	260	All < LLD			All < LLD	0
	Co-60 (2)	130	All < LLD			All < LLD	0

TABLE 4

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

(Page 3 of 3)

River Bend Station
West Feliciana Parish, Louisiana

Docket Number: 50-458
Reporting Period 1/1/99 to 12/31/99

Medium or Pathway Sampled (Unit of Measure)	Type and Total Number of Analyses Performed	Lower Limit of Detection[1] (LLD)	All Indicator Stations Mean (f)[2] Range	Location with Highest Annual Mean		Control Locations Mean (f)[2] Range	Number of Nonroutine Reported Results
				Name Distance/Direction	Mean (f)[2] Range		
Fish/Invertebrate (pCi/kg wet)	Zn-65 (2)	260	All < LLD			All < LLD	0
	Cs-134 (2)	130	All < LLD			All < LLD	0
	Cs-137 (2)	160	All < LLD			All < LLD	0
Broadleaf Vegetation (pCi/kg wet)	I-131 (8)	60	All < LLD			All < LLD	0
	Cs-134 (8)	60	All < LLD			All < LLD	0
	Cs-137 (8)	80	All < LLD			All < LLD	0

NOTES:

(1) Lower Limit of Detection (LLD) as defined in RBS Technical Requirements Manual (Table 3.12.1-3).

(2) Mean and range based on detectable measurements only. The fraction of detectable measurements at specified locations is indicated in parenthesis (f).

(3) Specific activities found for certain common and readily distinguished, naturally occurring nuclides are included to provide perspective. It should also be noted that other gamma-emitting, naturally occurring nuclides (e.g., primordial series) are often detected but not reported because of the complexities and uncertainties of specific identification.

(4) Quarterly gamma exposure estimates are "normalized" to a 90-day quarter.

3.2 Comparison of Operational and Baseline REMP Results

Radioiodine in the airborne exposure pathway was not measured at levels above the required LLDs during 1999. Gross beta activities on air particulate filters averaged 0.018 pCi/m^3 at indicator and 0.022 pCi/m^3 at control locations in 1999, compared to 0.03 pCi/m^3 at both indicator and control locations during the preoperational phase of the REMP (Appendix B).

In the direct exposure pathway, the 1999 net average normalized readings for quarterly TLDs from both indicator (13.46 mR) and control (14.91 mR) locations were slightly lower than the corresponding values (19.0 mR and 18.9 mR) for the baseline period. Thus far, no appreciable differences have been observed in TLD exposures between indicator and control locations or between the same locations from one year to the next.

In the waterborne exposure pathway, activities for required gamma-emitting nuclides were measured at levels below the RBS Technical Requirements Manual LLDs during 1999 as had been the case during the preoperational phase (Appendix B). As in preoperational period, required gamma-emitting nuclides in shoreline sediments were all below LLDs. Tritium levels in water are compared below:

WATERBORNE AVERAGE TRITIUM (pCi/l)

Location	Pre-Operational	1994	1995	1996	1997	1998	1999
Surface Water, Upstream (4 km)	<3000	<324	<249	<263	<491	<520	<541
Surface Water, Downstream (4 km)	<3000	158	235	152	254	<508	<537
Upgradient Groundwater	<3000	336	<244	<263	223	<517	<551
Downgradient Groundwater	<3000	173	<251	<263	<492	<509	<535

In the ingestion exposure pathway, no gamma-emitting nuclides were measured above LLDs during 1999. There appears to have been no increase in radionuclide concentrations attributable to RBS operation in food/forage media over baseline levels (Appendix B).

APPENDIX A

Listings of 1999 REMP Results

The following tables list individual analytical results and direct measurements of radiation (TLD exposures) recorded by the Radiological Environmental Monitoring Program (REMP) during 1999. It should be noted that other gamma emitting, naturally occurring nuclides were often detected but are not listed. Tables listing analytical results for some non-TRM required samples for 1999 are also included.

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

INDICATOR LOCATIONS	1ST QTR	2ND QTR	3RD QTR	4TH QTR	LOCATION MEAN
TA1	9.57	11.61	11.74	11.32	11.06
TB1	13.79	16.93	16.31	15.45	15.62
TC1	13.45	16.30	16.31	15.09	15.29
TD1	13.90	16.52	16.39	16.27	15.77
TE1	11.81	14.86	15.59	14.97	14.31
TF1	12.27	14.98	14.65	14.14	14.01
TG1	13.63	16.59	16.76	16.00	15.74
TH1	10.11	12.66	12.64	12.84	12.06
TJ1	11.54	14.32	14.09	13.68	13.41
TK1	12.64	14.39	14.43	14.14	13.90
TL1	12.31	14.67	16.28	14.60	14.46
TM1	10.26	12.15	12.24	12.28	11.74
TN1	9.82	12.06	12.65	12.42	11.74
TNS	10.52	13.16	12.93	12.61	12.31
TP1	12.70	15.80	14.87	14.17	14.38
TQ1	9.29	10.49	10.43	10.68	10.22
TR1	9.05	10.61	11.09	10.98	10.43
TQS1	13.26	15.55	13.35	16.10	14.56
TQS2	11.11	13.41	15.57	13.16	13.31
TRS	12.97	15.67	16.39	15.62	15.16
TCS	11.59	13.41	14.32	13.25	13.14
MAX	13.90	16.93	16.76	16.27	15.77
AVG	11.69	14.10	14.24	13.80	13.46
MIN	9.05	10.49	10.43	10.68	10.22

CONTROL LOCATIONS	1ST QTR	2ND QTR	3RD QTR	4TH QTR	LOCATION MEAN
TAC	11.40	13.66	14.78	14.54	13.59
TEC	12.39	15.36	15.92	15.82	14.87
TGS	14.69	16.65	17.32	16.46	16.28
MAX	14.69	16.65	17.32	16.46	16.28
AVG	12.83	15.22	16.01	15.61	14.91
MIN	11.40	13.66	14.78	14.54	13.59

	INDICATOR	CONTROL
MAX	16.93	17.32
AVG	13.46	14.91
MIN	9.05	11.40

Charcoal Cartridge Iodine-131 Activity (pCi/m^3) (LLD = 0.07 pCi/m^3)

Period			Indicators			Control
Start	End	AQ1*	AP1	AN1	AQS2	AGC
12/28/98	1/5/99	< 0.012	< 0.014	< 0.014	< 0.009	< 0.009
1/5/99	1/11/99	< 0.016	< 0.014	< 0.014	< 0.017	< 0.011
1/11/99	1/25/99		< 0.009	< 0.009	< 0.009	< 0.007
1/25/99	2/8/99		*	< 0.009	< 0.009	< 0.009
2/8/99	2/22/99		< 0.007	< 0.008	< 0.009	< 0.009
2/22/99	3/8/99		< 0.008	< 0.009	< 0.010	< 0.008
3/8/99	3/22/99		< 0.007	< 0.002	< 0.009	< 0.006
3/22/99	4/5/99		< 0.007	< 0.008	< 0.008	< 0.007
4/5/99	4/19/99		< 0.008	< 0.009	< 0.008	< 0.007
4/19/99	5/3/99		< 0.007	< 0.009	< 0.009	< 0.009
5/3/99	5/17/99		< 0.007	< 0.008	< 0.008	< 0.007
5/17/99	5/31/99		< 0.006	< 0.007	< 0.007	< 0.008
5/31/99	6/14/99		< 0.009	< 0.008	< 0.008	< 0.006
6/14/99	6/28/99		< 0.007	< 0.008	< 0.008	< 0.007
6/28/99	7/12/99		< 0.008	< 0.008	< 0.007	< 0.007
7/12/99	7/26/99		< 0.007	< 0.006	< 0.009	< 0.006
7/26/99	8/9/99		< 0.008	< 0.008	< 0.008	< 0.007
8/9/99	8/23/99		< 0.007	< 0.001	< 0.008	< 0.006
8/23/99	9/7/99		< 0.007	< 0.008	< 0.007	< 0.009
9/7/99	9/20/99		< 0.008	< 0.008	< 0.009	< 0.007
9/20/99	10/4/99		< 0.007	< 0.008	< 0.008	< 0.006
10/4/99	10/18/99		< 0.006	< 0.008	< 0.007	< 0.007
10/18/99	10/31/99		< 0.008	< 0.008	< 0.008	< 0.007
10/31/99	11/14/99		< 0.006	< 0.008	< 0.008	< 0.007
11/14/99	11/29/99		< 0.006	< 0.007	< 0.008	< 0.008
11/29/99	12/12/99		< 0.007	< 0.007	< 0.008	< 0.007
12/12/99	12/27/99		< 0.008	< 0.007	< 0.008	< 0.008
MAX		**< LLD**	**< LLD**	**< LLD**	**< LLD**	**< LLD**
AVG						
MIN						

Notes: Activities indicated as "<" are minimum detectable activities (MDAs).
Location AQ1 was discontinued due to REMP reduction in January 1999.
Location AP1 loss of sample volume this period.

Air Particulate Filter Gross Beta Activity (LLD = 0.01 pCi/m^3)

Period		Indicators				Control
Start	End	AQ1*	AP1	AN1	AQS2	AGC
12/28/98	1/5/99	0.016	0.033	0.020	0.020	0.026
1/5/99	1/11/99	0.014	0.025	0.016	0.019	0.023
1/11/99	1/25/99		0.027	0.017	0.018	0.022
1/25/99	2/8/99		*	0.016	0.017	0.014
2/8/99	2/22/99		0.019	0.014	0.017	0.018
2/22/99	3/8/99		0.020	0.015	0.017	0.020
3/8/99	3/22/99		0.017	0.042	0.007	0.027
3/22/99	4/5/99		0.026	0.015	0.021	0.017
4/5/99	4/19/99		0.025	0.014	0.018	0.021
4/19/99	5/3/99		0.025	0.012	0.015	0.015
5/3/99	5/17/99		0.025	0.017	0.015	0.017
5/17/99	5/31/99		0.017	0.016	0.015	0.017
5/31/99	6/14/99		0.012	0.012	0.010	0.013
6/14/99	6/28/99		0.017	0.015	0.013	0.016
6/28/99	7/12/99		0.014	0.015	0.010	0.017
7/12/99	7/26/99		0.012	0.011	0.009	0.015
7/26/99	8/9/99		0.021	0.019	0.015	0.024
8/9/99	8/23/99		0.016	0.016	0.013	0.021
8/23/99	9/7/99		0.019	0.019	0.014	0.025
9/7/99	09/20/99		0.022	0.022	0.017	0.028
9/20/99	10/4/99		0.020	0.020	0.016	0.026
10/4/99	10/18/99		0.026	0.024	0.020	0.032
10/18/99	10/31/99		0.028	0.026	0.024	0.031
10/31/99	11/14/99		0.032	0.028	0.037	0.039
11/14/99	11/29/99		0.028	0.028	0.036	0.032
11/29/99	12/12/99		0.022	0.019	0.028	0.024
12/12/99	12/27/99		0.023	0.018	0.028	0.028
MIN		0.014	0.012	0.011	0.007	0.013
MAX		0.016	0.033	0.042	0.037	0.039
AVG		0.015	0.022	0.019	0.018	0.022

	MIN	MAX	AVG
INDICATOR:	0.007	0.042	0.018
CONTROL:	0.013	0.039	0.022

Notes: Activities indicated as "<" are minimum detectable activities (MDAs).
Location AQ1 was discontinued due to REMP reduction in January 1999.
Location AP1 loss of sample volume this period.

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

MANGANESE-54 (LLD=15pCi/l)

	INDICATORS		CONTROLS	
PERIOD	SWD	WD	SWU	WU
1ST QTR	< 5.55		< 5.55	
2ND QTR	< 5.09	< 5.92	< 5.09	< 8.33
3RD QTR	< 5.35		< 5.35	
4TH QTR	< 4.82	< 5.97	< 4.82	< 5.22
MAX	< LLD	< LLD	< LLD	< LLD
AVG				
MIN				

COBALT-58 (LLD=15 pCi/l)

	INDICATORS		CONTROLS	
PERIOD	SWD	WD	SWU	WU
1ST QTR	< 4.89		< 4.89	
2ND QTR	< 5.52	< 4.27	< 5.52	< 8.70
3RD QTR	< 4.30		< 4.30	
4TH QTR	< 3.82	< 4.93	< 3.82	< 6.38
MAX	< LLD	< LLD	< LLD	< LLD
AVG				
MIN				

IRON-59 (LLD=30 pCi/l)

	INDICATORS		CONTROLS	
PERIOD	SWD	WD	SWU	WU
1ST QTR	< 9.73		< 9.73	
2ND QTR	< 11.60	< 16.00	< 11.60	< 11.00
3RD QTR	< 9.71		< 9.71	
4TH QTR	< 9.38	< 11.50	< 9.38	< 6.12
MAX	< LLD	< LLD	< LLD	< LLD
AVG				
MIN				

Notes: Activities indicated as "<" are minimum detectable activities (MDAs).

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

COBALT-60 (LLD=15pCi/l)

	INDICATORS		CONTROLS	
PERIOD	SWD	WD	SWU	WU
1st QTR	< 5.53		< 6.54	
2ND QTR	< 4.33	< 5.13	< 4.17	< 7.02
3RD QTR	< 6.68		< 3.72	
4TH QTR	< 2.84	< 6.19	< 4.43	< 7.97
MAX	< LLD	< LLD	< LLD	< LLD
AVG				
MIN				

ZINC-65 (LLD=30 pCi/l)

	INDICATORS		CONTROLS	
PERIOD	SWD	WD	SWU	WU
1st QTR	< 13.00		< 11.30	
2ND QTR	< 11.20	< 12.60	< 8.60	< 17.30
3RD QTR	< 11.00		< 7.58	
4TH QTR	< 9.38	< 14.20	< 7.27	< 11.20
MAX	< LLD	< LLD	< LLD	< LLD
AVG				
MIN				

NIOBIUM-95 (LLD=15 pCi/l)

	INDICATORS		CONTROLS	
PERIOD	SWD	WD	SWU	WU
1st QTR	< 5.75		< 6.43	
2ND QTR	< 4.69	< 5.85	< 4.50	< 8.61
3RD QTR	< 4.32		< 3.79	
4TH QTR	< 5.48	< 7.33	< 4.64	< 5.81
MAX	< LLD	< LLD	< LLD	< LLD
AVG				
MIN				

Notes: Activities indicated as "<" are minimum detectable activities (MDAs).

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

ZIRCONIUM-95 (LLD=30pCi/l)

	INDICATORS		CONTROLS	
PERIOD	SWD	WD	SWU	WU
1st QTR	< 9.45		< 8.61	
2ND QTR	< 9.65	< 9.98	< 7.44	< 12.50
3RD QTR	< 8.08		< 5.50	
4TH QTR	< 9.38	< 9.90	< 6.74	< 9.22
MAX	< LLD	< LLD	< LLD	< LLD
AVG				
MIN				

IODINE-131 (LLD=15 pCi/l)

	INDICATORS		CONTROLS	
PERIOD	SWD	WD	SWU	WU
1st QTR	< 4.97		< 4.58	
2ND QTR	< 5.56	< 5.88	< 4.06	< 8.04
3RD QTR	< 5.61		< 3.96	
4TH QTR	< 6.03	< 5.64	< 4.67	< 6.42
MAX	< LLD	< LLD	< LLD	< LLD
AVG				
MIN				

CESIUM-134 (LLD=15 pCi/l)

	INDICATORS		CONTROLS	
PERIOD	SWD	WD	SWU	WU
1st QTR	< 4.72		< 5.28	
2ND QTR	< 5.09	< 5.63	< 5.14	< 6.14
3RD QTR	< 5.05		< 4.82	
4TH QTR	< 5.28	< 7.00	< 4.26	< 5.06
MAX	< LLD	< LLD	< LLD	< LLD
AVG				
MIN				

Notes: Activities indicated as "<" are minimum detectable activities (MDAs).

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

CESIUM-137 (LLD=18pCi/l)

	INDICATORS		CONTROLS	
PERIOD	SWD	WD	SWU	WU
1st QTR	< 6.17		< 6.23	
2ND QTR	< 4.62	< 5.73	< 4.38	< 6.26
3RD QTR	< 5.50		< 4.26	
4TH QTR	< 6.61	< 6.54	< 3.43	< 6.06
MAX	< LLD	< LLD	< LLD	< LLD
AVG				
MIN				

LANTHANUM-140 (LLD=15 pCi/l)

	INDICATORS		CONTROLS	
PERIOD	SWD	WD	SWU	WU
1st QTR	< 6.75		< 5.66	
2ND QTR	< 7.89	< 10.70	< 5.05	< 5.81
3RD QTR	< 8.23		< 4.52	
4TH QTR	< 5.98	< 8.51	< 5.69	< 7.04
MAX	< LLD	< LLD	< LLD	< LLD
AVG				
MIN				

BARIUM-140 (LLD=60 pCi/l)

	INDICATORS		CONTROLS	
PERIOD	SWD	WD	SWU	WU
1st QTR	< 18.70		< 24.40	
2ND QTR	< 13.10	< 19.20	< 15.10	< 20.30
3RD QTR	< 18.00		< 14.20	
4TH QTR	< 16.90	< 18.40	< 15.70	< 19.00
MAX	< LLD	< LLD	< LLD	< LLD
AVG				
MIN				

Notes: Activities indicated as "<" are minimum detectable activities (MDAs).

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

	INDICATORS		CONTROLS	
PERIOD	SWD	WD	SWU	WU
1st Quarter	< 473		< 470	
2nd Quarter	< 461	< 470	< 461	< 475
3rd Quarter	< 537		< 541	
4th Quarter	< 533	< 535	< 531	< 551
MAX	< LLD	< LLD	< LLD	< LLD
AVG				
MIN				

Surface Water:	Indicator	Control
MAX	< LLD	< LLD
AVG		
MIN		

Ground Water:	Indicator	Control
MAX	< LLD	< LLD
AVG		
MIN		

Notes: Activities indicated as "<" are minimum detectable activities (MDAs).

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

	LLD's (pCi/kg,wet)						
COLLECTION	130	130	260	130	260	130	150
DATE	MN-54	CO-58	FE-59	CO-60	ZN-65	CS-134	CS-137
12/22/99	< 13.7	< 11.8	< 32.1	< 18.0	< 34.3	< 12.2	< 13.5
MAX	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
AVG							
MIN							

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

	LLD's (pCi/kg,wet)						
COLLECTION	130	130	260	130	260	130	150
DATE	MN-54	CO-58	FE-59	CO-60	ZN-65	CS-134	CS-137
12/22/99	< 15.0	< 11.2	< 34.3	< 13.9	< 40.7	< 12.3	< 14.4
MAX	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD	< LLD
AVG							
MIN							

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

	LLD's (pCi/kg	
COLLECTION	150	180
DATE	CS-134	CS-137
12/15/99	< 25.60	< 27.60
MAX	< LLD	< LLD
AVG		
MIN		

NOTE: Activities indicated as "<" are minimum detectable activities (MDAs). The control sample for downstream sediment is the upstream surface water sample.

Gamma-Emitting Nuclide Activity (pCi/kg, wet) in Broadleaf Vegetation
GARDEN GN1 (Indicator)

COLLECTION PERIOD	LLD's (pCi/kg, wet) 60 I-131	60 CS-134	80 CS-137
1ST QTR	< 52.1	< 50.0	< 37.6
2ND QTR	< 45.0	< 47.4	< 46.1
3RD QTR	< 34.5	< 42.1	< 42.5
4TH QTR	< 41.3	< 55.8	< 62.3
MAX	< LLD	< LLD	< LLD
AVG			
MIN			

Gamma-Emitting Nuclide Activity (pCi/kg, wet) in Broadleaf Vegetation
ANGOLA GQC (Control)

COLLECTION PERIOD	LLD's (pCi/kg, wet) 60 I-131	60 CS-134	80 CS-137
1ST QTR	< 28.8	< 33.5	< 24.2
2ND QTR	< 35.1	< 43.6	< 38.6
3RD QTR	< 18.9	< 28.5	< 27.7
4TH QTR	< 45.9	< 43.5	< 53.8
MAX	< LLD	< LLD	< LLD
AVG			
MIN			

NOTE: Activities indicated as "<" are minimum detectable activities (MDAs).

Gamma-Emitting Nuclide Activity (pCi/kg dry) in East and West Creek Sediments
LLD's (pCi/kg): Cs-134=150; Cs-137=180

COLLECTION	East Creek		West Creek	
DATE	CS-134	CS-137	CS-134	CS-137
1ST QTR	< 16.5	< 14.7	< 14.0	< 20.3
2ND QTR	< 11.8	< 14.9	< 21.2	< 16.3
3RD QTR*				
4TH QTR	< 14.8	< 14.3	< 16.2	< 15.9
MAX	< LLD	< LLD	< LLD	< LLD
AVG				
MIN				

Gamma-Emitting Nuclide Acitivity (pCi/L) in Wastewater Treatment Plant Effluent

	LLD's (pCi/L)								
COLLECTION	15	15	30	15	30	15	30	15	15
DATE	MN-54	C0-58	FE-59	CO-60	ZN-65	NB-95	ZR-95	I-131	CS-134
JANUARY	< 3.88	< 4.42	< 9.74	< 4.04	< 11.50	< 5.41	< 6.23	< 14.80	< 5.08
FEBRURY	< 5.65	< 3.47	< 11.90	< 5.79	< 10.70	< 6.21	< 8.46	< 12.90	< 4.71
MARCH	< 5.31	< 4.57	< 7.64	< 3.96	< 10.20	< 4.38	< 8.33	< 14.80	< 3.62
APRIL	< 3.96	< 6.30	< 11.80	< 5.28	< 8.99	< 4.67	< 8.48	< 14.50	< 4.32
MAY	< 3.76	< 4.60	< 7.08	< 4.53	< 7.99	< 4.57	< 6.38	< 4.61	< 4.79
JUNE	< 3.29	< 3.06	< 6.73	< 2.97	< 5.03	< 4.27	< 5.46	< 12.40	< 2.88
JULY	< 4.45	< 3.67	< 9.86	< 5.22	< 8.36	< 4.76	< 7.87	< 12.40	< 3.41
AUGUST	< 3.04	< 3.50	< 6.54	< 2.13	< 5.55	< 3.80	< 6.18	< 14.90	< 2.56
SEPTEMBER	< 5.32	< 3.87	< 6.76	< 5.30	< 10.60	< 4.05	< 6.04	< 4.86	< 5.84
OCTOBER	< 4.41	< 3.40	< 12.70	< 4.71	< 6.78	< 6.53	< 7.91	< 13.00	< 4.53
NOVEMBER	< 4.31	< 5.00	< 6.46	< 4.96	< 8.53	< 4.47	< 7.11	< 4.05	< 4.08
DECEMBER	< 3.85	< 3.84	< 10.80	< 4.79	< 11.60	< 4.89	< 9.11	< 5.49	< 5.79

	LLD's (pCi/L)		
	18	60	15
COLLECTION			
DATE	CS-137	BA-140	LA-140
JANUARY	< 5.39	< 24.90	< 11.20
FEBRURY	< 5.10	< 29.00	< 13.20
MARCH	< 4.41	< 36.40	< 10.50
APRIL	< 4.39	< 37.10	< 7.06
MAY	< 4.83	< 12.80	< 6.09
JUNE	< 2.63	< 29.20	< 7.38
JULY	< 3.71	< 37.10	< 14.90
AUGUST	< 3.04	< 23.70	< 8.93
SEPTEMBER	< 4.96	< 13.10	< 7.51
OCTOBER	< 4.10	< 35.00	< 12.00
NOVEMBER	< 3.75	< 16.70	< 3.44
DECEMBER	< 6.04	< 15.50	< 8.64

Notes: Activities indicated as "<" are minimum detectable activities (MDAs). East and West Creek, and Waste Water Treatment Plant samples are not required by the TRM. East and West Creek samples are collected and analyzed per U.S. NRC I & E Bulletin B80-10. Waste Treatment Plant samples are monitored at the request of Radiation Control Department.
East and West Creek samples not collected during third quarter.

APPENDIX B

Summary of Preoperational REMP (Baseline) Results

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

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

River Bend Station
West Feliciana Parish, Louisiana

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

Medium or Pathway Sampled (Unit of Measure)	Type and Total Number of Analyses Performed	Lower Limit of Detection[1] (LLD)	All Indicator Stations Mean (f)[2] Range	Location with Highest Annual Mean		Control Locations Mean (f)[2] Range	Number of Nonroutine Reported Results
				Name Distance/Direction	Mean (f)[2] Range		
Air Particulate (pCi/m^3)	Gross Beta (1086)	0.01	0.03 (752/759) 0.01 - 0.09	AQS2 5.8 km NW	0.03 (146/158) 0.01 - 0.09	0.03 (326/327) 0.01 - 0.08	N/A
	Cs-134 (95)	0.05	All < LLD			All < LLD	N/A
	Cs-137 (95)	0.06	All < LLD			All < LLD	N/A
Air Radioiodine (pCi m^3)	I-131 (1086)	0.07	All < LLD			All < LLD	N/A
Direct (TLD)[4] (mR total)	Gamma Monthly (1214)		6.8 (1018/1064) 0.7 - 19.3	TM2 4.2 km WSW	7.8 (27/28) 3.2 - 16.2	6.7 (139/150) 0 - 27.8	N/A
	Gamma Quarterly (472)		19.0[3] (404/418) 6.8 - 32.1	TG1 1.6 km SE	27.5[3] (11/11) 12.2 - 27.6	18.9[3] (51/54) 6.5 - 23.5	N/A
Surface Water (pCi/liter)	H-3 (24)	2000	All < LLD			All < LLD	N/A
	Mn-54 (68)	15	All < LLD			All < LLD	N/A
	Co-58 (68)	15	All < LLD			All < LLD	N/A
	Fe-59 (68)	30	All < LLD			All < LLD	N/A
	Co-60 (68)	15	All < LLD			All < LLD	N/A
	Zn-65 (68)	30				All < LLD	N/A
	Nb-95 (68)	15				All < LLD	N/A
	Zr-95 (68)	30	All < LLD			All < LLD	N/A
	I-131 (68)	15	All < LLD			All < LLD	N/A
	Cs-134 (68)	15	All < LLD			All < LLD	N/A
	Cs-137 (68)	18	All < LLD			ALL > LLD	N/A
	Ba-140 (68)	60	All < LLD			ALL < LLD	N/A
	La-140 (68)	15	All < LLD			All < LLD	N/A
	Gross Beta (52)	4	8.1 (23/26) 4 - 12	SWD 4 km downstream	8.1 (23/26) 4 - 12	7.8 (24/26) 5 - 13	N/A

TABLE B.1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

(Page 2 of 4)

River Bend Station
West Feliciana Parish, Louisiana

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

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

TABLE B.1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

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River Bend Station
West Feliciana Parish, Louisiana

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

Medium or Pathway Sampled (Unit of Measure)	Type and Total Number of Analyses Performed	Lower Limit of Detection[1] (LLD)	All Indicator Stations Mean (f)[2] Range	Location with Highest Annual Mean		Control Locations Mean (f)[2] Range	Number of Nonroutine Reported Results
				Name Distance/Direction	Mean (f)[2] Range		
Drinking Water[5] (pCi/liter)	Zr-95 (40)	30	All < LLD			All < LLD	N/A
	I-131 (40)	15	All < LLD			All < LLD	N/A
	Cs-134 (40)	15	All < LLD			All < LLD	N/A
	Cs-137 (40)	18	All < LLD			All < LLD	N/A
	Ba-140 (40)	60	All < LLD			All < LLD	N/A
	La-140 (40)	15	All < LLD			All < LLD	N/A
	Gross Beta (54)	4	6.8 (28/28) 3 - 12	Donaldsonville 138 km downstream	6.8 (28/28) 3 - 12	7.8 (24/26) 5 - 13	N/A
Shoreline Sediment[6] (pCi/kg dry)	K-40[6] (2)	None Required	13700 (2/2) 11400 - 15900	SED 4 km downstream	13700 (2/2) 11400 - 15900	Not Required	N/A
	Cs-134 (4)	150	All < LLD				N/A
	Cs-137 (4)	180	All < LLD			All < LLD	N/A
Milk (pCi/liter)	K-40[6] (18)	None Required	1313 (8/9) 1179 - 1475	MF2 6 km ESE	1313 (8/9) 1179 - 1475	1318 (7/9) 1196 - 1409	N/A
	I-131 (81)	1	All < LLD			All < LLD[7]	N/A
	Cs-134 (82)	15	All < LLD			All < LLD[7]	N/A
	Cs-137 (82)	18	All < LLD			All < LLD[7]	N/A
	Ba-140 (82)	60	All < LLD			All < LLD[7]	N/A
	La-140 (82)	15	All < LLD			All < LLD	N/A
Fish/Invertebrates (pCi/kg wet)	K-40[6] (6)	None Required	9037 (2/2)	FD 4 km downstream	9037 (2/2) 6320 - 11754	7840 (4/4) 4177 - 11438	N/A
	Mn-54 (15)	130	All < LLD			All < LLD	N/A
	Co-58 (15)	130	All < LLD			All < LLD	N/A
	Fe-59 (15)	260	All < LLD[8]			All < LLD[8]	N/A
	Co-60 (15)	130	All < LLD			All < LLD	N/A

TABLE B.1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

(Page 4 of 4)

River Bend Station
West Feliciana Parish, Louisiana

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

Medium or Pathway Sampled (Unit of Measure)	Type and Total Number of Analyses Performed	Lower Limit of Detection[1] (LLD)	All Indicator Stations Mean (f)[2] Range	Location with Highest Annual Mean		Control Locations Mean (f)[2] Range	Number of Nonroutine Reported Results
				Name Distance/Direction	Mean (f)[2] Range		
Fish/Invertebrates (pCi/kg wet) (continued)	Zn-65 (15)	260	All < LLD			All < LLD	N/A
	Cs-134 (15)	130	All < LLD			All < LLD	N/A
	Cs-137 (15)	160	All < LLD			All < LLD	N/A
Vegetation (pCi/kg wet)	K-40[6] (11)	None Required	3368 (6/10) 1398 - 5389	G2 1.3 km NW	3368 (6/10) 1398 - 5389	3768 single value	N/A
	I-131 (75)	60	All < LLD[7]			All < LLD	N/A
	Cs-134 (76)	60	All < LLD			All < LLD	N/A
	Cs-137 (76)	80	97 (4/43) 59 - 120	G1 1 km WNW	97 (4/43) 59 - 120	All < LLD	N/A

NOTES:

(1) Lower Limit of Detection (LLD) as defined in RBS Technical Specifications (NUREG-1172), now TRM.

(2) Mean and range based on detectable measurements only. The fraction of detectable measurements at specified locations is indicated in parenthesis (f).

(3) For each of the TLD locations in 1985, a value equal to one-third of its 4th Quarter gamma exposure is used to simulate a "quarterly" measurement for October, 1985.

(4) Beginning in January, 1985, groundwater was sampled from one upgradient (WU - control) and one downgradient (WD - indicator) well; previously, groundwater was sampled from construction dewatering (well-point) wells.

(5) The upstream surface water sampling location (SWU) is used as a "control" for drinking water comparisons.

(6) The values listed for K-40 were derived from the initial in-house analytical program.

(7) The values listed for the control location for milk were derived from the initial in-house analytical program. Training of personnel in calibration and analytical methods delayed sample preparation and counting. As a result, the required LLDs were not met (by the in-house analytical program during this training period) in 2 out of 8 I-131 analyses; 1 out of 9 Cs-134 analyses; 1 out of 9 of Cs-137 analyses; 2 out of 9 Ba-140 analyses; and 4 out of 9 La-140 analyses. Similarly, the required LLD for I-131 in broadleaf vegetation was not met in 1 out of 11 analyses. (See discussion of Program Exceptions in the Preoperational Radiological Environmental Monitoring Report for 1985.)

(8) The LLD for one downstream fish sample (catfish, analyzed in-house) was 265 pCi/kg (wet). The LLD for one upstream fish sample (largemouth bass, analyzed in-house) was 263 pCi/kg (wet).