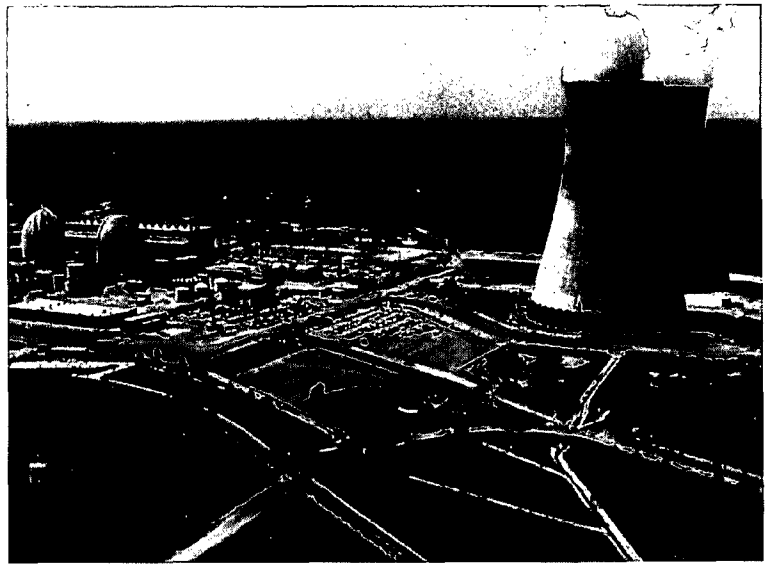
VOGTLE ELECTRIC GENERATING PLANT ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 2006



SOUTHERN COMPANY

Energy to Serve Your World℠

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

Acronyms presented in alphabetical order.

Acronym	Definition
ASTM	American Society for Testing and Materials
CL	Confidence Level
EL	Georgia Power Company Environmental Laboratory
EPA	Environmental Protection Agency
GPC	Georgia Power Company
ICP	Interlaboratory Comparison Program
MDC	Minimum Detectable Concentration
MDD	Minimum Detectable Difference
MWe	MegaWatts Electric
NA	Not Applicable
NDM	No Detectable Measurement(s)
NRC	Nuclear Regulatory Commission
ODCM	Offsite Dose Calculation Manual
Po	Preoperation
PWR	Pressurized Water Reactor
REMP	Radiological Environmental Monitoring Program
RL	Reporting Level
RM	River Mile
TLD	Thermoluminescent Dosimeter
TS	Technical Specification
VEGP	Alvin W. Vogtle Electric Generating Plant

1.0 INTRODUCTION

The Radiological Environmental Monitoring Program (REMP) is conducted in accordance with Chapter 4 of the Offsite Dose Calculation Manual (ODCM). The REMP activities for 2006 are reported herein in accordance with Technical Specification (TS) 5.6.2 and ODCM 7.1.

The objectives of the REMP are to:

1) Determine the levels of radiation and the concentrations of radioactivity in the environs and;

2) Assess the radiological impact (if any) to the environment due to the operation of the Alvin W. Vogtle Electric Generating Plant (VEGP).

The assessments include comparisons between results of analyses of samples obtained at locations where radiological levels are not expected to be affected by plant operation (control stations) and at locations where radiological levels are more likely to be affected by plant operation (indicator stations), as well as comparisons between preoperational and operational sample results.

VEGP is owned by Georgia Power Company (GPC), Oglethorpe Power Corporation, the Municipal Electric Authority of Georgia, and the City of Dalton, Georgia. It is located on the southwest side of the Savannah River approximately 23 river miles upstream from the intersection of the Savannah River and U.S. Highway 301. The site is in the eastern sector of Burke County, Georgia, and across the river from Barnwell County, South Carolina. The VEGP site is directly across the Savannah River from the Department of Energy Savannah River Site. Unit 1, a Westinghouse Electric Corporation Pressurized Water Reactor (PWR), with a licensed core thermal power of 3565 MegaWatts (MWt), received its operating license on January 16, 1987 and commercial operation started on May 31, 1987. Unit 2, also a Westinghouse PWR rated for 3565 MWt, received its operating license on February 9, 1989 and began commercial operation on May 19, 1989.

The pre-operational stage of the REMP began with initial sample collections in August of 1981. The transition from the pre-operational to the operational stage of the REMP occurred as Unit 1 reached initial criticality on March 9, 1987.

A description of the REMP is provided in Section 2 of this report. Maps showing the sampling stations are keyed to a table which indicates the direction and distance of each station from a point midway between the two reactors. Section 3 provides a summary of the results of the analyses of REMP samples for the year. The results are discussed, including an assessment of any radiological impacts upon the environment and the results of the land use census and the river survey, in Section 4. The results of the Interlaboratory Comparison Program (ICP) are provided in Section 5. Conclusions are provided in Section 6.

2.0 REMP DESCRIPTION

A summary description of the REMP is provided in Table 2-1. This table summarizes the program as it meets the requirements outlined in ODCM Table 4-1. It details the sample types to be collected and the analyses to be performed in order to monitor the airborne, direct radiation, waterborne and ingestion pathways, and also delineates the collection and analysis frequencies. In addition, Table 2-1 references the locations of stations as described in ODCM Section 4.2 and in Table 2-2 of this report. The stations are also depicted on maps in Figures 2-1 through 2-3.

REMP samples are collected by Georgia Power Company's (GPC) Environmental Laboratory (EL) personnel. The same lab performs all the laboratory analyses at their headquarters in Smyrna, Georgia.

TABLE 2-1 (SHEET 1 of 5)

SUMMARY DESCRIPTION OF RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Representative Samples and Sample Locations	Sampling and Collection Frequency	Type and Frequency of Analysis
1. Direct Radiation	Thirty nine routine monitoring stations with two or more dosimeters placed as follows: An inner ring of stations, one in each compass sector in the general area of the site boundary; An outer ring of stations, one in each compass sector at approximately 5 miles from the site; and Special interest areas, such as population centers, nearby recreation areas, and control stations.	Quarterly	Gamma dose, quarterly
2. Airborne Radioiodine and Particulates	Samples from seven locations: Five locations close to the site boundary in different sectors; A community having the highest calculated annual average ground level D/Q; and	Continuous sampler operation with sample collection weekly, or more frequently if required by dust loading.	Radioiodine canister: I-131 analysis, weekly. Particulate sampler: Gross beta analysis[1] following filter change and gamma isotopic analysis[2] of composite (by location), quarterly.

TABLE 2-1 (SHEET 2 of 5)

SUMMARY DESCRIPTION OF RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Representative Samples and Sample Locations	Sampling and Collection Frequency	Type and Frequency of Analysis
2. Airborne Radioiodine and Particulates (cont.)	A control location near a population center at a distance of about 14 miles.		
3. Waterborne			
a. Surface[3]	One sample upriver. Two samples downriver.	Composite sample over one month period[4].	Gamma isotopic analysis[2], monthly. Composite for tritium analysis, quarterly.
b. Drinking	Two samples at each of the three nearest water treatment plants that could be affected by plant discharges. Two samples at a control location.	Composite sample of river water near the intake of each water treatment plant over two week period[4] when I-131 analysis is required for each sample; monthly composite otherwise; and grab sample of finished water at each water treatment plant every two weeks or monthly, as appropriate.	I-131 analysis on each sample when the dose calculated for the consumption of the water is greater than 1 mrem per year[5]. Composite for gross beta and gamma isotopic analysis[2] on raw water, monthly. Gross beta, gamma isotopic and I-131 analyses on grab sample of finished water, monthly. Composite for tritium analysis on raw and finished water, quarterly.
c. Sediment from Shoreline	One sample from downriver area with existing or potential recreational value.	Semiannually	Gamma isotopic analysis[2], semiannually.

TABLE 2-1 (SHEET 3 of 5)

SUMMARY DESCRIPTION OF RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Representative Samples and Sample Locations	Sampling and Collection Frequency	Type and Frequency of Analysis
c. Sediment from Shoreline (cont.)	One sample from upriver area with existing or potential recreational value.		
4. Ingestion			
a. Milk	Two samples from milking animals[6] at control locations at a distance of about 10 miles or more.	Biweekly	Gamma isotopic analysis[2,7], biweekly.
b. Fish	At least one sample of any commercially or recreationally important species near the plant discharge. At least one sample of any commercially or recreationally important species in an area not influenced by plant discharges. At least one sample of any anadromous species near the plant discharge.	Semiannually During the spring spawning season.	Gamma isotopic analysis[2] on edible portions, semiannually. Gamma isotopic analysis[2] on edible portions, annually.

TABLE 2-1 (SHEET 4 of 5)

SUMMARY DESCRIPTION OF RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Representative Samples and Sample Locations	Sampling and Collection Frequency	Type and Frequency of Analysis
c. Grass or Leafy Vegetation	One sample from two onsite locations near the site boundary in different sectors. One sample from a control location at a distance of about 17 miles.	Monthly during growing season.	Gamma isotopic analysis[2, 7], monthly.

TABLE 2-1 (SHEET 5 of 5)

SUMMARY DESCRIPTION OF RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Notes:

(1) Airborne particulate sample filters shall be analyzed for gross beta radioactivity 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air particulate samples is greater than 10 times the yearly mean of control samples, gamma isotopic analysis shall be performed on the individual samples.

(2) Gamma isotopic analysis means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility.

(3) Upriver sample is taken at a distance beyond significant influence of the discharge. Downriver samples are taken beyond but near the mixing zone.

(4) Composite sample aliquots shall be collected at time intervals that are very short (e.g., hourly) relative to the compositing period (e.g., monthly) to assure obtaining a representative sample.

(5) The dose shall be calculated for the maximum organ and age group, using the methodology and parameters in the ODCM.

(6) A milking animal is a cow or goat producing milk for human consumption.

(7) If the gamma isotopic analysis is not sensitive enough to meet the Minimum Detectable Concentration (MDC) for I-131, a separate analysis for I-131 may be performed.

TABLE 2-2 (SHEET 1 of 3)

RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

Station Number	Station Type	Descriptive Location	Direction[1]	Distance (miles)[1]	Sample Type
1	Indicator	River Bank	N	1.1	Direct Rad.
2	Indicator	River Bank	NNE	0.8	Direct Rad.
3	Indicator	Discharge Area	NE	0.6	Airborne Rad.
3	Indicator	River Bank	NE	0.7	Direct Rad
4	Indicator	River Bank	ENE	0.8	Direct Rad.
5	Indicator	River Bank	E	1.0	Direct Rad.
6	Indicator	Plant Wilson	ESE	1.1	Direct Rad.
7	Indicator	Simulator Building	SE	1.7	Airborne Rad. Direct Rad. Vegetation
8	Indicator	River Road	SSE	1.1	Direct Rad.
9	Indicator	River Road	S	1.1	Direct Rad.
10	Indicator	Met Tower	SSW	0.9	Airborne Rad.
10	Indicator	River Road	SSW	1.1	Direct Rad.
11	Indicator	River Road	SW	1.2	Direct Rad.
12	Indicator	River Road	WSW	1.2	Airborne Rad. Direct Rad.
13	Indicator	River Road	W	1.3	Direct Rad.
14	Indicator	River Road	WNW	1.8	Direct Rad.
15	Indicator	Hancock Landing Road	NW	1.5	Direct Rad. Vegetation
16	Indicator	Hancock Landing Road	NNW	1.4	Airborne Rad. Direct Rad.
17	Other	Sav. River Site (SRS), River Road	N	5.4	Direct Rad.
18	Other	SRS, D Area	NNE	5.0	Direct Rad.
19	Other	SRS, Road A.13	NE	4.6	Direct Rad.
20	Other	SRS, Road A.13.1	ENE	4.8	Direct Rad.
21	Other	SRS, Road A.17	E	5.3	Direct Rad.
22	Other	River Bank	ESE	5.2	Direct Rad.
23	Other	River Road	SE	4.6	Direct Rad.
24	Other	Chance Road	SSE	4.9	Direct Rad.
25	Other	Chance Road near Highway 23	S	5.2	Direct Rad.
26	Other	Highway 23 and Ebenezer Church Road	SSW	4.6	Direct Rad.
27	Other	Highway 23 opposite Boll Weevil Road	SW	4.7	Direct Rad.
28	Other	Thomas Road	WSW	5.0	Direct Rad.

TABLE 2-2 (SHEET 2 of 3)

RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

Station Number	Station Type	Descriptive Location	Direction[1]	Distance (miles)[1]	Sample Type
29	Other	Claxton-Lively Road	W	5.1	Direct Rad.
30	Other	Nathaniel Howard Road	WNW	5.0	Direct Rad.
31	Other	River Road at Allen's Chapel Fork	NW	5.0	Direct Rad.
32	Other	River Bank	NNW	4.7	Direct Rad.
35	Other	Girard	SSE	6.6	Airborne Rad. Direct Rad.
36	Control	GPC Waynesboro Op. HQ	WSW	13.9	Airborne Rad. Direct Rad.
37	Control	Substation Waynesboro, GA	WSW	16.7	Direct Rad Vegetation
43	Other	Employee's Rec. Center	SW	2.2	Direct Rad.
47	Control	Oak Grove Church	SE	10.4	Direct Rad.
48	Control	McBean Cemetery	NW	10.2	Direct Rad.
51	Control	SGA School Sardis, GA	S	11.0	Direct Rad.
52	Control	Oglethorpe Substation; Alexander, GA	SW	10.7	Direct Rad.
80	Control	Augusta Water Treatment Plant	NNW	29.0	Drinking Water[2]
81	Control	Sav River	N	2.5	Fish[3] Sediment[4]
82	Control	Sav River (RM 151.2)	NNE	0.8	River Water
83	Indicator	Sav River (RM 150.4)	ENE	0.8	River Water Sediment[4]
84	Other	Sav River (RM 149.5)	ESE	1.6	River Water
85	Indicator	Sav River	ESE	4.3	Fish[3]
87	Indicator	Beaufort-Jasper County Water Treatment Plant	SE	76	Drinking Water[5]
88	Indicator	Cherokee Hill Water Treatment Plant, Port Wentworth, Ga	SSE	72	Drinking Water[6]

TABLE 2-2 (SHEET 3 of 3)

RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

89	Indicator	Purrysburg Water Treatment Plant; Purrysburg, SC	SSE	76	Drinking Water[9]
98	Control	W.C. Dixon Dairy	SE	9.8	Milk
99[7]	Control	Boyceland Dairy	W	20.9	Milk
100[8]	Control	Coble Dairy	WSW	23.8	Milk

Notes:

(1) Direction and distance are determined from a point midway between the two reactors.

(2) The intake for the Augusta Water Treatment Plant is located on the Augusta Canal. The entrance to the canal is at River Mile (RM) 207 on the Savannah River. The canal effectively parallels the river. The intake to the pumping station is about 4 miles down the canal.

(3) A 5 mile stretch of the river is generally needed to obtain adequate fish samples. Samples are normally gathered between RM 153 and 158 for upriver collections and between RM 144 and 149.4 for downriver collections.

(4) Sediment is collected at locations with existing or potential recreational value. Because high water, shifting of the river bottom, or other reasons could cause a suitable location for sediment collections to become unavailable or unsuitable, a stretch of the river between RM 148.5 and 150.5 was designated for downriver collections while a stretch between RM 153 and 154 was designated for upriver collections. In practice, collections are normally made at RM 150.2 for downriver collections and RM 153.3 for upriver collections.

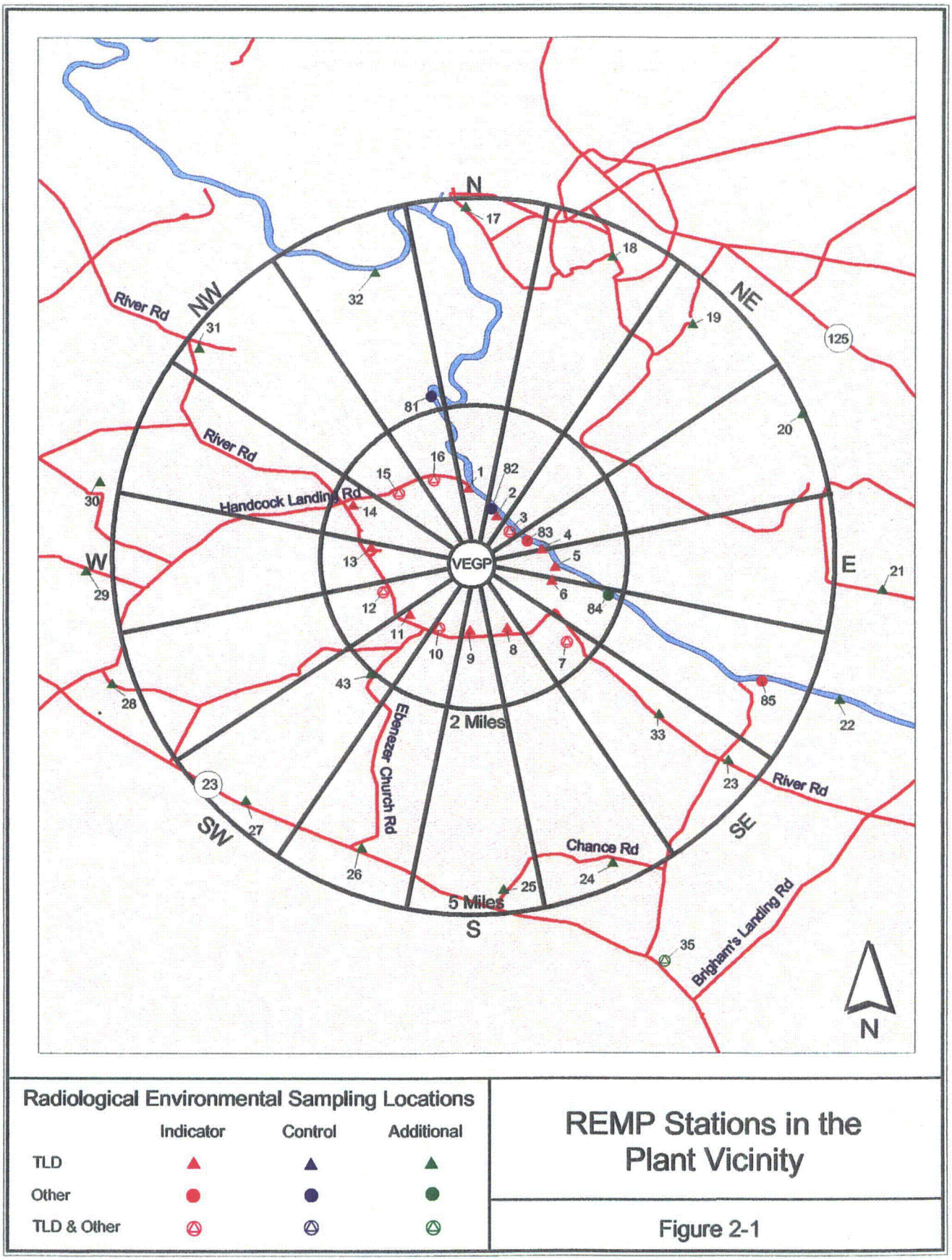
(5) The intake for the Beaufort-Jasper County Water Treatment Plant is located at the end of canal that begins at RM 39.3 on the Savannah River. This intake is about 16 miles by line of sight down the canal from its beginning on the Savannah River.

(6) The intake for the Cherokee Hill Water Treatment Plant is located on Abercorn Creek which is about one and a quarter creek miles from its mouth on the Savannah River at RM 29.

(7) Dairy operations ceased and milk sampling was discontinued at location 99 on September 3, 2003.

(8) Milk sample collection began at location 100 on September 30, 2003. In 2006, the dairy changed locations from WNW at 16.2 miles to WSW at 23.8 miles.

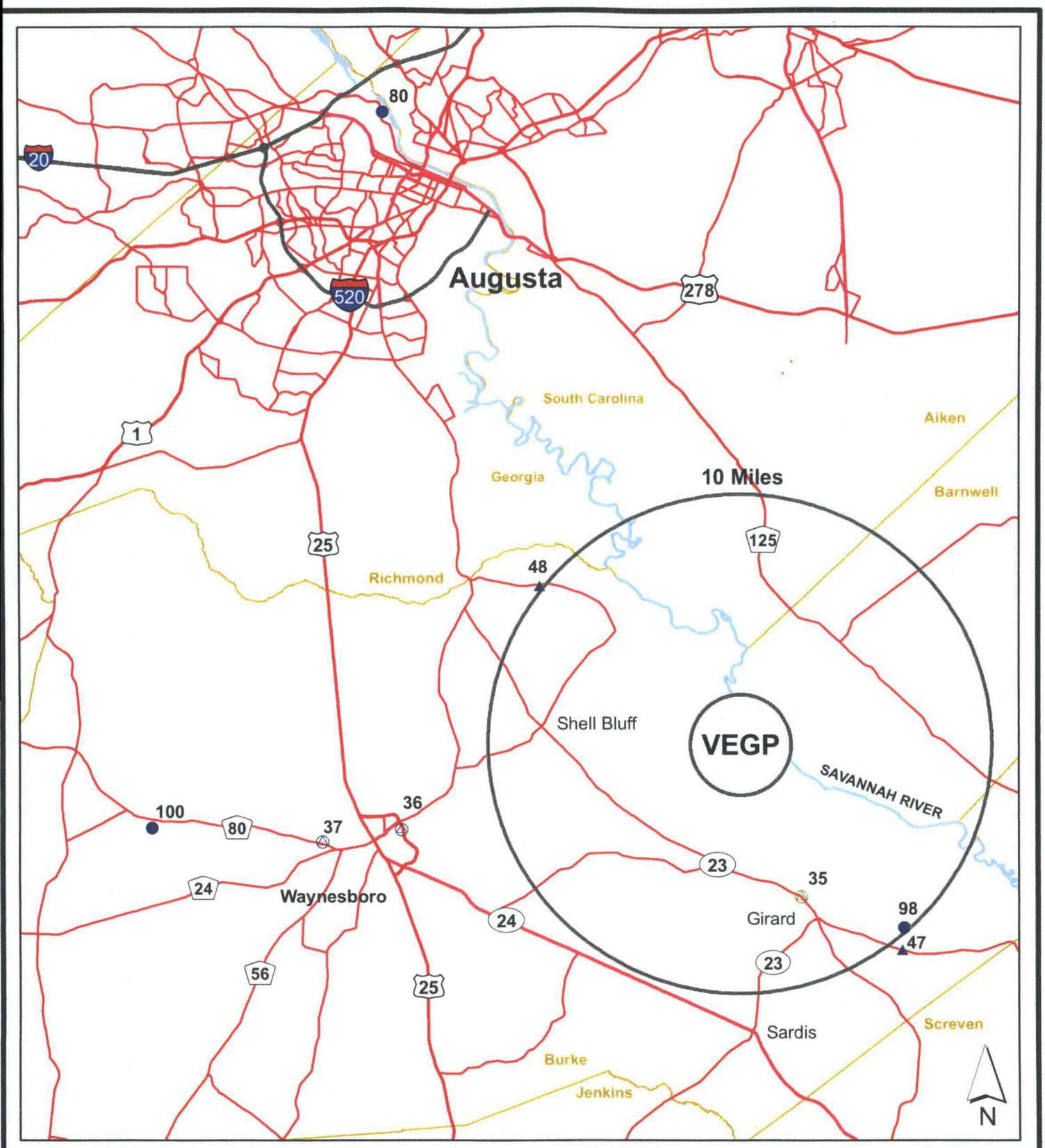
(9) The intake for the Purrysburg Water Treatment Plant is located on the same canal as the Beaufort-Jasper Water Treatment Plant. The Purrysburg intake is nearer to the Savannah River at the beginning of the canal.



Radiological Environmental Sampling Locations			
	Indicator	Control	Additional
TLD	▲	▲	▲
Other	●	●	●
TLD & Other	◬	◬	◬

REMP Stations in the Plant Vicinity

Figure 2-1

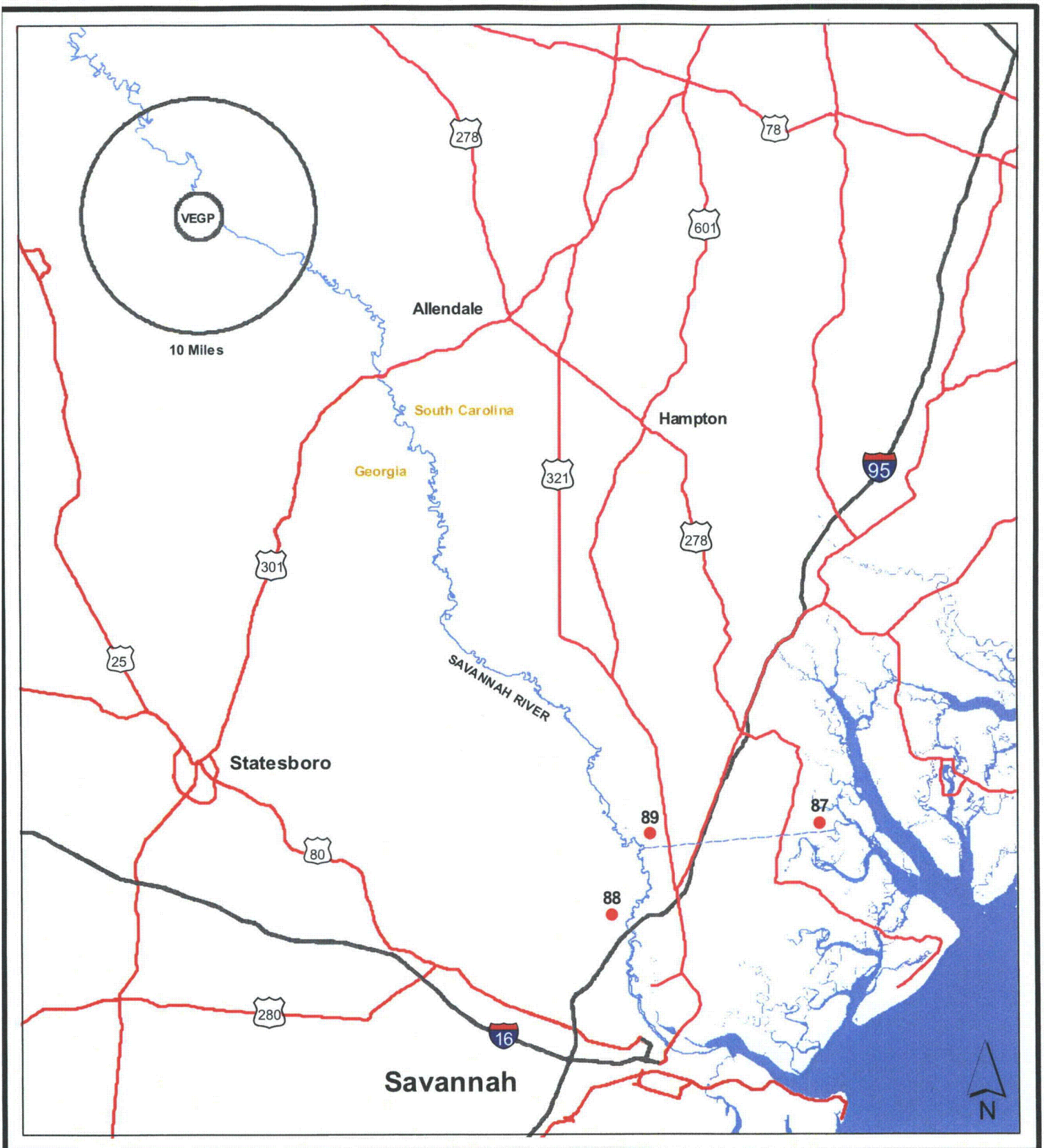


Radiological Environmental Sampling Locations

	Indicator	Control	Additional
TLD	▲	▲	▲
Other	●	●	●
TLD & Other	△	△	△

REMP Control Stations for the Plant

Figure 2-2



Radiological Environmental Sampling Locations

	Indicator	Control	Additional
TLD	▲	▲	▲
Other	●	●	●
TLD & Other	◬	◬	◬

REMP Indicator Drinking Water Stations

Figure 2-3

3.0 RESULTS SUMMARY

In accordance with ODCM 7.1.2.1, the summarized and tabulated results for all of the regular samples collected for the year at the designated indicator and control stations are presented in Table 3-1. The format of Table 3-1 is similar to Table 3 of the Nuclear Regulatory Commission (NRC) Branch Technical Position, "An Acceptable Radiological Environmental Monitoring Program", Revision 1, November 1979. Results for samples collected at locations other than indicator or control stations are discussed in Section 4 under the particular sample type.

As indicated in ODCM 7.1.2.1, the results for naturally occurring radionuclides that are also found in plant effluents must be reported along with man-made radionuclides. The radionuclide Be-7 which occurs abundantly in nature is found in some years in the plant's liquid and gaseous effluent. No other naturally occurring radionuclides are found in the plant's effluent releases. Therefore, the only radionuclides of interest in the REMP samples are the man-made radionuclides and Be-7, when it is detected in the effluent. Be-7 was not detected in plant effluents in 2006.

TABLE 3-1 (SHEET 1 of 8)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

Vogtle Electric Generating Plant, Docket Nos. 50-424 and 50-425
Burke County, Georgia

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Minimum Detectable Concentration (MDC) (a)	Indicator Locations Mean (b), Range (Fraction)	Location with the Highest Annual Mean		Other Stations (g) Mean (b), Range (Fraction)	Control Locations Mean (b), Range (Fraction)
				Name Distance & Direction	Mean (b), Range (Fraction)		
Airborne Particulates (fCi/m3)	Gross Beta 364	10	25.5 10.2-43.4 (260/260)	Station 10 Met Tower 0.9 miles SSW	25.9 11.7-42.5 (52/52)	24.3 11.9-39.7 (52/52)	24.6 12.1-47.8 (52/52)
	Gamma Isotopic 28						
	Cs-134	50	NDM (c)		NDM	NDM	NDM
	Cs-137	60	NDM		NDM	NDM	NDM
Airborne Radioiodine (fCi/m3)	I-131 364	70	NDM		NDM	NDM	NDM
Direct Radiation (mR/91 days)	Gamma Dose 160	NA (d)	13.1 10.5-17.9 (64/64)	Station 01 River Bank 1.1 miles N	16.6 15.5-17.9 (4/4)	13.0 10.0-17.3 (72/72)	12.9 10.6-15.7 (24/24)

TABLE 3-1 (SHEET 2 of 8)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

Vogtle Electric Generating Plant, Docket Nos. 50-424 and 50-425
Burke County, Georgia

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Minimum Detectable Concentration (MDC) (a)	Indicator Locations Mean (b), Range (Fraction)	Location with the Highest Annual Mean		Other Stations (g) Mean (b), Range (Fraction)	Control Locations Mean (b), Range (Fraction)
				Name Distance & Direction	Mean (b), Range (Fraction)		
Milk (pCi/l)	Gamma Isotopic 49						
	Cs-134	15	NA		NDM	NA	NDM
	Cs-137	18	NA		NDM	NA	NDM
	Ba-140	60	NA		NDM	NA	NDM
	La-140	15	NA		NDM	NA	NDM
	I-131	1	NA		NDM	NA	NDM
	49						
Vegetation (pCi/kg-wet)	Gamma Isotopic 36						
	I-131	60	NDM		NDM	NA	NDM
	Cs-134	60	NDM		NDM	NA	NDM
	Cs-137	80	23.9 20.3-27.6 (2/24)	Station 37 Waynesboro GPC Op. HQ 16.7 miles WSW	491.8 (1/12)	NA	491.8 (1/12)

TABLE 3-1 (SHEET 3 of 8)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

Vogtle Electric Generating Plant, Docket Nos. 50-424 and 50-425
Burke County, Georgia

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Minimum Detectable Concentration (MDC) (a)	Indicator Locations Mean (b), Range (Fraction)	Location with the Highest Annual Mean		Other Stations (g) Mean (b), Range (Fraction)	Control Locations Mean (b), Range (Fraction)
				Name Distance & Direction	Mean (b), Range (Fraction)		
River Water (pCi/l)	Gamma Isotopic 36						
	Be-7	124(e)	NDM		NDM	NDM	NDM
	Mn-54	15	NDM		NDM	NDM	NDM
	Fe-59	30	NDM		NDM	NDM	NDM
	Co-58	15	NDM		NDM	NDM	NDM
	Co-60	15	NDM		NDM	NDM	NDM
	Zn-65	30	NDM		NDM	NDM	NDM
	Zr-95	30	NDM		NDM	NDM	NDM
	Nb-95	15	NDM		NDM	NDM	NDM
	I-131	15	NDM		NDM	NDM	NDM
	Cs-134	15	NDM		NDM	NDM	NDM
	Cs-137	18	NDM		NDM	NDM	NDM
	Ba-140	60	NDM		NDM	NDM	NDM
	La-140	15	NDM		NDM	NDM	NDM
	Tritium 12	2000	2307 1140-3870 (4/4)	Station 83 RM 150.4 0.8 miles ENE	2307 1140-3870 (4/4)	852 555-1150 (4/4)	384 247-602 (3/4)

TABLE 3-1 (SHEET 4 of 8)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

Vogtle Electric Generating Plant, Docket Nos. 50-424 and 50-425
Burke County, Georgia

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Minimum Detectable Concentration (MDC) (a)	Indicator Locations Mean (b), Range (Fraction)	Location with the Highest Annual Mean Name Distance & Direction	Mean (b), Range (Fraction)	Other Stations (g) Mean (b), Range (Fraction)	Control Locations Mean (b), Range (Fraction)
Water Near Intakes to Water Treatment Plants (pCi/l)	Gross Beta 48	4	3.85 1.28-8.05 (36/36)	Station 87 Beaufort-Jasper WTP Beaufort, SC 76 miles SE	4.21 2.19-6.34 (12/12)	NA	2.93 1.24-3.76 (12/12)
	Gamma Isotopic 48						
	Be-7	124(e)	NDM		NDM	NA	NDM
	Mn-54	15	NDM		NDM	NA	NDM
	Fe-59	30	NDM		NDM	NA	NDM
	Co-58	15	NDM		NDM	NA	NDM
	Co-60	15	NDM		NDM	NA	NDM
	Zn-65	30	NDM		NDM	NA	NDM
	Zr-95	30	NDM		NDM	NA	NDM
	Nb-95	15	NDM		NDM	NA	NDM
	I-131(f)	15	NDM		NDM	NA	NDM
	Cs-134	15	NDM		NDM	NA	NDM
	Cs-137	18	NDM		NDM	NA	NDM
	Ba-140	60	NDM		NDM	NA	NDM
	La-140	15	NDM		NDM	NA	NDM
	Tritium 16	2000	690 370-935 (12/12)	Station 89 Purrysburg WTP Purrysburg, SC 76 miles SSE	746 518-935 (4/4)	NA	451 403-499 (2/4)

TABLE 3-1 (SHEET 5 of 8)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

Vogtle Electric Generating Plant, Docket Nos. 50-424 and 50-425
Burke County, Georgia

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Minimum Detectable Concentration (MDC) (a)	Indicator Locations Mean (b), Range (Fraction)	Location with the Highest Annual Mean Name Distance & Direction	Mean (b), Range (Fraction)	Other Stations (g) Mean (b), Range (Fraction)	Control Locations Mean (b), Range (Fraction)
Finished Water at Water Treatment Plants (pCi/l)	Gross Beta 48	4	3.23 1.47-8.89 (34/36)	Station 89 Purrysburg WTP Purrysburg, SC 76 miles SSE	3.76 1.88-8.89 (12/12)	NA	3.25 1.62-11.9 (12/12)
	Gamma Isotopic 48						
	Be-7	124(e)	NDM		NDM	NA	NDM
	Mn-54	15	NDM		NDM	NA	NDM
	Fe-59	30	NDM		NDM	NA	NDM
	Co-58	15	NDM		NDM	NA	NDM
	Co-60	15	NDM		NDM	NA	NDM
	Zn-65	30	NDM		NDM	NA	NDM
	Zr-95	30	NDM		NDM	NA	NDM
	Nb-95	15	NDM		NDM	NA	NDM
	I-131	1	NDM		NDM	NA	NDM
	Cs-134	15	NDM		NDM	NA	NDM
	Cs-137	18	NDM		NDM	NA	NDM
	Ba-140	60	NDM		NDM	NA	NDM
	La-140	15	NDM		NDM	NA	NDM
	Tritium 16	2000	688 258-1040 (12/12)	Station 89 Purrysburg WTP Purrysburg, SC 76 miles SSE	766 471-1040 (4/4)	NA	710 (1/4)

TABLE 3-1 (SHEET 6 of 8)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

Vogtle Electric Generating Plant, Docket Nos. 50-424 and 50-425
Burke County, Georgia

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Minimum Detectable Concentration (MDC) (a)	Indicator Locations Mean (b), Range (Fraction)	Location with the Highest Annual Mean Name Distance & Direction	 Mean (b), Range (Fraction)	Other Stations (g) Mean (b), Range (Fraction)	Control Locations Mean (b), Range (Fraction)
Anadromous Fish (pCi/kg-wet)	Gamma Isotopic 1						
	Be-7	655(e)	NDM		NDM	NA	NA
	Mn-54	130	NDM		NDM	NA	NA
	Fe-59	260	NDM		NDM	NA	NA
	Co-58	130	NDM		NDM	NA	NA
	Co-60	130	NDM		NDM	NA	NA
	Zn-65	260	NDM		NDM	NA	NA
	Cs-134	130	NDM		NDM	NA	NA
	Cs-137	150	NDM		NDM	NA	NA
Fish (pCi/kg-wet)	Gamma Isotopic 4						
	Be-7	655(e)	NDM		NDM	NA	NDM
	Mn-54	130	NDM		NDM	NA	NDM
	Fe-59	260	NDM		NDM	NA	NDM
	Co-58	130	NDM		NDM	NA	NDM
	Co-60	130	NDM		NDM	NA	NDM
	Zn-65	260	NDM		NDM	NA	NDM
	Cs-134	130	NDM		NDM	NA	NDM
	Cs-137	150	257 101-413 (2/2)	Station 85 4.3 miles ESE	257 101-413 (2/2)	NA	35.7 30.9-40.5 (2/2)

TABLE 3-1 (SHEET 7 of 8)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

Vogtle Electric Generating Plant, Docket Nos. 50-424 and 50-425
Burke County, Georgia

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Minimum Detectable Concentration (MDC) (a)	Indicator Locations Mean (b), Range (Fraction)	Location with the Highest Annual Mean		Other Stations (g) Mean (b), Range (Fraction)	Control Locations Mean (b), Range (Fraction)
				Name Distance & Direction	Mean (b), Range (Fraction)		
Sediment (pCi/kg-dry)	Gamma Isotopic 4						
	Be-7	655(e)	1254 920-1588 (2/2)	Station 83 0.8 miles ENE	1254 920-1588 (2/2)	NA	704 (1/2)
	Co-60	70(e)	40 (28-51) (2/2)	Station 83 0.8 miles ENE	40 (28-51) (2/2)	NA	NDM
	Cs-134	150	NDM		NDM	NA	NDM
	Cs-137	180	142 138-145 (2/2)	Station 83 0.8 miles ENE	142 138-145 (2/2)	NA	68 62-75 (2/2)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

Vogtle Electric Generating Plant, Docket Nos. 50-424 and 50-425
Burke County, Georgia

Notes:

a. The MDC is defined in ODCM 10.1. Except as noted otherwise, the values listed in this column are the detection capabilities required by ODCM Table 4-3. The values listed in this column are a priori (before the fact) MDCs. In practice, the a posteriori (after the fact) MDCs are generally lower than the values listed. Any a posteriori MDC greater than the value listed in this column is discussed in Section 4.

b. Mean and range are based upon detectable measurements only. The fraction of all measurements at a specified location that are detectable is placed in parenthesis.

c. No Detectable Measurement(s).

d. Not Applicable.

e. The EL has determined that this value may be routinely attained under normal conditions. No value is provided in ODCM Table 4-3.

f. Item 3 of ODCM Table 4-1 implies that an I-131 analysis is not required to be performed on water samples when the dose calculated from the consumption of water is less then 1 mrem per year. However, I-131 analyses have been performed on the finished drinking water samples.

g. "Other" stations, as identified in the "Station Type" column of Table 2-2, are "Community" and/or "Special" stations.

4.0 DISCUSSION OF RESULTS

Included in this section are evaluations of the laboratory results for the various sample types. Comparisons were made between the difference in mean values for pairs of station groups (e.g., indicator and control stations) and the calculated Minimum Detectable Difference (MDD) between these pairs at the 99% Confidence Level (CL). The MDD was determined using the standard Student's t-test. A difference in the mean values that was less than the MDD was considered to be statistically indiscernible.

The 2006 results were compared with past results, including those obtained during preoperation. As appropriate, results were compared with their Minimum Detectable Concentrations (MDC) and Reporting Levels (RL) which are listed in Tables 4-1 and 4-2 of this report, respectively. The required MDCs were achieved during laboratory sample analysis. Any anomalous results are explained within this report.

Results of interest are graphed to show historical trends. The data points are tabulated and included in this report. The points plotted and provided in the tables represent mean values of only detectable results. Periods for which no detectable measurements (NDM) were observed or periods for which values were not applicable (e.g., milk indicator, etc.) are listed as NDM and are plotted in the tables as 0's.

Table 4-1

Minimum Detectable Concentrations (MDC)

Analysis	Water (pCi/l)	Airborne Particulate or Gases (fCi/m3)	Fish (pCi/kg-wet)	Milk (pCi/l)	Grass or Leafy Vegetation (pCi/kg-wet)	Sediment (pCi/kg)
Gross Beta	4	10				
H-3	2000 (a)					
Mn-54	15		130			
Fe-59	30		260			
Co-58	15		130			
Co-60	15		130			
Zn-65	30		260			
Zr-95	30					
Nb-95	15					
I-131	1 (b)	70		1	60	
Cs-134	15	50	130	15	60	150
Cs-137	18	60	150	18	80	180
Ba-140	60			60		
La-140	15			15		

(a) If no drinking water pathway exists, a value of 3000 pCi/l may be used.

(b) If no drinking water pathway exists, a value of 15 pCi/l may be used.

Table 4-2
Reporting Levels (RL)

Analysis	Water (pCi/l)	Airborne Particulate or Gases (fCi/m3)	Fish (pCi/kg-wet)	Milk (pCi/l)	Grass or Leafy Vegetation (pCi/kg-wet)
H-3	20,000 (a)				
Mn-54	1000		30,000		
Fe-59	400		10,000		
Co-58	1000		30,000		
Co-60	300		10,000		
Zn-65	300		20,000		
Zr-95	400				
Nb-95	700				
I-131	2 (b)	900		3	100
Cs-134	30	10,000	1000	60	1000
Cs-137	50	20,000	2000	70	2000
Ba-140	200			300	
La-140	100			400	

(a) This is the 40 CFR 141 value for drinking water samples. If no drinking water pathway exists, a value of 30,000 may be used.

(b) If no drinking water pathway exists, a value of 20 pCi/l may be used.

Atmospheric nuclear weapons tests from the mid 1940s through 1980 distributed man-made nuclides around the world. The most recent atmospheric tests in the 1970s and in 1980 had a significant impact upon the radiological concentrations found in the environment prior to and during preoperation, and the earlier years of operation. Some long lived radionuclides, such as Cs-137, continue to have some impact. A significant component of the Cs-137 which has often been found in various samples over the years (and continues to be found) is attributed to the nuclear weapons tests.

Data in this section has been modified to remove any obvious non-plant short term impacts. The specific short term impact data that has been removed includes: the nuclear atmospheric weapon test in the fall of 1980; abnormal releases from the Savannah River Site (SRS) during 1987 and 1991; and the Chernobyl incident in the spring of 1986.

In accordance with ODCM 4.1.1.2.1, deviations from the required sampling schedule are permitted, if samples are unobtainable due to hazardous conditions, unavailability, inclement weather, equipment malfunction or other just reasons. Deviations from conducting the REMP as described in Table 2-1 are summarized in Table 4-3 along with their causes and resolutions. As discussed in Section 4.2, during 2006 there were no deviations which resulted in loss of data.

All results were tested for conformance with Chauvenet's criterion (G. D. Chase and J. L. Rabinowitz, Principles of Radioisotope Methodology, Burgess Publishing Company, 1962, pages 87-90) to identify values which differed from the mean of a set by a statistically significant amount. Identified outliers were investigated to determine the reason(s) for the difference. If equipment malfunction or other valid physical reasons were identified as causing the variation, the anomalous result was excluded from the data set as non-representative. No data were excluded exclusively for failing Chauvenet's criterion. Data exclusions are discussed in this section under the appropriate sample type.

TABLE 4-3

DEVIATIONS FROM RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

COLLECTION PERIOD	AFFECTED SAMPLES	DEVIATION	CAUSE	RESOLUTION
12/20/05-1/4/06	W. C. Dixon Dairy	No milk samples available.	Cows were sold in 2005. No milk sample has been available since 10/24/05.	Owner purchased 5 cows and agreed to sell milk to GPC beginning on 1/18/06.
2/14/06-2/28/06 and 2/28/06-3/14/06	W. C. Dixon Dairy	No milk samples available.	Owner was ill for several weeks and temporarily out of business.	Owner agreed to provide milk samples again starting on 3/28/06.

4.1 Land Use Census and River Survey

In accordance with ODCM 4.1.2, a land use census was conducted on November 28, 2006 to determine the locations of the nearest permanent residence, milk animal, and garden of greater than 500 square feet producing broad leaf vegetation, in each of the 16 compass sectors within a distance of 5 miles; the locations of the nearest beef cattle in each sector were also determined. A milk animal is a cow or goat producing milk for human consumption. Land within SRS was excluded from the census. The census results are tabulated in Table 4.1-1.

Table 4.1-1

LAND USE CENSUS RESULTS

Distance in Miles to the Nearest Location in Each Sector

SECTOR	RESIDENCE	MILK ANIMAL	BEEF CATTLE	GARDEN
N	1.4	None	None	None
NNE	None	None	None	None
NE	None	None	None	None
ENE	None	None	None	None
E	None	None	None	None
ESE	4.2	None	None	None
SE	4.4	None	5.0	None
SSE	4.6	None	4.7	None
S	4.4	None	None	None
SSW	4.7	None	4.5	None
SW	2.7	None	4.9	None
WSW	1.2	None	2.7	3.2
W	3.7	None	4.5	4.2
WNW	1.8	None	None	None
NW	1.6	None	1.9	None
NNW	1.5	None	None	None

ODCM 4.1.2.2.1 requires a new controlling receptor to be identified, if the land use census identifies a location that yields a calculated receptor dose greater than the one in current use. It was determined that no change in the controlling receptor was required in 2006.

ODCM 4.1.2.2.2 requires that whenever the land use census identifies a location which yields a calculated dose (via the same ingestion pathway) 20% greater than that of a current indicator station, the new location must become a REMP station (if samples are available). None of the identified locations yielded a calculated

dose 20% greater than that for any of the current indicator stations. No milk animals were identified within five miles of the plant.

A survey of the Savannah River downstream of the plant for approximately 100 miles was conducted on October 31, 2006 to identify any withdrawal of water from the river for drinking or irrigation purposes. No such usage was identified. These results were corroborated by checking with the Georgia Department of Natural Resources on December 5, 2006 and the South Carolina Department of Health and Environmental Control on November 17, 2006. Each of these agencies confirmed that no water withdrawal permits for drinking or irrigation purposes had been issued for this stretch of the Savannah River. The three water treatment plants used as indicator stations for drinking water are located farther downriver.

4.2 Airborne

As specified in Table 2-1 and shown in Figures 2-1 through 2-3, airborne particulate filters and charcoal canisters are collected weekly at 5 indicator stations (Stations 3, 7, 10, 12 and 16) which encircle the plant at the site periphery, at a nearby community station (Station 35) approximately 7 miles from the plant, and at a control station (Station 36) which is approximately 14 miles from the plant. At each location, air is continuously drawn through a glass fiber filter to retain airborne particulate and an activated charcoal canister is placed in series with the filter to adsorb radioiodine.

Each particulate filter is counted for gross beta activity. A quarterly gamma isotopic analysis is performed on a composite of the air particulate filters for each station. Each charcoal canister is analyzed for I-131.

As provided in Table 3-1, the 2006 annual average weekly gross beta activity was 25.5 fCi/m^3 for the indicator stations. It was 0.9 fCi/m^3 greater than the control station average of 24.6 fCi/m^3 for the year. This difference is not statistically discernible, since it is less than the calculated MDD of 2.3 fCi/m^3.

The 2006 annual average weekly gross beta activity at the Girard community station was 24.3 fCi/m^3 which was 0.3 fCi/m^3 less than the control station average. This difference is not statistically discernible since it is less than the calculated MDD of 3.0 fCi/m^3.

The historical trending of the average weekly gross beta air concentrations for each year of operation and the preoperational period (September, 1981 to January, 1987) at the indicator, control and community stations is plotted in Figure 4.2-1 and listed in Table 4.2-1. In general, there is close agreement between the results for the indicator, control and community stations. This close agreement supports the position that the plant is not contributing significantly to the gross beta concentrations in air.

Figure 4.2-1

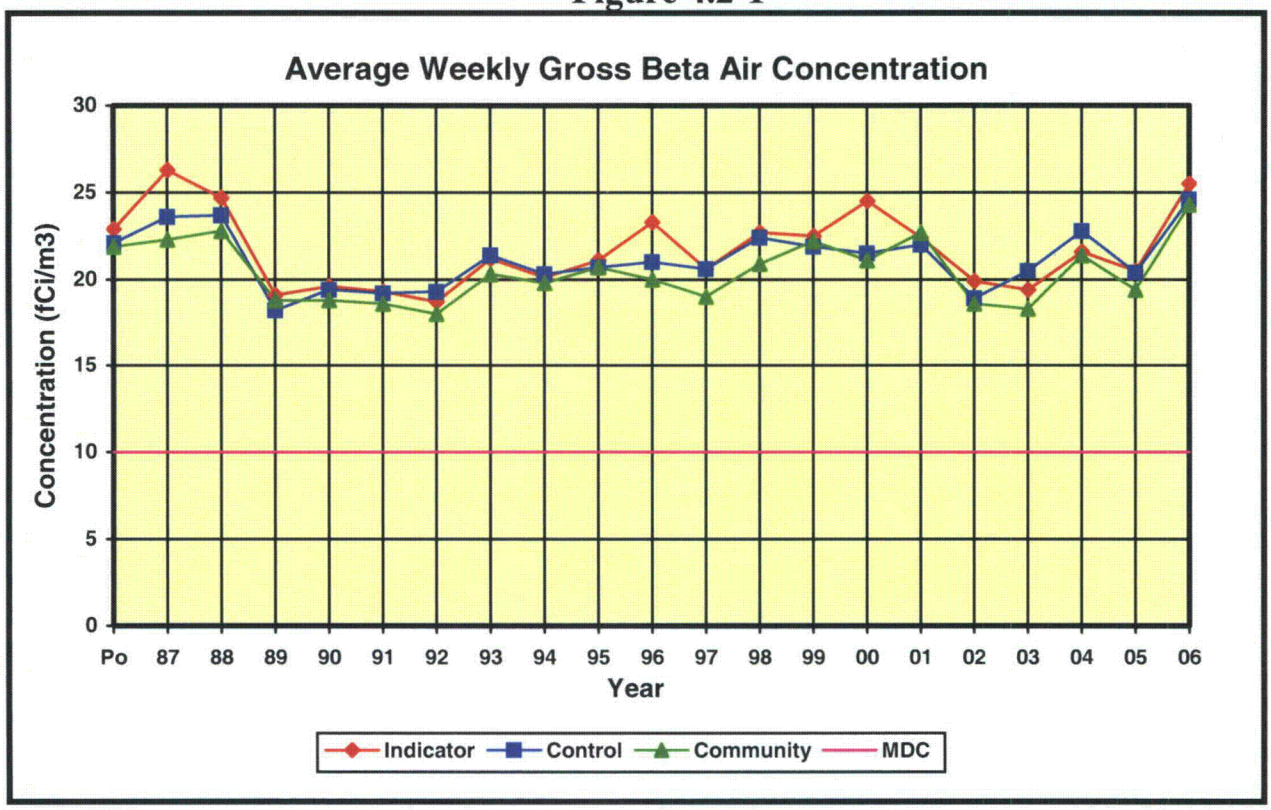


Table 4.2-1
Average Weekly Gross Beta Air Concentration

Period	Indicator (fCi/m3)	Control (fCi/m3)	Community (fCi/m3)
Pre-op	22.9	22.1	21.9
1987	26.3	23.6	22.3
1988	24.7	23.7	22.8
1989	19.1	18.2	18.8
1990	19.6	19.4	18.8
1991	19.3	19.2	18.6
1992	18.7	19.3	18.0
1993	21.2	21.4	20.3
1994	20.1	20.3	19.8
1995	21.1	20.7	20.7
1996	23.3	21.0	20.0
1997	20.6	20.6	19.0
1998	22.7	22.4	20.9
1999	22.5	21.9	22.2
2000	24.5	21.5	21.1
2001	22.4	22.0	22.7
2002	19.9	18.9	18.6
2003	19.4	20.5	18.3
2004	21.6	22.8	21.4
2005	20.5	20.4	19.4
2006	25.5	24.6	24.3

During 2006, no man-made radionuclides were detected from the gamma isotopic analysis of the quarterly composites of the air particulate filters. In 1987, Cs-137 was found in one indicator composite at a concentration of 1.7 fCi/m^3. During pre-operation, Cs-137 was found in approximately 12% of the indicator composites and 14% of the control composites with average concentrations of 1.7 and 1.0 fCi/m^3, respectively. The MDC for airborne Cs-137 is 60 fCi/m^3. Also, during pre-operation, Cs-134 was found in about 8% of the indicator composites at an average concentration of 1.2 fCi/m3. The MDC for Cs-134 is 50 fCi/m3.

The naturally occurring radionuclide Be-7 is typically detected in all indicator and control station gamma isotopic analysis of the quarterly composites of the air particulate filters. In 2006, Be-7 was not identified in plant gaseous effluents therefore it is not included in the 2006 REMP summary table for the airborne pathway samples. Be-7 has been detected in gaseous effluents in only eight of the years of plant operation. However, there was not a statistically discernible difference between the indicator and control station Be-7 concentrations in air samples in any of the years.

Airborne I-131 was not detected in any sample during 2006. During pre-operation, positive results were obtained only during the Chernobyl incident when concentrations as high as 182 fCi/m^3 were observed. The MDC and RL for airborne I-131 are 70 and 900 fCi/m^3, respectively.

Table 4-3 lists REMP deviations that occurred in 2006. There were no air sampling deviations. On July 25, 2006, the timeclock at the River Road air station malfunctioned, but the pump continued to operate and the air samples (filter and cartridge) were not affected. The timeclock was replaced and station run time for 7/18/06-7/25/06 was calculated as elapsed time based on field records.

4.3 Direct Radiation

Direct (external) radiation is measured with thermoluminescent dosimeters (TLDs). Two Panasonic UD-814 TLD badges are placed at each station. Each badge contains three phosphors composed of calcium sulfate crystals (with thulium impurity). The gamma dose at each station is based upon the average readings of the phosphors from the two badges. The badges for each station are placed in thin plastic bags for protection from moisture while in the field. The badges are nominally exposed for periods of a quarter of a year (91 days). An inspection is performed near mid-quarter to assure that all badges are on-station and to replace any missing or damaged badges.

Two TLD stations are established in each of the 16 compass sectors, to form 2 concentric rings. The inner ring (Stations 1 through 16) is located near the plant perimeter as shown in Figure 2-1 and the outer ring (Stations 17 through 32) is located at a distance of approximately 5 miles from the plant as shown in Figure 2-2. The 16 stations forming the inner ring are designated as the indicator stations. The two ring configuration of stations was established in accordance with NRC Branch Technical Position "An Acceptable Radiological Environmental Monitoring Program", Revision 1, November 1979. The 6 control stations (Stations 36, 37, 47, 48, 51 and 52) are located at distances greater than 10 miles from the plant as shown in Figure 2-2. Monitored special interest areas consist of the following: Station 35 at the town of Girard, and Station 43 at the employee recreational area. The TLD mean and range values presented in the "Other" column in Table 3-1 (page 1 of 8) includes the outer ring stations (stations 17 through 32) as well as stations 35 and 43.

As provided in Table 3-1 the average quarterly exposure measured at the indicator stations was 13.1 mR with a range of 10.5 to 17.9 mR. This average was 0.2 mR greater than the average quarterly exposure measured at the control stations (12.9 mR). This difference is not statistically discernible since it is less than the MDD of 0.9 mR. Over the operational history of the site, the annual average quarterly exposures shows a variation of no more than 0.7 mR difference between the indicator and control stations. The overall average quarterly exposure for the control stations during preoperation was 1.2 mR greater than that for the indicator stations.

The quarterly exposures acquired at the outer ring stations during 2006 ranged from 10.0 to 17.3 mR with an average of 13.0 mR which was 0.1 mR greater than that for the control stations. However, this difference is not discernible since it is less than the MDD of 1.1 mR. For the entire period of operation, the annual average quarterly exposures at the outer ring stations vary by no more than 1.2 mR from those at the control stations. The overall average quarterly exposure for the outer ring stations during preoperation was 1.8 mR less than that for the control stations.

The historical trending of the average quarterly exposures for the indicator inner ring, outer ring, and the control stations are plotted in Figure 4.3-1 and listed in Table 4.3-1. The decrease between 1991 and 1992 values is attributed to a change in TLDs from Teledyne to Panasonic. It should be noted however that the differences between indicator and control and outer ring values did not change. The close agreement between the station groups supports the position that the plant is not contributing significantly to direct radiation in the environment.

Figure 4.3-1

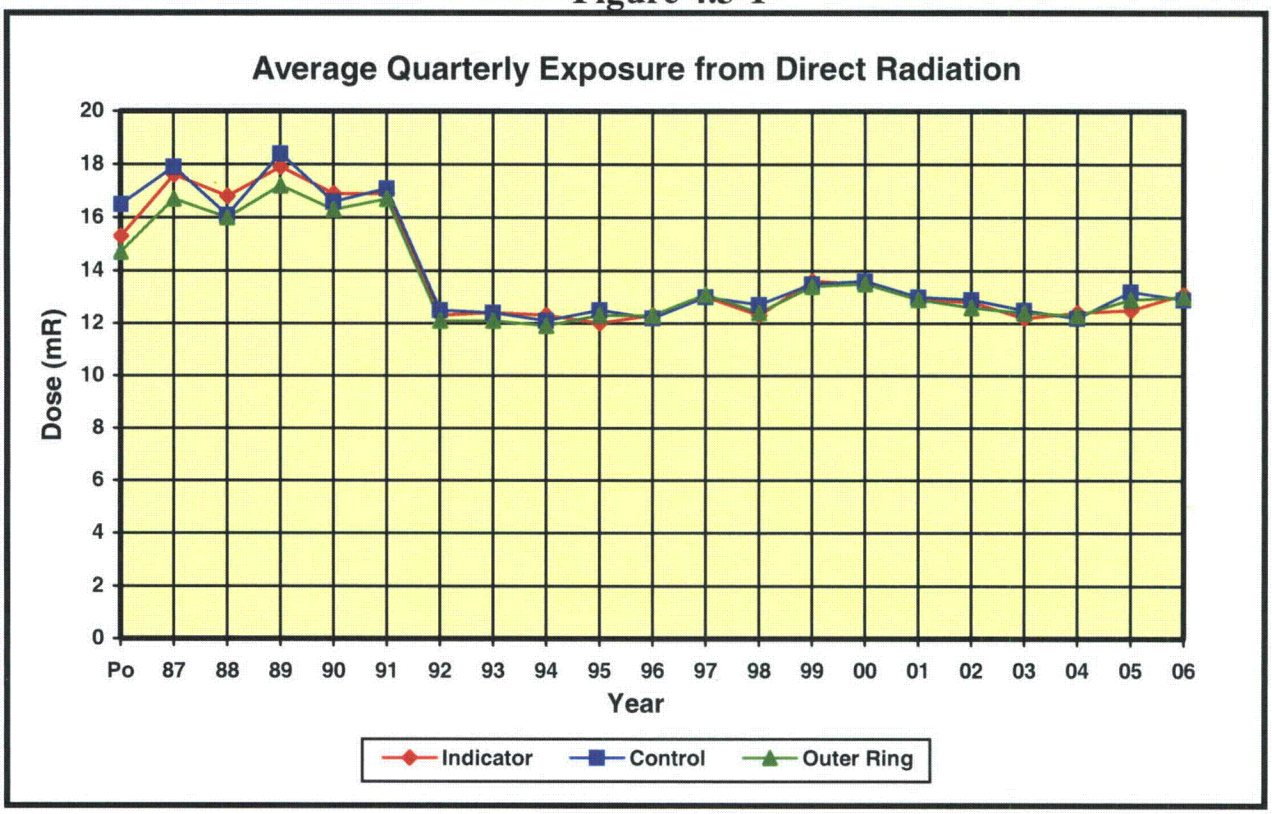


Table 4.3-1
Average Quarterly Exposure from Direct Radiation

Period	Indicator (mR)	Control (mR)	Outer Ring (mR)
Pre-op	15.3	16.5	14.7
1987	17.6	17.9	16.7
1988	16.8	16.1	16.0
1989	17.9	18.4	17.2
1990	16.9	16.6	16.3
1991	16.9	17.1	16.7
1992	12.3	12.5	12.1
1993	12.4	12.4	12.1
1994	12.3	12.1	11.9
1995	12.0	12.5	12.3
1996	12.3	12.2	12.3
1997	13.0	13.0	13.1
1998	12.3	12.7	12.4
1999	13.6	13.5	13.4
2000	13.5	13.6	13.5
2001	12.9	13.0	12.9
2002	12.8	12.9	12.6
2003	12.2	12.5	12.4
2004	12.4	12.2	12.3
2005	12.5	13.2	12.9
2006	13.1	12.9	13.0

The historical trending of the average quarterly exposures at the special interest areas for the same periods are provided in Figure 4.3-2 and listed in Table 4.3-2. These exposures are within the range of those acquired at the other stations. They too, show that the plant is not contributing significantly to direct radiation at the special interest areas.

Figure 4.3-2

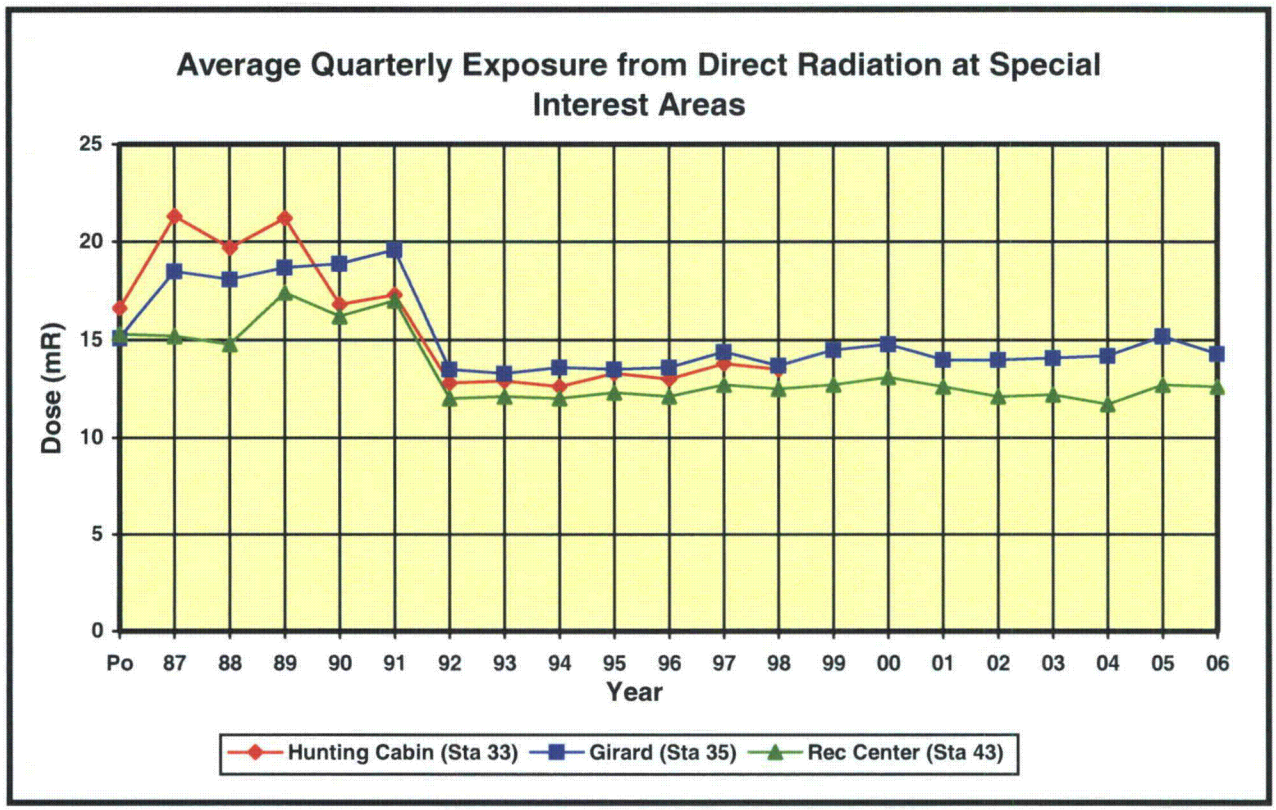


Table 4.3-2

Average Quarterly Exposure from Direct Radiation at Special Interest Areas

Period	Station 33 (mR)	Station 35 (mR)	Station 43 (mR)
Pre-op	16.6	15.1	15.3
1987	21.3	18.5	15.2
1988	19.7	18.1	14.8
1989	21.2	18.7	17.4
1990	16.8	18.9	16.2
1991	17.3	19.6	17.0
1992	12.8	13.5	12.0
1993	12.9	13.3	12.1
1994	12.6	13.6	12.0
1995	13.3	13.5	12.3
1996	13.0	13.6	12.1
1997	13.8	14.4	12.7
1998	13.5	13.7	12.5
1999	NA	14.5	12.7
2000	NA	14.8	13.1
2001	NA	14.0	12.6
2002	NA	14.0	12.1
2003	NA	14.1	12.2
2004	NA	14.2	11.7
2005	NA	15.2	12.7
2006	NA	14.3	12.6

The hunting cabin activities at Station 33 have been discontinued and, consequently, this location is no longer considered as an area of special interest. Monitoring at this location was discontinued at the end of 1998.

There were no deviations from the REMP pertaining to measuring quarterly gamma doses during 2006. However, the standard deviation for the quarterly result for each badge was subjected to a self imposed limit of 1.4. This limit is based upon the standard deviations obtained with the Panasonic UD-814 badges during 1992 and is calculated using a method developed by the American Society of Testing and Materials (ASTM Special Technical Publication 15D, ASTM Manual on Presentation of Data and Control Chart Analysis, Fourth Revision, Philadelphia, PA, October 1976).

The limit serves as a flag to initiate an investigation. To be conservative, readings with a standard deviation greater than 1.4 are excluded since the high standard deviation is interpreted as an indication of unacceptable variation in TLD response.

The readings for the following badges were deemed unacceptable since the standard deviation for each badge was greater than the self-imposed limit of 1.4:

First Quarter:	V04B, V23A, V28A
Second Quarter:	None
Third Quarter:	V43B
Fourth Quarter:	V22A

However, for these cases when only one badge exceeded a standard deviation of 1.4, the companion badges were available and were used for determining the quarterly doses. The badges exceeding the self-imposed limit were visually inspected under a microscope and the glow curve and test results for the anneal data and the element correction factors were reviewed. No reason was evident for the high standard deviation.

4.4 Milk

In accordance with Tables 2-1 and 2-2, milk samples are collected biweekly from two control locations, the W. C. Dixon Dairy (Station 98) and the Coble Dairy (Station 100). In the fall of 2005, W. C. Dixon sold his cows. Near the beginning of 2006, Mr. Dixon purchased five more cows and started providing REMP samples again on January 18, 2006. From 2/14/06-3/14/06 Mr. Dixon was ill and his dairy was temporarily out of business (no milk samples available). March 28, 2006 he was able to provide samples consistently for the remainder of the year.

No indicator station (a location within 5 miles of the plant) for milk has been available since April 1986. As discussed in Section 4.1, no milk animal was found during the 2006 land use census.

Gamma isotopic and I-131 analyses are performed on each milk sample. No man-made radionuclides were identified by gamma isotopic analysis in 2006. The MDC and RL for Cs-137 in milk are 18 and 70 pCi/l, respectively. During preoperation and each year of operation through 1991, Cs-137 was found in 2 to 6% of the samples at concentrations ranging from 5 to 27 pCi/l. During preoperation, Cs-134 was detected in one sample and in the first year of operation, Zn-65 was detected in one sample. Figure 4.4-1 and Table 4.4-1 provide the historical trending of the Cs-137 concentration in milk.

Figure 4.4-1

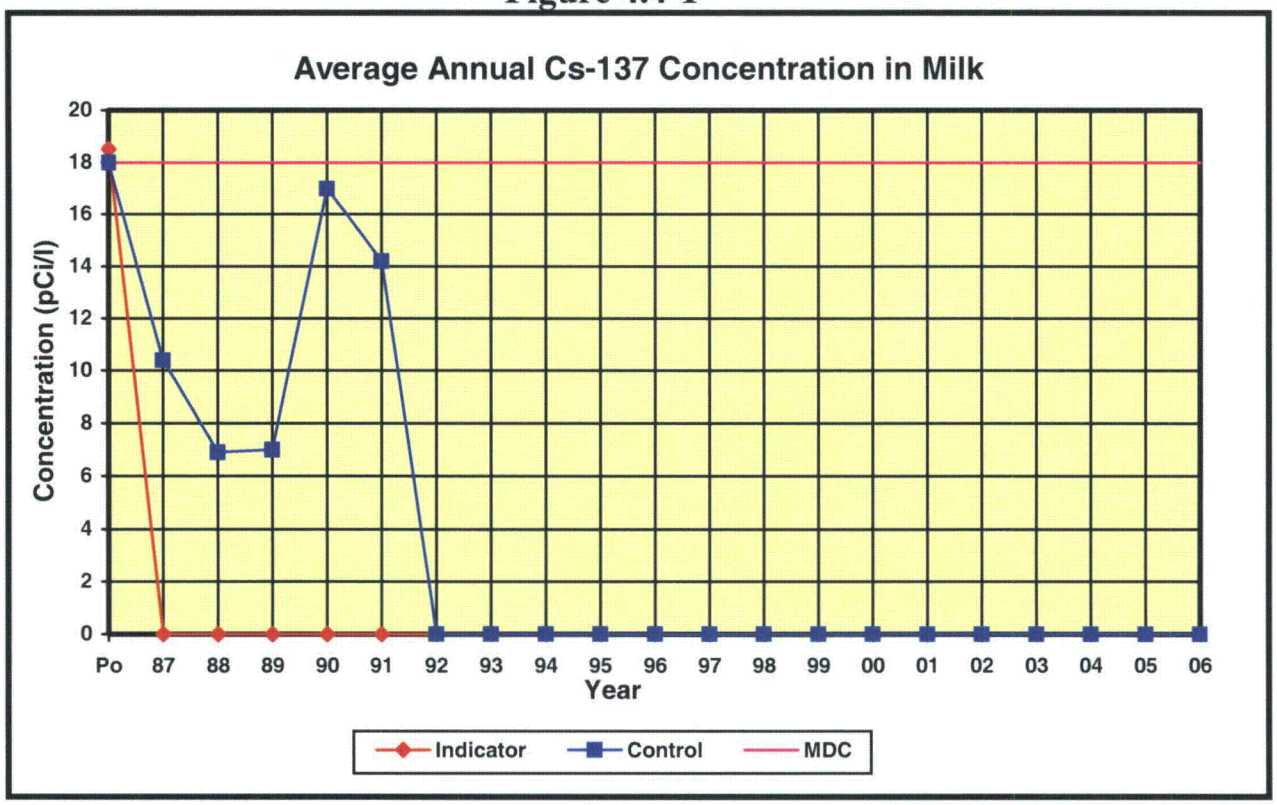


Table 4.4-1

Average Annual Cs-137 Concentration in Milk

Year	Indicator (pCi/l)	Control (pCi/l)
Pre-op	18.5	18
1987	NDM	10.4
1988	NDM	6.9
1989	NDM	7
1990	NDM	17
1991	NDM	14.2
1992	NDM	NDM
1993	NDM	NDM
1994	NDM	NDM
1995	NDM	NDM
1996	NDM	NDM
1997	NDM	NDM
1998	NDM	NDM
1999	NDM	NDM
2000	NDM	NDM
2001	NDM	NDM
2002	NDM	NDM
2003	NDM	NDM
2004	NDM	NDM
2005	NDM	NDM
2006	NDM	NDM

During 2006, I-131 was not detected in any of the milk samples. Since plant operations began in 1987, I-131 may have been detected in one sample in 1996 and two during 1990; however, its presence in these cases was questionable, due to large counting uncertainties. During preoperation, positive I-131 results were found only during the Chernobyl incident with concentrations ranging from 0.53 to 5.07 pCi/l. The MDC and RL for I-131 in milk are 1 and 3 pCi/l, respectively.

4.5 Vegetation

In accordance with Tables 2-1 and 2-2, grass samples are collected monthly at two indicator locations onsite near the site boundary (Stations 7 and 15) and at one control station located about 17 miles WSW from the plant (Station 37). Gamma isotopic analyses are performed on the samples. During 2006, two samples out of the 24 samples collected at the indicator stations were positive for the man-made radionuclide, Cs-137. The average of the two positive indicator samples was 23.9 pCi/kg-wet. One of the 12 samples collected at the control stations was positive for Cs-137 at 491.8 pCi/kg-wet. Duplicate samples are collected periodically and one was collected at the control station on the date of the positive cesium value. The analysis of the duplicate confirmed the level of Cs-137 at the control station. The vegetation plot was seeded about 2 weeks prior to the time of the positive indication and the collection was the first after the seeding was performed. This work would have disturbed several layers of soil in the vegetation plot and could have contributed to the higher value. Cesium-137 is often detected in environmental samples as a result of atmospheric weapons testing and the Chernobyl incident.

The historical trending of the average concentration of Cs-137 at the indicator and control stations is provided in Figure 4.5-1 and listed in Table 4.5-1. No trend is recognized in this data. The MDC and RL for Cs-137 in vegetation samples are 80 and 2000 pCi/kg-wet, respectively. Cs-137 is the only man-made radionuclide that has been identified in vegetation samples during the operational history of the plant. During preoperation, Cs-137 was found in approximately 60% of the samples from indicator stations and in approximately 20% of the samples from the control station. These percentages have generally decreased during operation.

The naturally occurring radionuclide Be-7 is typically detected in indicator and control station vegetation samples. Be-7 was not detected in gaseous effluents in 2006, therefore it is not included in the REMP summary table for the airborne pathway samples. Be-7 has been detected in gaseous effluents eight of the eighteen years of plant operation and is therefore of interest in the REMP program. However, the levels of Be-7 found in the REMP make no significant contribution to dose.

In May and June of 1986 during preoperation, as a consequence of the Chernobyl incident, I-131 was found in nearly all the samples collected for a period of several weeks in the range of 200 to 500 pCi/kg-wet. The MDC and RL for I-131 in vegetation are 60 and 100 pCi/kg-wet, respectively. Also during this time period, Co-60 was found in one of the samples at a concentration of 62.5 pCi/kg-wet. There is no specified MDC or RL for Co-60 in vegetation.

Figure 4.5-1

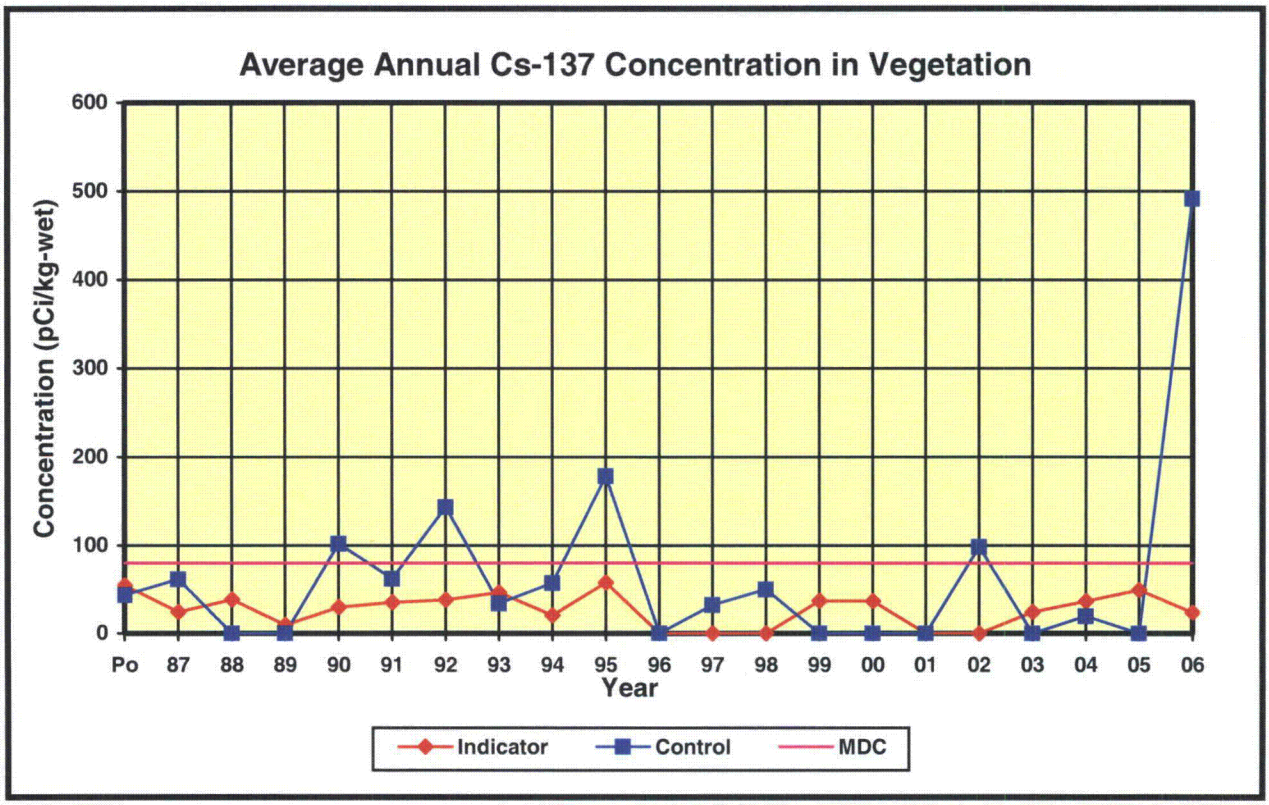


Table 4.5-1
Average Annual Cs-137 Concentration in Vegetation

Year	Indicator (pCi/kg-wet)	Control (pCi/kg-wet)
Pre-op	54.6	43.7
1987	24.4	61.5
1988	38.7	NDM
1989	9.7	NDM
1990	30.0	102.0
1991	35.3	62.4
1992	38.1	144.0
1993	46.4	34.1
1994	20.7	57.4
1995	57.8	179.0
1996	NDM	NDM
1997	NDM	32.6
1998	NDM	50.1
1999	37.2	NDM
2000	36.6	NDM
2001	NDM	NDM
2002	NDM	98.3
2003	24.5	NDM
2004	36.8	19.7
2005	49.5	NDM
2006	23.9	491.8

4.6 River Water

Surface water from the Savannah River is obtained at three locations using automatic samplers. Small quantities are drawn at intervals not exceeding a few hours. The samples drawn are collected monthly; quarterly composites are produced from the monthly collections.

The collection points consist of a control location (Station 82) which is located about 0.4 miles upriver of the plant intake structure, an indicator location (Station 83) which is located about 0.4 miles downriver of the plant discharge structure, and a special location (Station 84) which is located approximately 1.3 miles downriver of the plant discharge structure. A statistically significant increase in the concentrations found in samples collected at the indicator station compared to those collected at the control station could be indicative of plant releases. Concentrations found at the special station are more likely to represent the activity in the river as a whole, which might include plant releases combined with those from other sources along the river.

A gamma isotopic analysis is conducted on each monthly sample. As in all previous years, there were no gamma emitting radionuclides of interest detected in the 2006 river water samples.

In 2006, several outages resulted in an increase of the annual curies of tritium released in liquid effluents from the site. The increase in liquid effluents along with drought conditions on the river contributed to a higher annual average tritium at the indicator station. River water is collected continuously by automatic samplers and composited quarterly for tritium analysis. As indicated in Table 3-1, the average concentration found at the indicator station was 2307 pCi/l which was 1923 pCi/l greater than the average at the control station (384 pCi/l). The difference between the indicator and the control station was less than the calculated MDD (2688 pCi/l), but the MDD is influenced by the variability of concentrations at the indicator station from quarter to quarter. The low number of samples (four quarterly composite samples), the variability of the four sample values, and the high standard deviation contributed to the large MDD value. Although the drinking water stations are much further downstream, the potential dose to someone consuming water near the plant discharge for an entire year (730 liters) would be 1.47E-02 mrem in a year. The potential dose from tritium in the river to an individual who regularly consumed fish in the vicinity of the plant would be 3.82E-03 mrem in a year. The dose limit to a member of the public due to liquid effluents is 3 mrem per year. The MDC for tritium in river water used to supply drinking water is 2000 pCi/l and the RL is 20,000 pCi/l.

At the special river water sampling station, the results ranged from 555 pCi/l to 1150 pCi/l with an average of 852 pCi/l. The difference between the average concentration at the control station and the average at the special station was less than the calculated MDD of 575 pCi/l. The decrease in tritium concentration between the indicator station and the special station is due to the additional dispersion over the 0.9 miles that separates the two stations. In the first two years of operation, the tritium concentration at the special station was somewhat greater than that at the indicator station. In recent years, the level at the special station has generally become less than the level at the indicator station.

The historical trending of the average tritium concentrations found at the special, indicator, and control stations along with the MDC for tritium is plotted on Figure 4.6-1. The data for the plot is listed in Table 4.6-1. Also included in the table are data from the calculated difference between the indicator and control stations; the MDD between the indicator and control stations; and the total curies of tritium released from the plant in liquid effluents.

The annual downriver survey of the Savannah River showed that river water is not being used for purposes of drinking or irrigation for at least 100 miles downriver (discussed in Section 4.1).

Figure 4.6-1

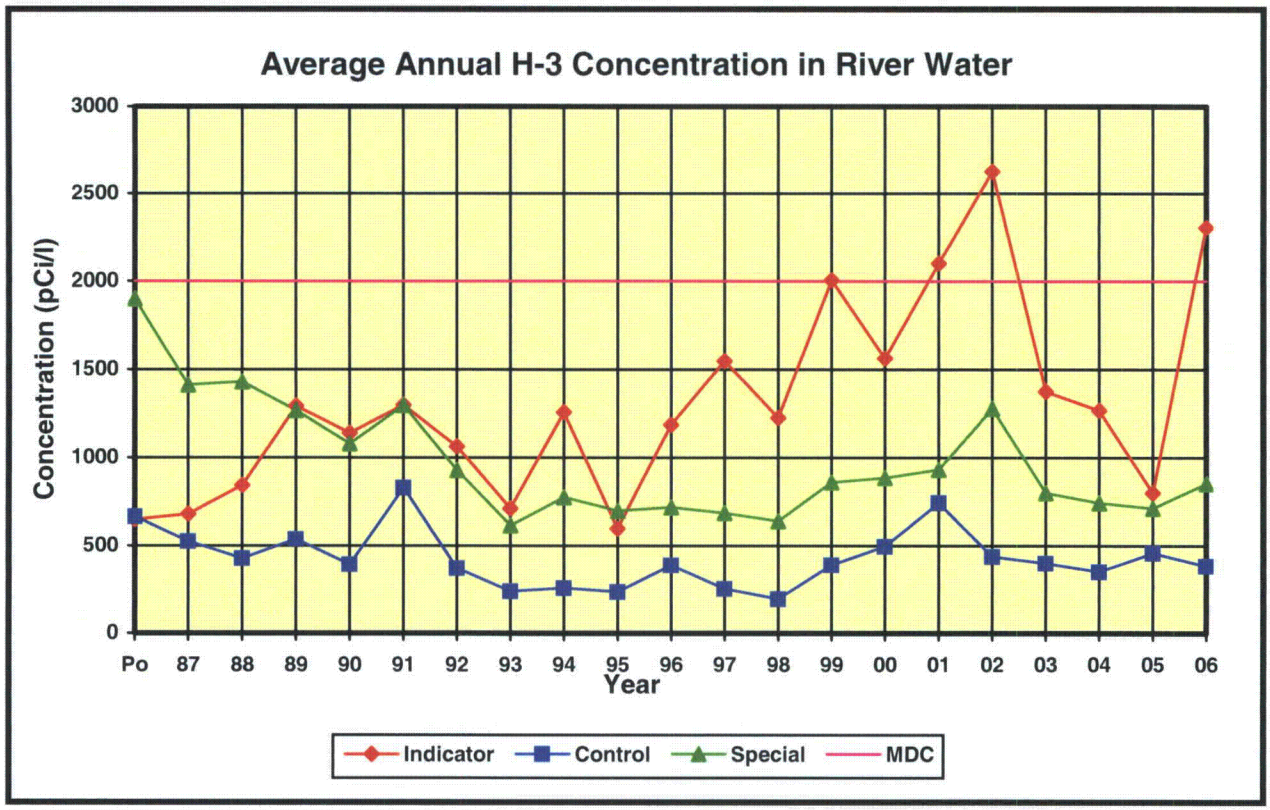


Table 4.6-1

Average Annual H-3 Concentration in River Water

Year	Special (pCi/l)	Indicator (pCi/l)	Control (pCi/l)	Difference Between Indicator and Control (pCi/l)	MDD (pCi/l)	Annual Site Tritium Released (Ci)
Pre-op	1900	650	665	-15	145	NA
1987	1411	680	524	156	416	321
1988	1430	843	427	416	271	390
1989	1268	1293	538	755	518	918
1990	1081	1142	392	750	766	1172
1991	1298	1299	828	471	626	1094
1992	929	1064	371	693	714	1481
1993	616	712	238	474	1526	761
1994	774	1258	257	1001	2009	1052
1995	699	597	236	361	766	968
1996	719	1187	387	800	2147	1637
1997	686	1547	254	1293	1566	1449
1998	640	1226	196	1030	1313	1669
1999	859	2005	389	1616	1079	1674
2000	885	1564	496	1068	1786	869
2001	931	2101	743	1358	1696	1492
2002	1280	2628	437	2190	1211	1566
2003	800	1376	399	977	1706	1932
2004	743	1269	351	918	1061	1212
2005	713	800	458	342	1333	1860
2006	852	2307	384	1882	2688	2005

4.7 Drinking Water

Samples are collected at a control location (Station 80 - the Augusta Water Treatment Plant in Augusta, Georgia located about 56 river miles upriver), and at three indicator locations (Station 87 - the Beaufort-Jasper County Water Treatment Plant near Beaufort, South Carolina, 112 river miles downriver; Station 88 - the Cherokee Hill Water Treatment Plant near Port Wentworth, Georgia, 122 river miles downriver; and Station 89 – the Purrysburg Water Treatment Plant near Purrysburg, South Carolina, located about 112 miles downriver. The Purrysburg Station was added to the REMP in January 2006.) Stations 87 and 89 are located on the same canal with the Purrysburg location at the beginning of the canal (nearer the Savannah River) and the Beaufort-Jasper location near the end of the canal. These upriver and downriver distances in river miles are the distances from the plant to the point on the river where water is diverted to the intake for each of these water treatment plants.

Water samples are taken near the intake of each water treatment plant (raw drinking water) using automatic samplers that take periodical small aliquots from the stream. These composite samples are collected monthly along with a grab sample of the processed water coming from the treatment plants (finished drinking water). Quarterly composites are made from these monthly collections for both raw and processed river water. Gross beta and gamma isotopic analyses are performed on each of the monthly samples while tritium analysis is conducted on the quarterly composites. An I-131 analysis is not required to be conducted on these samples, since the dose calculated from the consumption of water is less than 1 mrem per year (see ODCM Table 4-1). However, an I-131 analysis is conducted on each of the monthly finished water grab samples, since a drinking water pathway exists.

Provided in Figures 4.7-1 and 4.7-2 and Tables 4.7-1 and 4.7-2, are the historical trends of the average gross beta concentrations found in the monthly collections of raw and finished drinking water.

For 2006, the indicator station average gross beta concentration in the raw drinking water was 3.85 pCi/l which was 0.92 pCi/l greater than the average gross beta concentration at the control station (2.93 pCi/l). This difference is not statistically discernible, since it is less than the calculated MDD of 1.12 pCi/l. The required MDC for gross beta in water is 4.0 pCi/l. There is no RL for gross beta in water.

For 2006, the indicator station average gross beta concentration in the finished drinking water was 3.23 pCi/l which was 0.02 pCi/l less than the average gross beta concentration at the control station (3.25 pCi/l). This difference is less than the MDD of 2.44 pCi/l and is not statistically discernible. The gross beta concentrations at the indicator stations ranged from 1.47 to 8.89 pCi/l while the concentrations at the control station ranged from 1.62 to 11.89 pCi/l. The required MDC for gross beta in water is 4.0 pCi/l. There is no RL for gross beta in water.

Figure 4.7-1

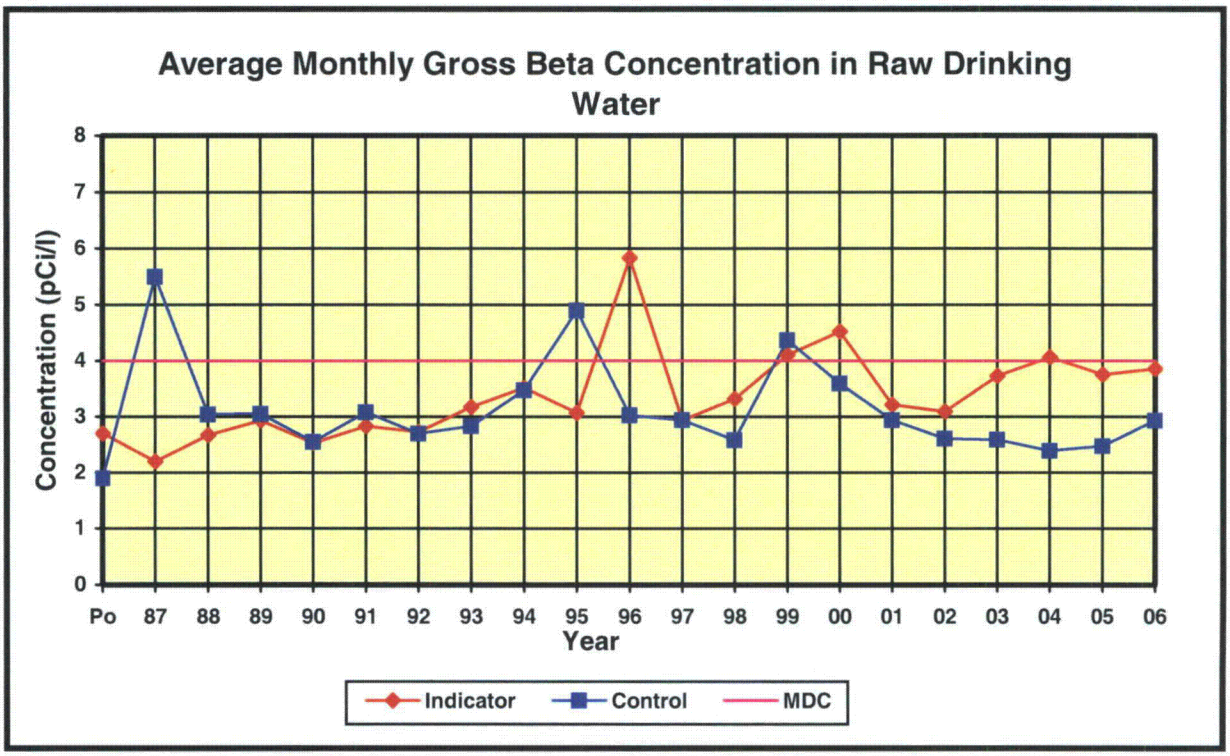


Table 4.7-1
Average Monthly Gross Beta Concentration in Raw Drinking Water

Period	Indicator (pCi/l)	Control (pCi/l)
Pre-op	2.70	1.90
1987	2.20	5.50
1988	2.67	3.04
1989	2.93	3.05
1990	2.53	2.55
1991	2.83	3.08
1992	2.73	2.70
1993	3.17	2.83
1994	3.51	3.47
1995	3.06	4.90
1996	5.83	3.02
1997	2.93	2.94
1998	3.31	2.58
1999	4.10	4.37
2000	4.52	3.59
2001	3.21	2.94
2002	3.09	2.61
2003	3.73	2.59
2004	4.06	2.39
2005	3.75	2.48
2006	3.85	2.93

Figure 4.7-2

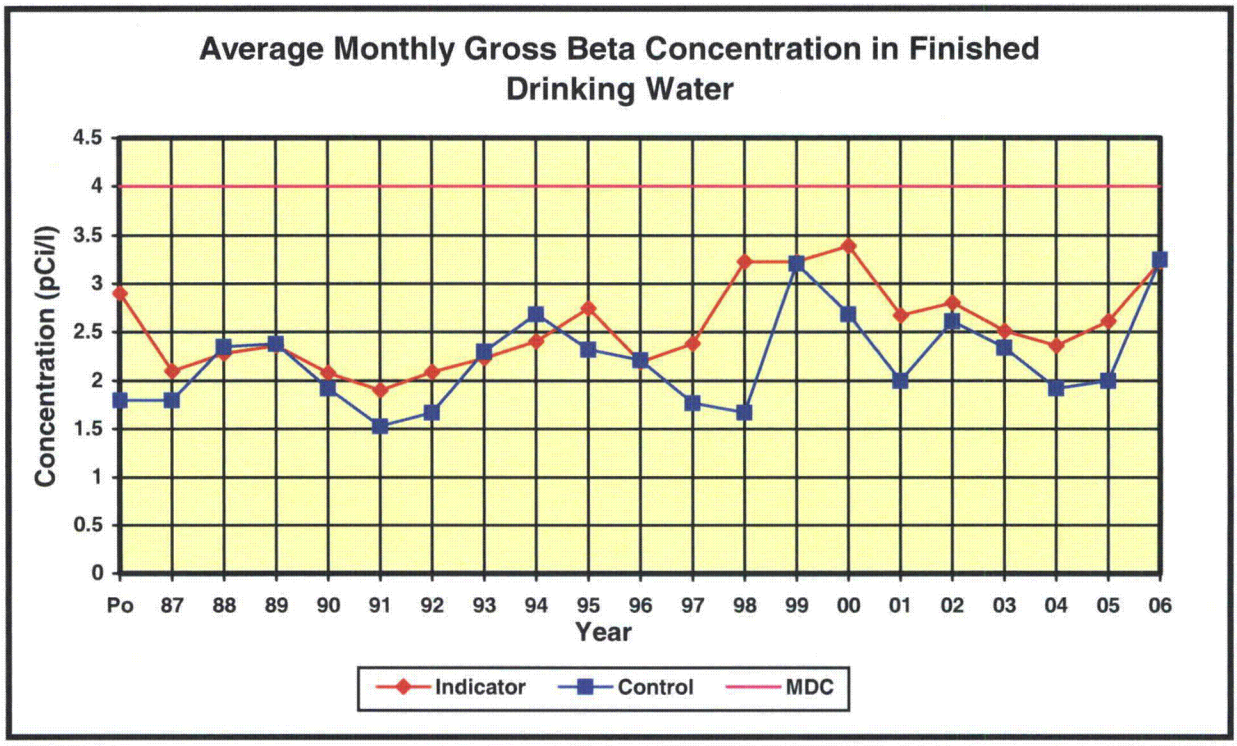


Table 4.7-2
Average Monthly Gross Beta Concentration in Finished Drinking Water

Period	Indicator (pCi/l)	Control (pCi/l)
Pre-op	2.90	1.80
1987	2.10	1.80
1988	2.28	2.35
1989	2.36	2.38
1990	2.08	1.92
1991	1.90	1.53
1992	2.09	1.67
1993	2.23	2.30
1994	2.40	2.68
1995	2.74	2.32
1996	2.19	2.21
1997	2.38	1.77
1998	3.23	1.67
1999	3.23	3.21
2000	3.39	2.68
2001	2.67	2.00
2002	2.80	2.61
2003	2.51	2.34
2004	2.36	1.92
2005	2.61	2.00
2006	3.23	3.25

As provided in Table 3-1, there were no positive results during 2006 for the radionuclides of interest from the gamma isotopic analysis of the monthly collections for both raw and finished drinking water. Only one positive result has been found since operation began. Be-7 was found at a concentration of 68.2 pCi/l in the sample collected for September 1987 at Station 87. During preoperation Be-7 was found in about 5% of the samples at concentrations ranging from 50 to 80 pCi/l. The MDC assigned for Be-7 in water is 124 pCi/l. Also during preoperation, Cs-134 and Cs-137 were detected in about 7% of the samples at concentrations on the order of their MDCs which are 15 and 18 pCi/l, respectively.

I-131 was detected in finished drinking water in 1997 at levels near the MDC. This was the first occurrence for detecting I-131 in finished drinking water since operation began. During preoperation, it was detected in only one of 73 samples at a concentration of 0.77 pCi/l at Port Wentworth. The MDC and RL for I-131 in drinking water are 1 and 2 pCi/l, respectively.

Figures 4.7-3 and 4.7-4 and Tables 4.7-3 and 4.7-4 provide historical trending for the average tritium concentrations found in the quarterly composites of raw and finished drinking water collected at the indicator and control stations. The tables also list the calculated differences between the indicator and control stations, and list the MDDs between these two station groups.

The graphs and tables show that the tritium concentrations in the drinking water samples, both raw and finished, have been gradually trending downward since 1988. The small increase in average concentrations at the indicator stations for 1991 and 1992 reflect the impact of the inadvertent release from SRS of 7,500 Ci of tritium to the Savannah River about 10 miles downriver of VEGP, in December 1991 (SRS release data was obtained from "Release of 7,500 Curies of Tritium to the Savannah River from the Savannah River Site", Georgia Department of National Resources, Environmental Protection Division, Environmental Radiation Program, January 1992).

The 2006 raw drinking water indicator stations average tritium was 690 pCi/l which was 239 pCi/l greater than the concentration determined at the control station (451 pCi/l). The difference between the average at the indicator stations and the average at the control station is less than the calculated MDD of 394 pCi/l and therefore is not statistically discernible. The MDC and RL for tritium in drinking water are 2000 pCi/l and 20,000 pCi/l, respectively.

The finished drinking water average tritium concentration at the indicator stations during 2006 was 688 pCi/l which was 22 pCi/l less than that found at the control station (710 pCi/l) which only had one of four samples to show detectable tritium. Application of the modified Student's t-test shows that the difference between the average at the indicator stations and the single positive value at the control station is not statistically discernible.

Figure 4.7-3

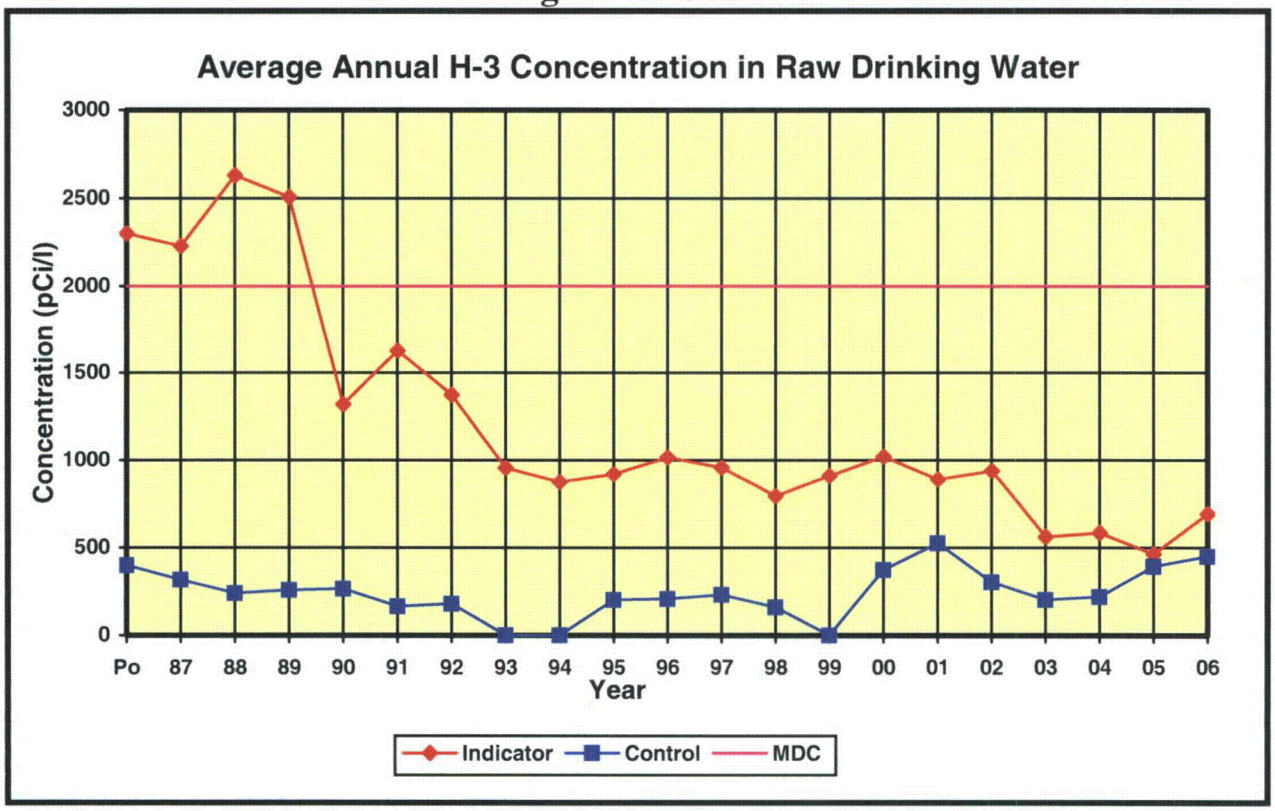


Table 4.7-3
Average Annual H-3 Concentration in Raw Drinking Water

Period	Indicator (pCi/l)	Control (pCi/l)	Difference Between Ind. & Control (pCi/l)	MDD (pCi/l)
Pre-op	2300	400	1900	
1987	2229	316	1913	793
1988	2630	240	2390	580
1989	2508	259	2249	1000
1990	1320	266	1054	572
1991	1626	165	1461	834
1992	1373	179	1194	353
1993	955	NDM	955	NA
1994	871	NDM	871	NA
1995	917	201	716	NA
1996	1014	207	807	151
1997	956	230	726	61
1998	791	160	631	NA
1999	908	NDM	908	NA
2000	1020	373	647	704
2001	889	525	364	NA
2002	938	304	634	284
2003	563	203	360	NA
2004	585	220	365	204
2005	463	393	70	301
2006	690	451	239	394

Figure 4.7-4

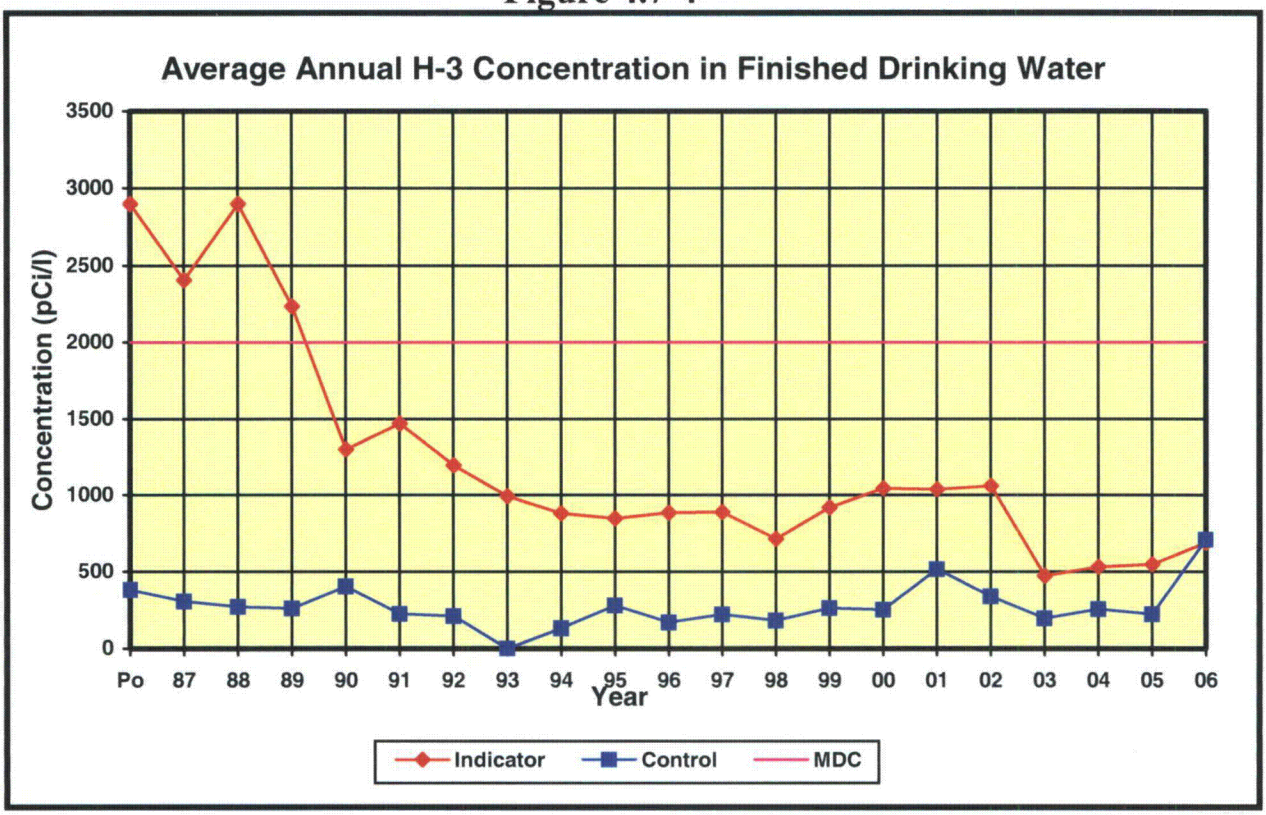


Table 4.7-4
Average Annual H-3 Concentration in Finished Drinking Water

Period	Indicator (pCi/l)	Control (pCi/l)	Difference Between Ind. & Control (pCi/l)	MDD (pCi/l)
Pre-op	2900	380	2520	
1987	2406	305	2101	1007
1988	2900	270	2630	830
1989	2236	259	1977	627
1990	1299	404	895	1131
1991	1471	225	1246	647
1992	1195	211	984	427
1993	993	NDM	993	NA
1994	880	131	749	270
1995	847	279	568	NA
1996	884	168	716	NA
1997	887	221	666	383
1998	713	180	533	NA
1999	920	263	657	NA
2000	1043	251	792	833
2001	1037	516	521	NA
2002	1060	340	720	416
2003	473	196	277	NA
2004	531	255	276	314
2005	546	223	323	NA
2006	688	710	22	NA

4.8 Fish

Table 2-1 requires the collection of at least one sample of any anadromous species of fish in the vicinity of the plant discharge during the spring spawning season, and for the semi-annual collection of at least one sample of any commercially or recreationally important species in the vicinity of the plant discharge area and in an area not influenced by plant discharges. Table 2-1 specifies that a gamma isotopic analysis be performed on the edible portions of each sample collected.

As provided in Table 2-2, a 5-mile stretch of the river is generally needed to obtain adequate fish samples. For the semiannual collections, the control location (Station 81) extends from approximately 2 to 7 miles upriver of the plant intake structure, and the indicator location (Station 85) extends from about 1.4 to 7 miles downriver of the plant discharge structure. For anadromous species, all collection points can be considered as indicator stations.

The anadromous fish (American Shad) sample was collected on March 13, 2006 during the spring spawning season. No man-made radionuclides were detected in the 2006 sample. In all but three previous years of operation, no radionuclides were detected. In 2005, Cs-137 was detected in the anadromous fish sample at a low level of 28.8 pCi/kg-wet. In 1987, as well as in 1991, Cs-137 was found in a single sample of American Shad at concentrations of 10 and 12 pCi/kg-wet, respectively.

The dates and compositions of the semi-annual catches at the indicator and control stations during 2006 are shown below.

Date	Indicator	Control
April 4	Channel Catfish	Largemouth Bass
November 8	Largemouth Bass	Largemouth Bass

As indicated in Table 3-1, Cs-137 was the only radionuclide found in the semiannual collections of a commercially or recreationally important species of fish. It has been found in all but 4 of the 129 samples collected during operation and in all but 5 of the 32 samples collected during preoperation. As provided in Table 3-1, the average concentration at the indicator station was 257 pCi/kg-wet which was 221.3 pCi/kg-wet greater than that at the control station (35.7 pCi/kg-wet). The difference between the average at the indicator station and the average at the control station is less than the calculated MDD of 1087 pCi/l and therefore is not statistically discernible. No discernible difference has occurred for any year of operation or during pre-operation.

Figure 4.8-1 and Table 4.8-1 provide the historical trending of the average concentrations of Cs-137 in units of pCi/kg-wet found in fish samples at the indicator and control stations. The indicator station fish sample concentration of Cs-137 in 1999 was greatly influenced by a largemouth bass collected in October with a concentration of 2500 pCi/kg-wet. Other than the fact that largemouth bass are predators that concentrate Cs-137, no specific cause for the elevated concentration in this sample is known. No trend is recognized in this data. The MDC and RL for Cs-137 in fish are 150 and 2000 pCi/kg-wet, respectively.

Figure 4.8-1

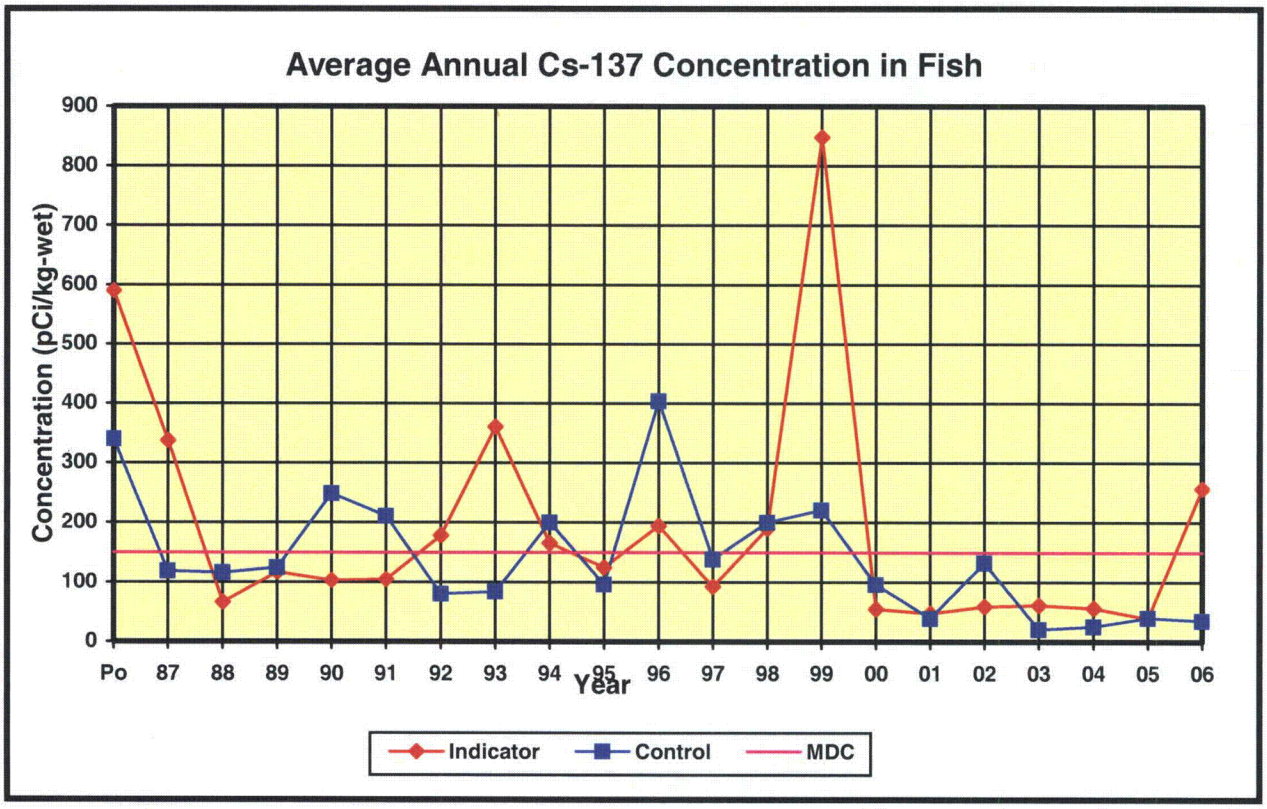

Average Annual Cs-137 Concentration in Fish
Concentration (pCi/kg-wet)
900
800
700
600
500
400
300
200
100
0
Po
87
88
89
90
91
92
93
94
95
96
97
98
99
00
01
02
03
04
05
06
Year
Indicator
Control
MDC

Table 4.8-1
Average Annual Cs-137 Concentration in Fish

Year	Indicator (pCi/kg-wet)	Control (pCi/kg-wet)
Pre-op	590	340
1987	337	119
1988	66	116
1989	117	125
1990	103	249
1991	105	211
1992	178	80
1993	360	84
1994	165	200
1995	125	96
1996	194	404
1997	93	139
1998	190	200
1999	848	221
2000	55	96
2001	48	39
2002	59	133
2003	62	21
2004	56.4	26.0
2005	39.3	40.2
2006	257	35.7

The only other radionuclide found in fish samples during operation is I-131. In 1989, it was found in one sample at the indicator station at a concentration of 18 pCi/kg-wet. In 1990, it was found in one sample at the indicator station and in one sample at the control station, at concentrations of 13 and 12 pCi/kg-wet, respectively. The MDC assigned to I-131 in fish is 53 pCi/kg-wet.

During preoperation, Cs-134 was found in two of the 17 samples collected at the control station at concentrations of 23 and 190 pCi/kg-wet. The MDC and RL for Cs-134 are 130 and 1000 pCi/kg-wet, respectively. Nb-95 was also found in one of the control station samples at a concentration of 34 pCi/kg-wet. The assigned MDC and calculated RL for Nb-95 are 50 and 70,000 pCi/kg-wet, respectively.

4.9 Sediment

Sediment was collected along the shoreline of the Savannah River on April 4 and October 3, 2006 at Stations 81 and 83. Station 81 is a control station located about 2.5 miles upriver of the plant intake structure while Station 83 is an indicator station located about 0.6 miles downriver of the plant discharge structure. A gamma isotopic analysis was performed on each sample. The radionuclides of interest identified in 2006 samples were Be-7, Co-60, and Cs-137.

Be-7, which is abundant in nature, was not identified in plant liquid effluents during 2006. However, it continues to be trended in river sediment in the REMP report. In 2006, the average level at the indicator station was 1254 pCi/kg-dry and at the control station the single positive value was 704 pCi/kg-dry. Application of the modified Student's t-test shows that the difference between the average at the indicator station and the single positive value at the control station is not statistically discernible. Because there continues to be no significant difference between the indicator and control station, the Be-7 found at the indicator station is not attributed to plant releases.

For Cs-137, the average concentration at the indicator station during 2006 was 142 pCi/kg-dry which was 74 pCi/kg-dry greater than that at the control station (68 pCi/kg-dry). The difference between the average value at the indicator station and the average value at the control station is statistically discernible. Therefore, the concentration of Cs-137 found at the indicator station could be attributed to plant effluents or to other facilities that release radioactive effluents in the vicinity of the plant. The Cs-137 level at the indicator station has averaged nearly 100 pCi/kg-dry greater than that at the control station over the entire period of operation. During preoperation, the Cs-137 was 170 pCi/kg-dry greater at the indicator station than at the control station.

During 2006, Co-60 was detected in the two sediment samples at the indicator station. The average concentration of the two samples was 40 pCi/kg-dry. Since no Co-60 was detected in sediment collected at the control station, this concentration of Co-60 could be attributed to plant releases or, potentially, to other facilities that release radioactive effluents in the vicinity of the plant.

The historical average concentrations of Be-7, Co-58, Co-60, and Cs-137 in sediment are plotted in Figures 4.9-1 through 4.9-4 along with listings of their concentrations in Tables 4.9-1 through 4.9-4. The concentrations of the solely man-made nuclides (Co-58, Co-60, & Cs-137) are consistent with past average concentrations. No pattern has been detected. Be-7, produced by man and nature, is also within the range that is typically seen.

During preoperation, Zr-95, Nb-95, Cs-134, and Ce-141 were detected in at least one of the control station samples and Nb-95 was detected in one of the indicator station samples. Be-7 and Cs-137 were found in several of the samples. The concentrations of these preoperational nuclides were on the order of their respective MDC values. The presence of these preoperational nuclides could be attributed to atmospheric weapons testing and the Chernobyl incident.

Mn-54 and I-131 were found sporadically over several years of operation. A summary of the positive results for these nuclides along with their applicable MDCs is provided in Table 4.9-5.

Figure 4.9-1

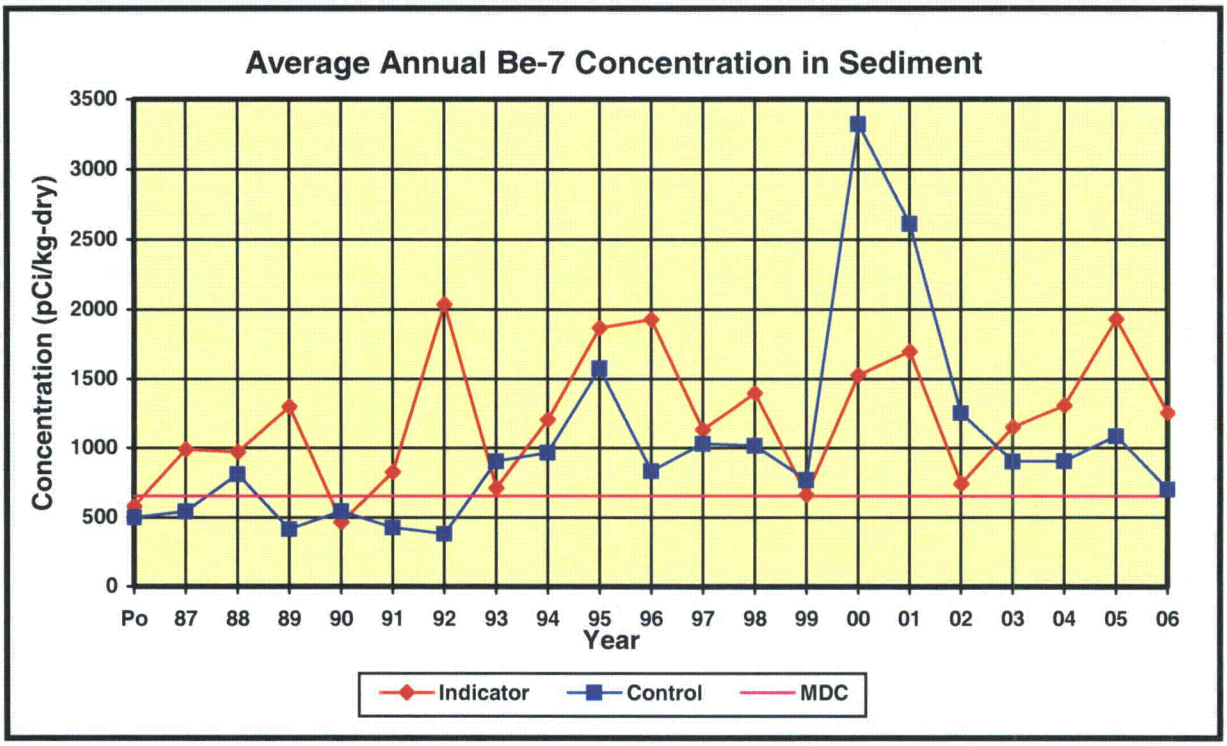


Table 4.9-1
Average Annual Be-7 Concentration in Sediment

MDC=655 pCi/kg-dry		
Year	**Indicator (pCi/kg-dry)**	**Control (pCi/kg-dry)**
Pre-op	580	500
1987	987	543
1988	970	810
1989	1300	415
1990	465	545
1991	826	427
1992	2038	380
1993	711	902
1994	1203	964
1995	1865	1575
1996	1925	831
1997	1130	1028
1998	1396	1016
1999	662	769
2000	1526	3324
2001	1697	2614
2002	742	1254
2003	1150	903
2004	1309	905
2005	1931	1086
2006	1254	704

Figure 4.9-2

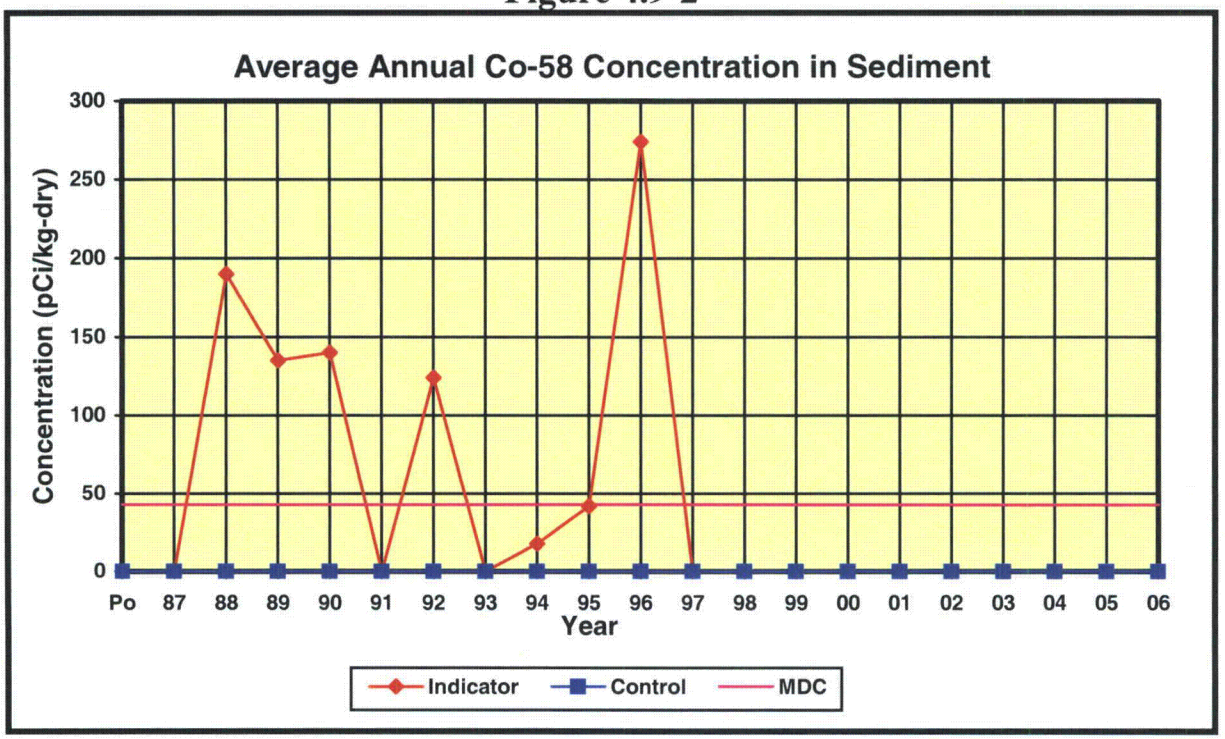


Table 4.9-2
Average Annual Co-58 Concentration in Sediment

MDC=43 pCi/kg-dry		
Year	**Indicator (pCi/kg-dry)**	**Control (pCi/kg-dry)**
Pre-op	NDM	NDM
1987	NDM	NDM
1988	190	NDM
1989	135	NDM
1990	140	NDM
1991	NDM	NDM
1992	124	NDM
1993	NDM	NDM
1994	18.4	NDM
1995	42.4	NDM
1996	274	NDM
1997	NDM	NDM
1998	NDM	NDM
1999	NDM	NDM
2000	NDM	NDM
2001	NDM	NDM
2002	NDM	NDM
2003	NDM	NDM
2004	NDM	NDM
2005	NDM	NDM
2006	NDM	NDM

Figure 4.9-3

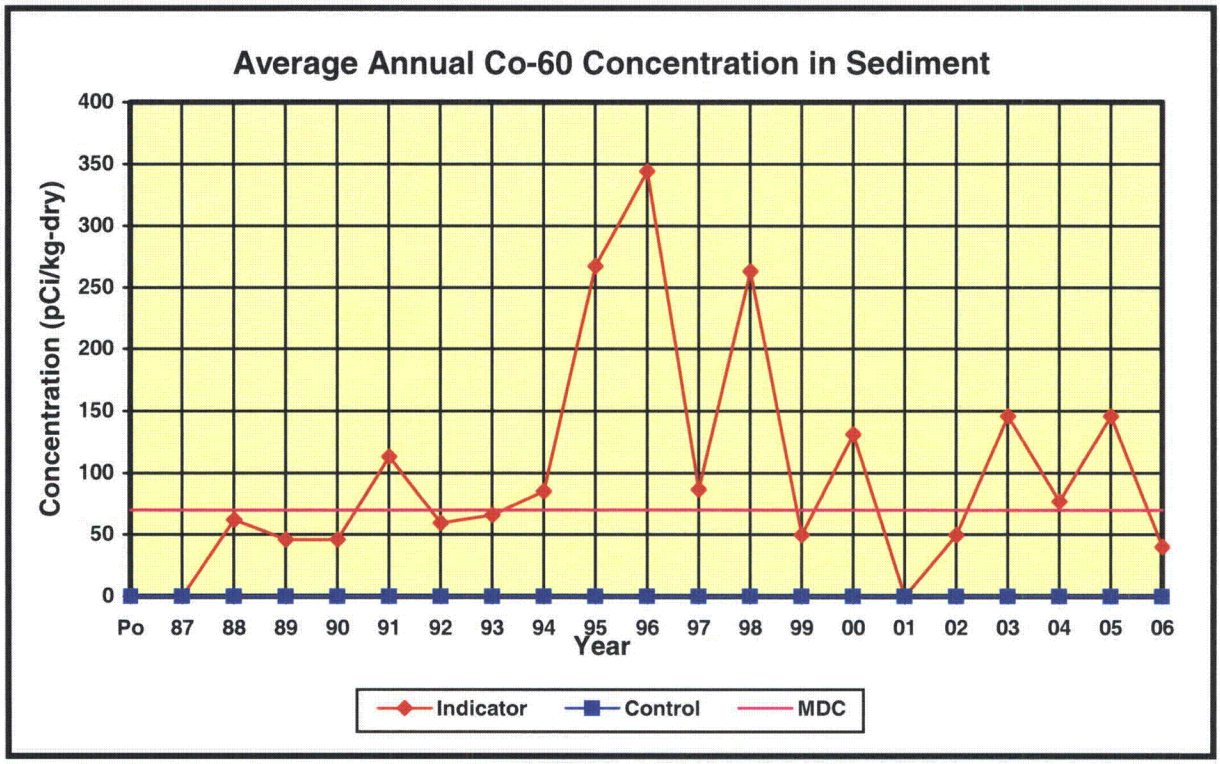


Table 4.9-3
Average Annual Co-60 Concentration in Sediment

MDC=70 pCi/kg-dry		
Year	**Indicator (pCi/kg-dry)**	**Control (pCi/kg-dry)**
Pre-op	NDM	NDM
1987	NDM	NDM
1988	62	NDM
1989	46	NDM
1990	46	NDM
1991	113	NDM
1992	59.5	NDM
1993	65.9	NDM
1994	85.2	NDM
1995	267	NDM
1996	344	NDM
1997	86	NDM
1998	263	NDM
1999	49.5	NDM
2000	131.3	NDM
2001	NDM	NDM
2002	49.7	NDM
2003	146	NDM
2004	77	NDM
2005	146	NDM
2006	40	NDM

Figure 4.9-4

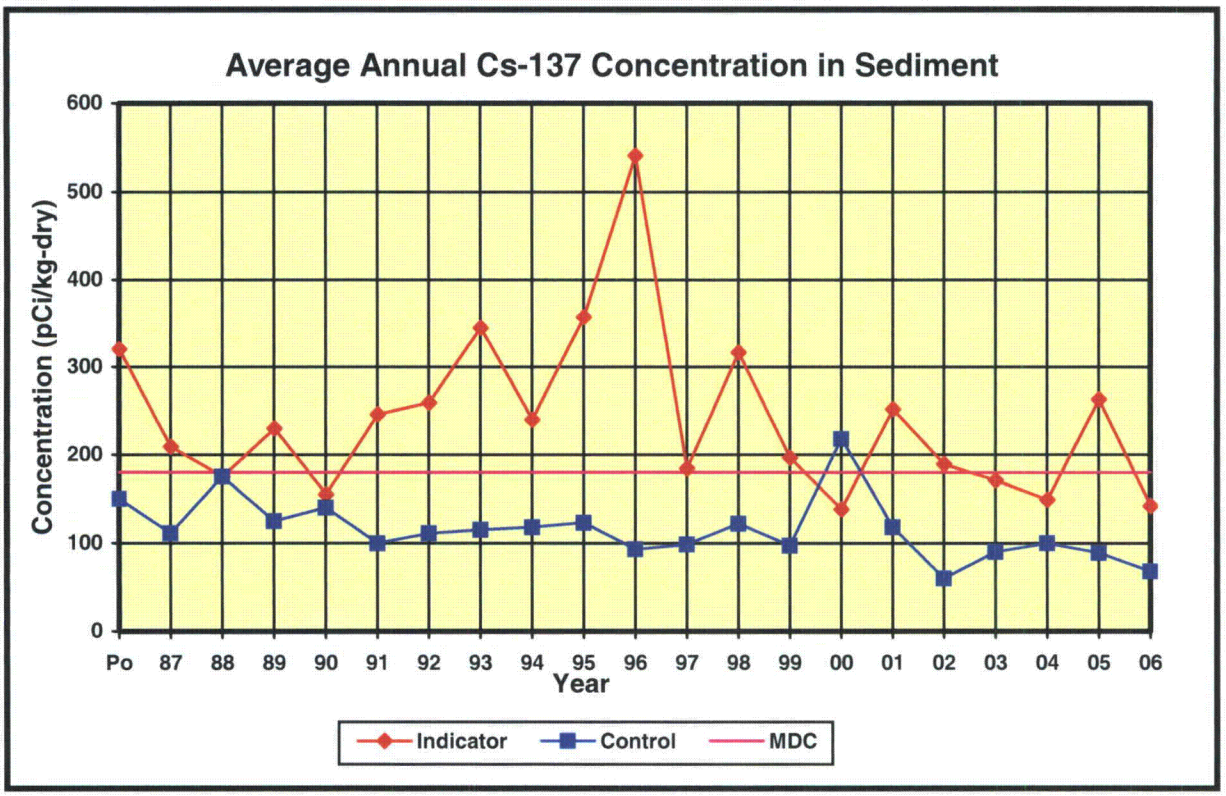

Average Annual Cs-137 Concentration in Sediment
Concentration (pCi/kg-dry)
600
500
400
300
200
100
0
Po 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03 04 05 06
Year
Indicator
Control
MDC

Table 4.9-4
Average Annual Cs-137 Concentration in Sediment

MDC=180 pCi/kg		
Year	**Indicator (pCi/kg)**	**Control (pCi/kg)**
Pre-op	320	150
1987	209	111
1988	175	175
1989	230	125
1990	155	140
1991	246	100
1992	259	111
1993	345	115
1994	240	118
1995	357	123
1996	541	93
1997	184	98
1998	316	122
1999	197	97
2000	138	218
2001	252	118
2002	189	60
2003	171	90
2004	149	100
2005	263	89
2006	142	68

Table 4.9-5

Additional Sediment Nuclide Concentrations

Nuclide	YEAR	Indicator (pCi/kg-dry)	Control (pCi/kg-dry)	MDC (pCi/kg-dry)
Mn-54	1988	22	NDM	42
	1989	18	NDM	
	1994	32	NDM	
I-131	1992	194	20	53
	1994	51	41	

4.10 Groundwater

In 2006, NEI (Nuclear Energy Institute) formed a task force to address monitoring onsite groundwater for radionuclides at nuclear facilities. The task force was formed after several plants detected radionuclides (primarily tritium) in groundwater wells off plant site. The contamination sources were found to be onsite underground piping leaks, tank leaks, storage ponds, or radioactive spills that had slowly seeped into the groundwater. These small leaks went undetected for many years and eventually led to the unexpected discovery of radionuclides off plant site. The amount of radioactivity seen in the offsite wells did not pose a significant health concern. However, NEI felt it was prudent for the industry to update site hydrology information and to develop radiological groundwater monitoring plans at each site. These groundwater protection plans would ensure that underground leaks and spills would be addressed more promptly. Additionally, NEI recommended developing a communications protocol to report radioactive leaks or spills that entered groundwater (or might eventually enter groundwater) to the NRC and State and Local government officials as needed.

In 2006, Vogtle sampled onsite drinking water deep wells and onsite makeup water deep wells for tritium and gamma isotopic activity. These wells did not contain detectable amounts of radioactivity. In 2007, Vogtle will implement a more extensive radiological groundwater monitoring program. A qualified hydrologist will make recommendations for drilling additional onsite monitoring wells and will update the site hydrology information. The groundwater monitoring results will be reported each year in the site REMP report.

Southern Nuclear has developed a company-wide communications protocol which is contained in the Nuclear Management Procedure, *Actions for Potential Groundwater Contamination Events*, to ensure radioactive leaks and spills would be addressed and communicated appropriately.

5.0 INTERLABORATORY COMPARISON PROGRAM

In accordance with ODCM 4.1.3, the EL participates in an ICP that satisfies the requirements of Regulatory Guide 4.15, Revision 1, "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment", February 1979. The guide indicates the ICP is to be conducted with the Environmental Protection Agency (EPA) Environmental Radioactivity Laboratory Intercomparison Studies (Cross-check) Program or an equivalent program, and the ICP should include all of the determinations (sample medium/radionuclide combinations) that are offered by the EPA and included in the REMP.

The ICP is conducted by Analytics, Inc. of Atlanta, Georgia. Analytics has a documented Quality Assurance (QA) program and the capability to prepare Quality Control (QC) materials traceable to the National Institute of Standards and Technology. The ICP is a third party blind testing program which provides a means to ensure independent checks are performed on the accuracy and precision of the measurements of radioactive materials in environmental sample matrices. Analytics supplies the crosscheck samples to the EL which performs the laboratory analyses in a normal manner. Each of the specified analyses is performed three times. The results are then sent to Analytics who performs an evaluation which may be helpful to the EL in the identification of instrument or procedural problems.

The samples offered by Analytics and included in the EL analyses are gross beta and gamma isotopic analyses of an air filter; gamma isotopic analyses of milk samples; and gross beta, tritium and gamma isotopic analyses of water samples.

The accuracy of each result is measured by the normalized deviation, which is the ratio of the reported average less the known value to the total error. The total error is the square root of the sum of the squares of the uncertainties of the known value and of the reported average. The uncertainty of the known value includes all analytical uncertainties as reported by Analytics. The uncertainty of the reported average is the propagated error of the values in the reported average by the EL. The precision of each result is measured by the coefficient of variation, which is defined as the standard deviation of the reported result divided by the reported average. An investigation is undertaken whenever the absolute value of the normalized deviation is greater than three or whenever the coefficient of variation is greater than 15% for all radionuclides other than Cr-51 and Fe-59. For Cr-51 and Fe-59, an investigation is undertaken when the coefficient of variation exceeds the values shown as follows:

Nuclide	Concentration *	Total Sample Activity (pCi)	Percent Coefficient of Variation
Cr-51	<300	NA	25
Cr-51	NA	>1000	25
Cr-51	>300	<1000	15
Fe-59	<80	NA	25
Fe-59	>80	NA	15

* For air filters, concentration units are pCi/filter. For all other media, concentration units are pCi/liter (pCi/l).

As required by ODCM 4.1.3.3 and 7.1.2.3, a summary of the results of the EL's participation in the ICP is provided in Table 5-1 for: the gross beta and gamma isotopic analyses of an air filter; gamma isotopic analyses of milk samples; and gross beta, tritium and gamma isotopic analyses of water samples. Delineated in this table for each of the media/analysis combinations, are: the specific radionuclides; Analytics' preparation dates; the known values with their uncertainties supplied by Analytics; the reported averages with their standard deviations; and the resultant normalized deviations and coefficients of variation expressed as a percentage.

The GPC EL analyzed 9 samples for 46 parameters in 2006. These analyses included tritium, gross beta, Fe-55, Sr-89/90 and gamma emitting radio-nuclides in different matrices. The attached results indicate all analyses are acceptable for accuracy. Three analyses outside the control limit for precision are discussed below. The precision deviations were for the determination of gross alpha in water, I-131 in milk and Sr-90 in an air filter.

The gross alpha in water is analyzed in triplicate with an average value reported. The high range is attributed to one of the samples not evenly mixing in the beaker during digestion. The samples were counted a second time to eliminate detector variation. The second quarter alpha sample was in control for both accuracy and precision and no further investigation will be performed.

The second quarter milk sample was analyzed by gamma spectroscopy. The sample is analyzed on three detectors with an error weighted average reported. An elevated range of values in the analysis is due to one of the detectors measuring a higher activity. No inconsistencies were found in the detectors shaping or analysis of the 364.5 kev gamma peak. No further investigation will be performed.

The third quarter air filter sample analyzed for Sr-90 had a high range of values. The low activity in the sample resulted in a high uncertainty for the measurement and is reflected in the precision for the reported values. No further investigation will be performed.

The 2005 investigation into the Fe-59 high bias using gamma spectroscopy indicated a need for the calibration curve to be evaluated. The efficiency curve was believed to be affected by summing losses for specific gamma energies of Co-60 and Y-88. A calibration standard was purchased which included nuclides that do not contribute to summing. A calibration curve was developed using the standard and the curve was compared to the calibration curve using Co-60 and Y-88. The comparison indicated only a slight difference in efficiencies, therefore there is no benefit to adjusting the calibration curve for efficiency. The analysis of Fe-59 has been investigated and a small positive bias of 13% exists in the activity recovery. No further investigation will be performed and no corrective actions are planned.

TABLE 5-1 (SHEET 1 of 3)

INTERLABORATORY COMPARISON PROGRAM RESULTS

GROSS BETA ANALYSIS OF AN AIR FILTER (pCi/filter)

Analysis or Radionuclide	Date Prepared	Reported Average	Known Value	Standard Deviation EL	Uncertainty Analytics (3S)	Percent Coef of Variation	Normalized Deviation
Gross Beta	09/26/06	78.90	78.40	3.14	0.87	5.63	0.12

GAMMA ISOTOPIC ANALYSIS OF AN AIR FILTER (pCi/filter)

Analysis or Radionuclide	Date Prepared	Reported Average	Known Value	Standard Deviation EL	Uncertainty Analytics (3S)	Percent Coef of Variation	Normalized Deviation
Ce-141	09/26/06	51.60	55.20	1.19	0.61	4.92	-1.44
Co-58	09/26/06	80.20	80.60	2.58	0.90	5.54	-0.09
Co-60	09/26/06	105.90	111.00	2.19	0.33	4.25	-1.13
Cr-51	09/26/06	179.60	173.00	17.53	1.92	12.67	0.29
Cs-134	09/26/06	64.50	69.70	3.05	0.77	6.44	-1.26
Cs-137	09/26/06	148.50	145.00	7.04	1.61	6.03	0.39
Fe-59	09/26/06	36.90	30.10	4.56	1.01	14.92	1.23
Mn-54	09/26/06	98.50	90.80	4.71	1.29	6.32	1.23
Zn-65	09/26/06	127.20	116.00	3.22	1.23	5.84	1.50

GAMMA ISOTOPIC ANALYSIS OF A MILK SAMPLE (pCi/liter)

Analysis or Radionuclide	Date Prepared	Reported Average	Known Value	Standard Deviation EL	Uncertainty Analytics (3S)	Percent Coef of Variation	Normalized Deviation
Ce-141	06/08/06	186.00	184.00	7.78	2.04	6.15	0.17
Co-58	06/08/06	99.00	100.00	1.19	1.11	7.08	-0.15
Co-60	06/08/06	129.80	129.00	2.12	1.43	4.94	0.13
Cr-51	06/08/06	307.80	259.00	31.86	2.88	16.25	0.97
Cs-134	06/08/06	127.00	127.00	8.61	1.41	8.31	0
Cs-137	06/08/06	120.60	117.00	8.55	1.30	9.30	0.32

TABLE 5-1 (SHEET 2 of 3)

INTERLABORATORY COMPARISON PROGRAM RESULTS

GAMMA ISOTOPIC ANALYSIS OF A MILK SAMPLE (pCi/liter)

Analysis or Radionuclide	Date Prepared	Reported Average	Known Value	Standard Deviation EL	Uncertainty Analytics (3S)	Percent Coef of Variation	Normalized Deviation
Fe-59	06/08/06	102.70	93.60	6.69	1.04	10.50	0.85
I-131	06/08/06	67.40	63.20	9.05	0.70	17.18	0.37
Mn-54	06/08/06	147.20	146.00	3.06	1.63	5.78	0.14
Zn-65	06/08/06	185.30	185.00	14.68	2.06	10.51	0.02

GROSS BETA ANALYSIS OF WATER SAMPLE (pCi/liter)

Analysis or Radionuclide	Date Prepared	Reported Average	Known Value	Standard Deviation EL	Uncertainty Analytics (3S)	Percent Coef of Variation	Normalized Deviation
Gross Beta	03/23/06	258.90	262.00	4.69	2.91	4.88	-0.25
	06/08/06	176.00	169.00	12.39	1.88	9.13	0.44

GAMMA ISOTOPIC ANALYSIS OF WATER SAMPLES (pCi/liter)

Analysis or Radionuclide	Date Prepared	Reported Average	Known Value	Standard Deviation EL	Uncertainty Analytics (3S)	Percent Coef of Variation	Normalized Deviation
Ce-141	03/23/06	90.20	86.80	2.65	0.96	7.42	0.51
Co-58	03/23/06	87.80	87.50	2.55	0.97	7.08	0.04
Co-60	03/23/06	103.00	107.00	3.71	1.19	6.31	-0.61
Cr-51	03/23/06	240.70	234.00	14.02	2.60	14.79	0.19
Cs-134	03/23/06	102.70	101.00	3.5	1.12	6.04	0.28

TABLE 5-1 (SHEET 3 of 3)

INTERLABORATORY COMPARISON PROGRAM RESULTS

GAMMA ISOTOPIC ANALYSIS OF WATER SAMPLES (pCi/liter)

Analysis or Radionuclide	Date Prepared	Reported Average	Known Value	Standard Deviation EL	Uncertainty Analytics (3S)	Percent Coef of Variation	Normalized Deviation
Cs-137	03/23/06	74.80	74.30	6.11	0.83	11.03	0.07
Fe-59	03/23/06	78.80	72.40	2.81	0.80	9.39	0.86
I-131	03/23/06	70.30	67.40	1.19	0.75	7.21	0.58
Mn-54	03/23/06	80.80	78.10	8.55	0.87	12.86	0.26
Zn-65	03/23/06	159.20	148.00	13.76	1.64	11.61	0.60

TRITIUM ANALYSIS OF WATER SAMPLES (pCi/liter)

Analysis or Radionuclide	Date Prepared	Reported Average	Known Value	Standard Deviation EL	Uncertainty Analytics (3S)	Percent Coef of Variation	Normalized Deviation
H-3	03/23/06	4531.80	4210.00	325.95	70	7.88	0.90
	06/08/06	6143.10	6000.00	220.4	100	4.50	0.52

6.0 CONCLUSIONS

This report confirms the licensee's conformance with the requirements of Chapter 4 of the ODCM. It provides a summary and discussion of the results of the laboratory analyses for each type of sample.

In 2006, there were two instances in which the indicator station readings were statistically discernible from the control station readings. These are discussed in detail below. No discernible radiological impact upon the environment or the public as a consequence of plant discharges to the atmosphere and to the river was established for any other REMP samples.

Cesium-137 and Cobalt-60 were identified in river sediment in both samples at the indicator station. Only Cs-137 was identified at the control station. Low levels of Cs-137 in the environment are attributed primarily to fallout from nuclear weapons testing and from the Chernobyl incident. The Co-60 activity found at the indicator station could be attributed to plant releases since Co-60 was not detected at the control station. The consequent total body dose to a member of the public expected to receive the highest dose was determined to be approximately 8.33E-04 mrem in one year due to Cs-137 and approximately 1.82E-03 mrem in a year due to Co-60. Collectively these doses are less than 0.1% of the ODCM limit which is 3 mrem per year per operating unit.

The radiological levels reported in 2006 were low. The REMP trends over the course of time from preoperation to the present are generally decreasing or have remained fairly constant. This supports the conclusion that there is no adverse radiological impact on the environment or to the public as a result of the operation of Plant Vogtle.