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SOUTHERN COMPANY
Energy to Serve Your World℠

May 12, 2006

NL-06-0963

Docket Nos.: 50-321 50-348 50-424
50-366 50-364 50-425

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

Edwin I. Hatch Nuclear Plant
Joseph M. Farley Nuclear Plant
Vogtle Electric Generating Plant
Annual Radiological Environmental Operating Reports for 2005

Ladies and Gentlemen:

In accordance with section 5.6.2 of the referenced plants' Technical Specifications, Southern Nuclear Operating Company hereby submits the Annual Radiological Environmental Operating Reports for 2005.

This letter contains no NRC commitments. If you have any questions, please advise.

Sincerely,

Lewis Sumner

H. L. Sumner, Jr.

HLS/JMG/sdl

Enclosures: 1. Hatch Annual Radiological Environmental Operating Report for 2005
2. Farley Annual Radiological Environmental Operating Report for 2005
3. Vogtle Annual Radiological Environmental Operating Report for 2005

IE25

cc: Southern Nuclear Operating Company
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ENCLOSURE 1

Edwin I. Hatch Nuclear Plant
Annual Radiological Environmental Operating Report for 2005

EDWIN I. HATCH NUCLEAR PLANT
ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 2005

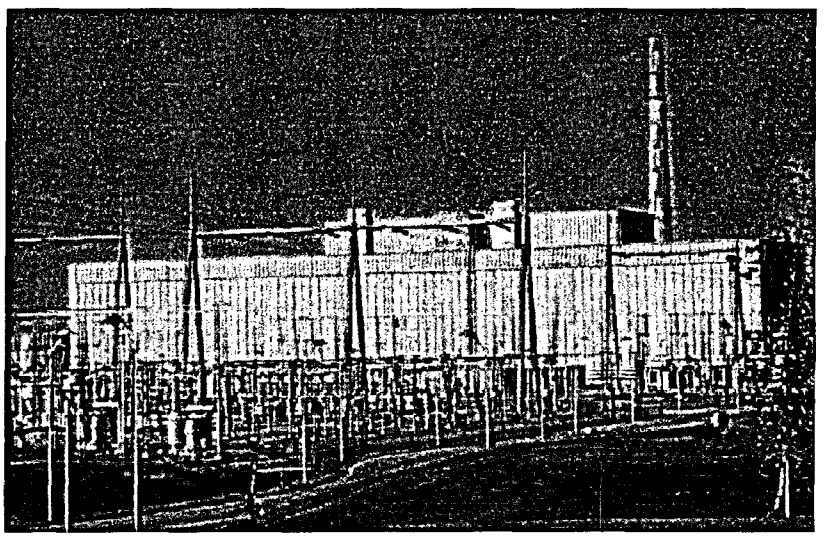

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TABLE OF CONTENTS

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
HNP	Edwin I. Hatch Nuclear Plant
ICP	Interlaboratory Comparison Program
MDC	Minimum Detectable Concentration
MDD	Minimum Detectable Difference
NA	Not Applicable
NDM	No Detectable Measurement(s)
NRC	Nuclear Regulatory Commission
ODCM	Offsite Dose Calculation Manual
Po	Preoperation
REMP	Radiological Environmental Monitoring Program
RL	Reporting Level
TLD	Thermoluminescent Dosimeter
TS	Technical Specification

1.0 INTRODUCTION

The Radiological Environmental Monitoring Program (REMP) is conducted in accordance with Chapter 4 of the Offsite Dose Calculation Manual (ODCM). REMP activities for 2005 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 Edwin I. Hatch Nuclear Plant (HNP).

The assessments include comparisons between the 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.

The pre-operational stage of the REMP began with the establishment and activation of the environmental monitoring stations in January of 1972. The operational stage of the REMP began on September 12, 1974 with Unit 1 initial criticality.

A description of the REMP is provided in Section 2 of this report. An annual summary of the results of the analyses of REMP samples is provided in Section 3. A discussion of the results, including assessments of any radiological impacts upon the environment, and the results of the land use census and the river survey, are provided 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. The sampling locations (stations) specified by ODCM 4.2 are depicted on maps in Figures 2-1 and 2-2. These maps are keyed to Table 2-2 which delineates the direction and distance of each station from the main stack.

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 3)

SUMMARY DESCRIPTION OF RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Approximate Number of Sample Locations	Sampling and Collection Frequency	Type of Analysis and Frequency
1. Airborne Radioiodine and Particulates	6	Continuous operation of the sampler with sample collection weekly.	Radioiodine canister: I-131 analysis, weekly. Particulate sampler: analyze for gross beta radioactivity not less than 24 hours following filter change, weekly; perform gamma isotopic analysis on affected sample when gross beta activity is 10 times the yearly mean of control samples; and composite (by location) for gamma isotopic analysis, quarterly.
2. Direct Radiation	37	Quarterly	Gamma dose, quarterly.
3. Ingestion			
Milk (a)	1	Biweekly	Gamma isotopic and I-131 analysis, biweekly.
Fish or Clams (b)	2	Semiannually	Gamma isotopic analysis on edible portions, semiannually.
Grass or Leafy Vegetation	3	Monthly during growing season.	Gamma isotopic analysis, monthly. (c)
4. Waterborne			
Surface	2	Composite sample collected monthly. (d)	Gamma isotopic analysis, monthly. Composite (by location) for tritium analysis, quarterly.
Sediment	2	Semiannually.	Gamma isotopic analysis, semiannually.

TABLE 2-1 (SHEET 2 of 3)

SUMMARY DESCRIPTION OF RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Approximate Number of Sample Locations	Sampling and Collection Frequency	Type of Analysis and Frequency
Drinking Water (e & f)	One sample of river water near the intake and one sample of finished water from each of one to three of the nearest water supplies which could be affected by HNP discharges.	River water collected near the intake will be a composite sample; the finished water will be a grab sample. These samples will be collected monthly unless the calculated dose due to consumption of the water is greater than 1 mrem/year; then the collection will be biweekly. The collections may revert to monthly should the calculated doses become less than 1 mrem/year.	I-131 analysis on each sample when biweekly collections are required. Gross beta and gamma isotopic analysis on each sample; composite (by location) for tritium analysis, quarterly.

TABLE 2-1 (SHEET 3 of 3)

SUMMARY DESCRIPTION OF RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Notes:

a. Up to three sampling locations within 5 miles and in different sectors will be used as available. In addition, one or more control locations beyond 10 miles will be used.

b. Commercially or recreationally important fish may be sampled. Clams may be sampled if difficulties are encountered in obtaining sufficient fish samples.

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

d. The composite samples shall be composed of a series of aliquots collected at intervals not exceeding a few hours.

e. If it is found that river water downstream of the plant is used for drinking, drinking water samples will be collected and analyzed as specified herein.

f. A survey shall be conducted annually at least 50 river miles downstream of the plant to identify those who use water from the Altamaha River for drinking.

TABLE 2-2 (SHEET 1 of 2)

RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

Station Number	Station Type	Descriptive Location	Direction (a)	Distance (a) (miles)	Sample Type
064	Other	Roadside Park	WNW	0.8	Direct Rad
101	Indicator	Inner Ring	N	1.9	Direct Rad
102	Indicator	Inner Ring	NNE	2.5	Direct Rad
103	Indicator	Inner Ring	NE	1.8	Airborne Rad Direct Rad
104	Indicator	Inner Ring	ENE	1.6	Direct Rad
105	Indicator	Inner Ring	E	3.7	Direct Rad
106	Indicator	Inner Ring	ESE	1.1	Direct Rad Vegetation
107	Indicator	Inner Ring	SE	1.2	Airborne Rad Direct Rad
108	Indicator	Inner Ring	SSE	1.6	Direct Rad
109	Indicator	Inner Ring	S	0.9	Direct Rad
110	Indicator	Inner Ring	SSW	1.0	Direct Rad
111	Indicator	Inner Ring	SW	0.9	Direct Rad
112	Indicator	Inner Ring	WSW	1.0	Airborne Rad Direct Rad Vegetation
113	Indicator	Inner Ring	W	1.1	Direct Rad
114	Indicator	Inner Ring	WNW	1.2	Direct Rad
115	Indicator	Inner Ring	NW	1.1	Direct Rad
116	Indicator	Inner Ring	NNW	1.6	Airborne Rad Direct Rad
170	Control	Upstream	WNW	(c)	River (b)
172	Indicator	Downstream	E	(c)	River (b)
201	Other	Outer Ring	N	5.0	Direct Rad
202	Other	Outer Ring	NNE	4.9	Direct Rad
203	Other	Outer Ring	NE	5.0	Direct Rad
204	Other	Outer Ring	ENE	5.0	Direct Rad
205	Other	Outer Ring	E	7.2	Direct Rad
206	Other	Outer Ring	ESE	4.8	Direct Rad
207	Other	Outer Ring	SE	4.3	Direct Rad
208	Other	Outer Ring	SSE	4.8	Direct Rad
209	Other	Outer Ring	S	4.4	Direct Rad
210	Other	Outer Ring	SSW	4.3	Direct Rad
211	Other	Outer Ring	SW	4.7	Direct Rad
212	Other	Outer Ring	WSW	4.4	Direct Rad
213	Other	Outer Ring	W	4.3	Direct Rad
214	Other	Outer Ring	WNW	5.4	Direct Rad
215	Other	Outer Ring	NW	4.4	Direct Rad
216	Other	Outer Ring	NNW	4.8	Direct Rad
301	Other	Toombs Central School	N	8.0	Direct Rad
304	Control	State Prison	ENE	11.2	Airborne Rad Direct Rad
304	Control	State Prison	ENE	10.3	Milk
309	Control	Baxley Substation	S	10.0	Airborne Rad Direct Rad
416	Control	Emergency News Center	NNW	21.0	Direct Rad Vegetation

TABLE 2-2 (SHEET 2 of 2)

RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

Notes:

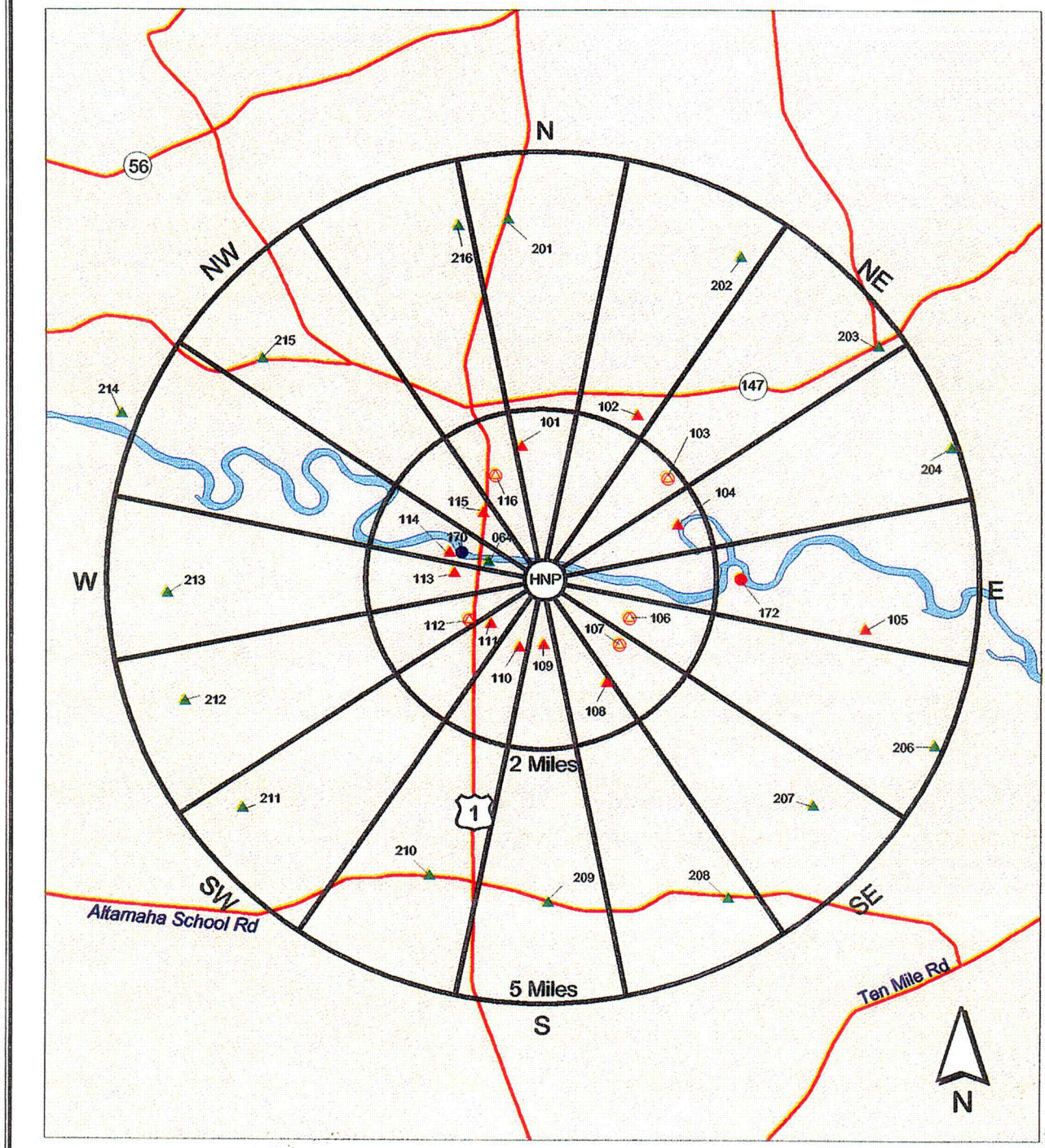
a. Direction and distance are determined from the main stack.

b. River (fish or clams, shoreline sediment, and surface water)

c. Station 170 is located approximately 0.6 river miles upstream of the intake structure for river water, 1.1 river miles for sediment and clams, and 1.5 river miles for fish.

   Station 172 is located approximately 3.0 river miles downstream of the discharge structure for river water, sediment and clams, and 1.7 river miles for fish.

   The locations from which river water and sediment may be taken can be sharply defined. However, the sampling locations for clams often have to be extended over a wide area to obtain a sufficient quantity. High water adds to the difficulty in obtaining clam samples and may also make an otherwise suitable location for sediment sampling unavailable. A stretch of the river of a few miles or so is generally needed to obtain adequate fish samples. The mile locations given above represent approximations of the locations where samples are collected.

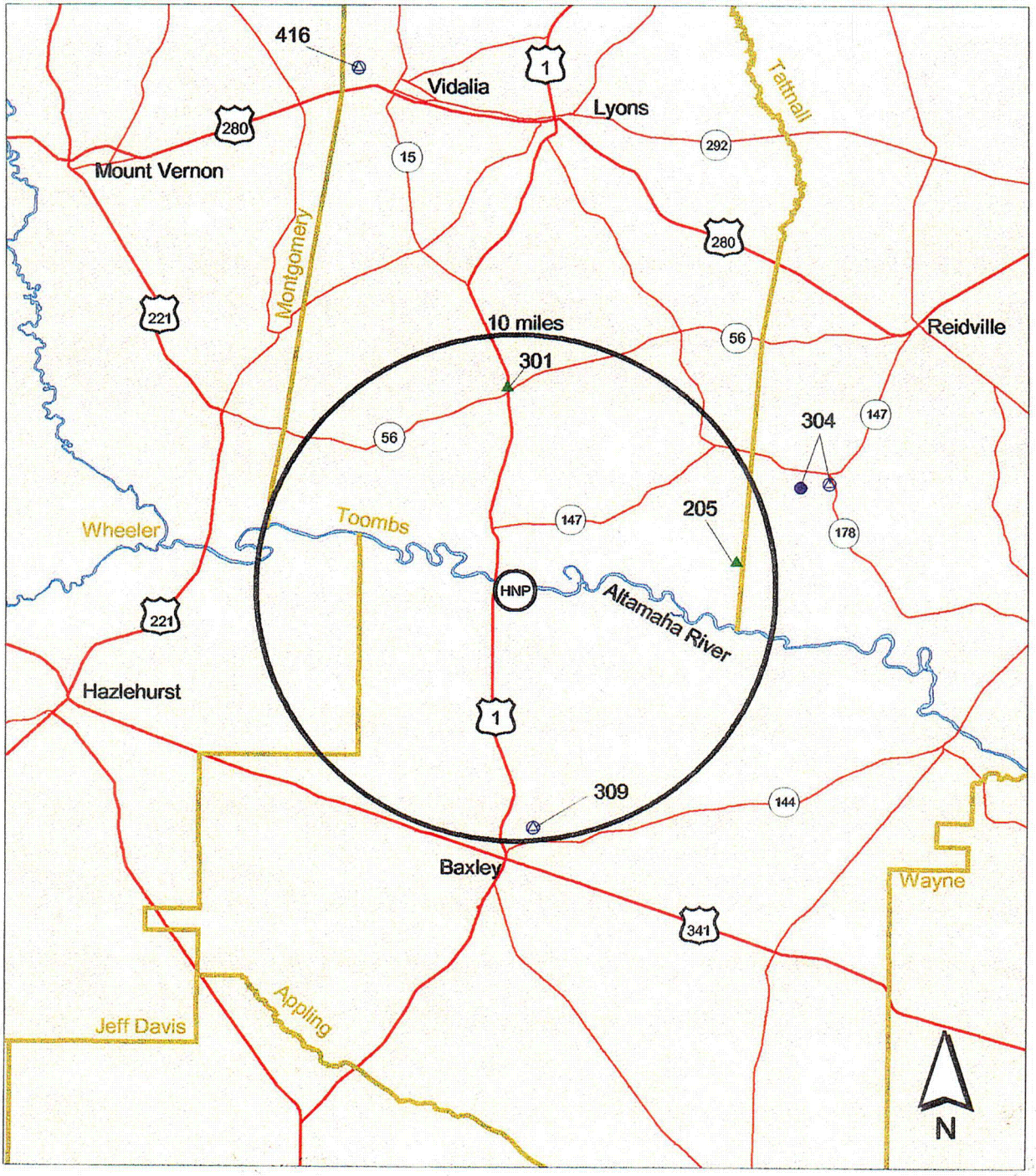


Radiological Environmental Sampling Locations			
	Indicator	Control	Additional
TLD	▲	▲	▲
Other	●	●	●
TLD & Other	◬	◬	◬

REMP Stations Near the Plant

Figure 2-1

C01



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

REMP Stations Beyond Six Miles from the Plant

Figure 2-2

C02

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. Since no naturally occurring radionuclides were found in the plant's effluent releases, only man-made radionuclides are reported as permitted by ODCM 7.1.2.1. Results for samples collected at locations other than control or indicator stations are discussed in Section 4 under the particular sample type.

TABLE 3-1 (SHEET 1 of 4)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

Edwin I. Hatch Nuclear Plant, Docket Nos. 50-321 and 50-366
Appling 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 (Fraction)	Mean (b), Range	Other Stations(h) Mean (b), Range (Fraction)	Control Locations Mean (b), Range (Fraction)
Airborne Particulates (fCi/m3)	Gross Beta 311	10	19.7 7.0-49.9 (207/207)	No. 112 Indicator 1.0 mile, WSW	20.0 7.0-49.9 (52/52)	NA	19.3 6.0-40.1 (104/104)
	Gamma Isotopic 24						
	Cs-134	50	NDM (c)		NDM		NDM
	Cs-137	60	NDM		NDM		NDM
Airborne Radioiodine (fCi/m3)	I-131 311	70	NDM		NDM	NA	NDM
Direct Radiation (mR/91 days)	Gamma Dose 145	NA (d)	12.1 10.1-15.5 (62/62)	No. 214(e) Outer Ring 5.4 miles, WNW	15.5 14.3-16.6 (4/4)	12.0 9.2-17.3 (71/71)	12.5 10.6-15.0 (12/12)
Milk (pCi/l)	Gamma Isotopic 26					NA	
	Cs-134	15	NA		NDM		NDM
	Cs-137	18	NA		NDM		NDM
	Ba-140	60	NA		NDM		NDM
	La-140	15	NA		NDM		NDM
	I-131 26	1	NA		NDM		NDM

TABLE 3-1 (SHEET 2 of 4)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

Edwin I. Hatch Nuclear Plant, Docket Nos. 50-321 and 50-366
Appling 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		Control Locations Mean (b), Range (Fraction)
				Name Distance & Direction	Mean (b), Range (Fraction)	
Vegetation (pCi/kg-wet)	Gamma Isotopic 36					
	I-131	60	NDM		NDM	NDM
	Cs-134	60	NDM		NDM	NDM
	Cs-137	80	47.7 16.6-108.8 (12/24)	Station 106 Inner Ring 1.1 miles; ESE	55.2 27.8-108.8 (8/12)	39.8 25.4-55.8 (3/12)
River Water (pCi/l)	Gamma Isotopic 24					
	Mn-54	15	NDM		NDM	NDM
	Fe-59	30	NDM		NDM	NDM
	Co-58	15	NDM		NDM	NDM
	Co-60	15	NDM		NDM	NDM
	Zn-65	30	NDM		NDM	NDM
	Zr-95	30	NDM		NDM	NDM
	Nb-95	15	NDM		NDM	NDM
	I-131	15 (f)	NDM		NDM	NDM
	Cs-134	15	NDM		NDM	NDM
	Cs-137	18	NDM		NDM	NDM
	Ba-140	60	NDM		NDM	NDM
	La-140	15	NDM		NDM	NDM
	Tritium 8	3000 (g)	245 215-275 (2/4)	No. 172 3.0 miles Downstream	245 215-275 (2/4)	NDM

TABLE 3-1 (SHEET 3 of 4)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

Edwin I. Hatch Nuclear Plant, Docket Nos. 50-321 and 50-366
Appling 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)	Control Locations Mean (b), Range (Fraction)
Fish (pCi/kg-wet)	Gamma Isotopic 4					
	Mn-54	130	NDM		NDM	NDM
	Fe-59	260	NDM		NDM	NDM
	Co-58	130	NDM		NDM	NDM
	Co-60	130	NDM		NDM	NDM
	Zn-65	260	NDM		NDM	NDM
	Cs-134	130	NDM		NDM	NDM
	Cs-137	150	13.0 11.7-14.2 (2/2)	No. 170 1.5 miles Upstream	13.3 9.9-16.7 (2/2)	13.3 9.9-16.7 (2/2)
Sediment (pCi/kg-dry)	Gamma Isotopic 4					
	Cs-134	150	NDM		NDM	NDM
	Cs-137	180	57.2 37.5-76.8 (2/2)	No. 172 3.0 miles Downstream	57.2 37.5-76.8 (2/2)	30.3 23.7-37.0 (2/2)

TABLE 3-1 (SHEET 4 of 4)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

Edwin I. Hatch Nuclear Plant, Docket Nos. 50-321 and 50-366
Appling County, Georgia

NOTATIONS

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 specified locations that are detectable is placed in parenthesis.

c. No Detectable Measurement(s).

d. Not Applicable.

e. This station is in the outer ring and is one of eighteen "other (h)" stations.

f. If a drinking water pathway were to exist, a MDC of 1 pCi/l would have been used (see Table 4-1 of this report).

g. If a drinking water pathway were to exist, a MDC of 2000 pCi/l would have been used (see Table 4-1 of this report).

h. "Other" stations, identified in the "station type" column of Table 2-2, include community and 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 which was less than the MDD was considered to be statistically indiscernible.

The 2005 results were compared with past results, including those obtained during pre-operation. 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 analyses. 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 plotted as 0's and listed in the tables as NDM.

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-dry)
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 be detectable.

Significant upward trends also followed the Chernobyl incident which began on April 26, 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.

All results were tested for conformance to 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
02/28/05-03/07/05	Air sampling station 107	Heavy particulates on filter.	Controlled burn by Land Department.	Contacted Land Dept. and asked that GPC be notified prior to controlled burns.
1st Quarter 2005	TLD station 104	TLDs were underwater but were dry in holder bags.	TLDs were underwater due to high river water levels.	Ensure the holder bags were sealed and high river levels noted.
1st Quarter 2005	TLD station 115	TLDs were underwater and were wet in holder bags.	TLDs were underwater due to high river water levels.	Ensure the holder bags were sealed and high river levels noted.
04/25/05-05/02/05	Air sampling station 103	Non-representative sample of airborne particulates.	Air sampling pump "locked up" for 106.8 hours.	Exchanged pump motors.
2nd Quarter 2005	TLD station 213	Direct radiation results not available.	TLD destroyed during logging operations.	The TLDs were replaced at the beginning of the quarter.
1st Semi-Annual Period of 2005	Fish Collection	Unable to collect fish during first semi-annual period.	High river levels existed up until next sampling collection period.	Performed fish sampling when water levels permitted during second semi-annual period.
09/06/05-10/03/05	River Water station #172	River water collection volume short by 25%.	Bad battery in autosampler and hole in collection tubing affected sample volume.	Battery replaced and tubing repaired.
3rd Quarter 2005	TLD station 213	TLDs missing at mid-quarter check. Blank 1A looked damaged at end of quarter.	Tree cut down prior to mid-quarter. Rodent chewed Blank 1A.	Put Blanks 1A and 1B in place at mid-quarter. Tested end of quarter results which passed Chauvenet's Criterion.
4th Quarter 2005	TLD station 104	TLDs missing at end of quarter.	TLDs stolen from station.	Replacement TLDs put in place at beginning of next quarter.

4.1 Land Use Census and River Survey

In accordance with ODCM 4.1.2, a land use census was conducted on November 14 and 15, 2005, to determine the locations of the nearest permanent residence and milk animal in each of the 16 compass sectors within a distance of 5 miles, and the locations of all milk animals within a distance of 3 miles. A milk animal is defined as a cow or goat producing milk for human consumption. The locations of beef cattle and of gardens greater than 500 square feet producing broad leaf vegetation were also included in the census. The census results are tabulated in the Table 4.1-1.

Table 4.1-1

LAND USE CENSUS RESULTS

Distance in Miles to Nearest Location in Each Sector

SECTOR	RESIDENCE	MILK ANIMAL	BEEF CATTLE	GARDEN
N	2.1	None	None	3.8
NNE	2.9	None	None	2.9
NE	3.3	None	None	None
ENE	4.2	None	4.1	4.7
E	3.0	None	None	None
ESE	3.8	None	None	None
SE	1.8	None	2.3	3.3
SSE	2.0	None	2.2	2.1
S	1.0	None	2.3	2.3
SSW	1.1	None	2.0	2.7
SW	1.1	None	2.3	1.6
WSW	1.0	None	1.6	4.5
W	1.1	None	2.8	1.3
WNW	1.1	None	None	None
NW	3.6	None	4.6	4.3
NNW	1.8	None	4.2	3.6

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. No change in the controlling receptor was required as a result of the 2005 land use census. The current controlling receptor as described in ODCM Table 3-7 is a child in the WSW Sector at 1.2 miles

ODCM 4.1.2.2.2 requires that whenever the land use census identifies a location which would yield 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). The 2005 land use census did not identify a garden which yielded a calculated dose 20% greater than that for any of the current indicator stations for vegetation. The results of the census were corroborated by inquiries to the county extension agents in the 5 counties in the vicinity of the plant.

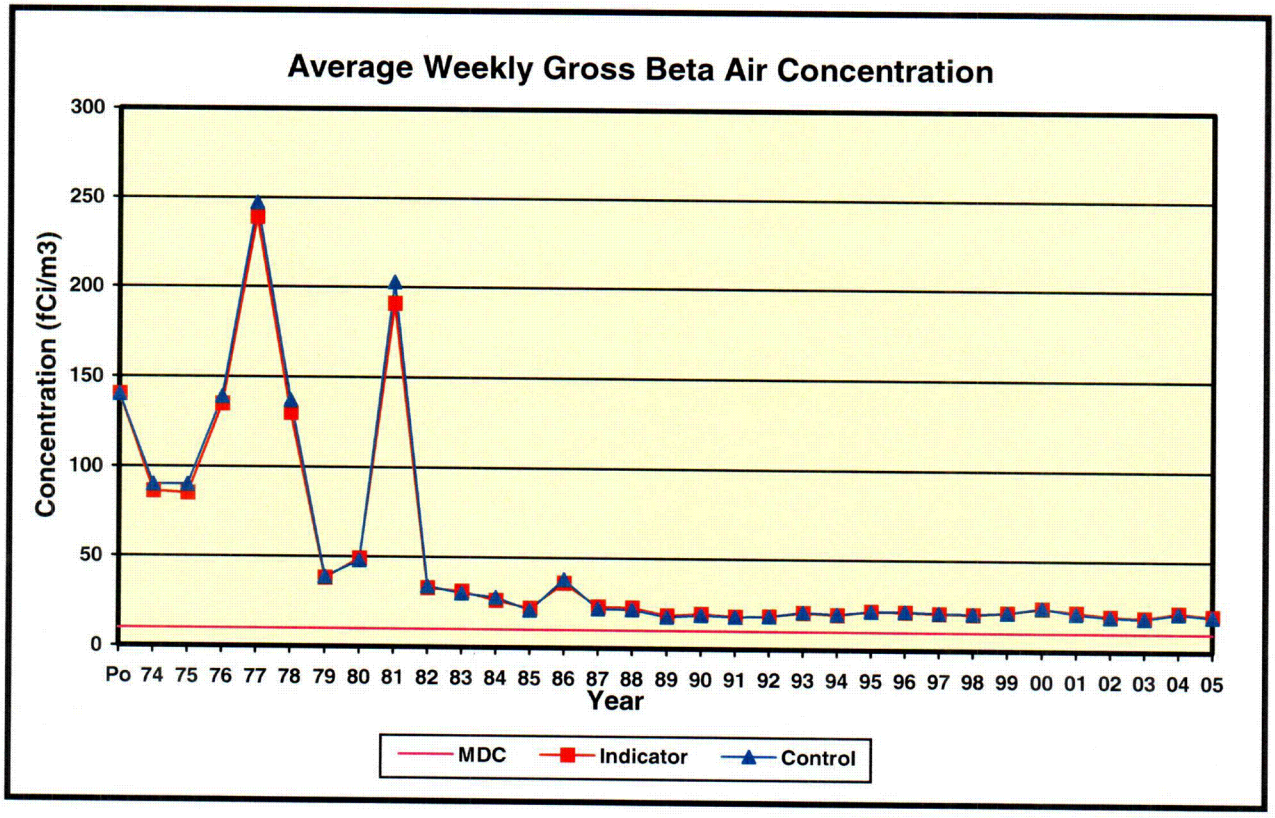
As required by Note f of Table 2-1, the annual survey of the Altamaha River for 50 miles downstream of the plant was conducted on September 19, 2005 to identify any withdrawal of river water for drinking purposes. No sources of withdrawal for drinking water were identified. One source of withdrawal for irrigation purposes was found at a location approximately three and three-quarters miles downstream of the plant discharge. Further investigation revealed that the water was being used for farm crop irrigation. Information obtained from the Georgia Department of Natural Resources on September 22, 2005 indicated that no surface water withdrawal permit for drinking purposes had been issued for this stretch of the Altamaha River between the 2004 survey and the 2005 survey. Should it be determined that river water downstream of the plant is being used for drinking, the sampling and analysis requirements for drinking water found in Table 2-1 would be implemented.

4.2 Airborne

As indicated in Table 2-2 and Figures 2-1 and 2-2, airborne particulates and airborne radioiodine are collected at 4 indicator stations (Nos. 103, 107, 112 and 116) which encircle the plant near the site periphery and at 2 control stations (Nos. 304 and 309) which are located approximately 10 miles from the main stack. At each location, air is continuously drawn through a glass fiber filter and a charcoal canister placed in series to collect airborne particulates and radioiodine. The filters and canisters are collected weekly and analyzed for gross beta and I-131, respectively. A gamma isotopic analysis is performed quarterly on a composite of the filters for each station.

The 2005 annual average weekly gross beta concentration of 19.7 fCi/m^3 for the indicator stations was 0.4 fCi/m^3 greater than that for the control stations (19.3 fCi/m^3). This difference is not statistically discernible, since it is less than the calculated MDD of 1.93 fCi/m^3. Figure 4.2-1 and Table 4.2-1 provide the historical trending of the average weekly gross beta concentrations in air. In general, there is close agreement between the results for the indicator and control stations. This close agreement supports the position that the plant is not contributing significantly to the gross beta concentration in air.

Figure 4.2-1



C03

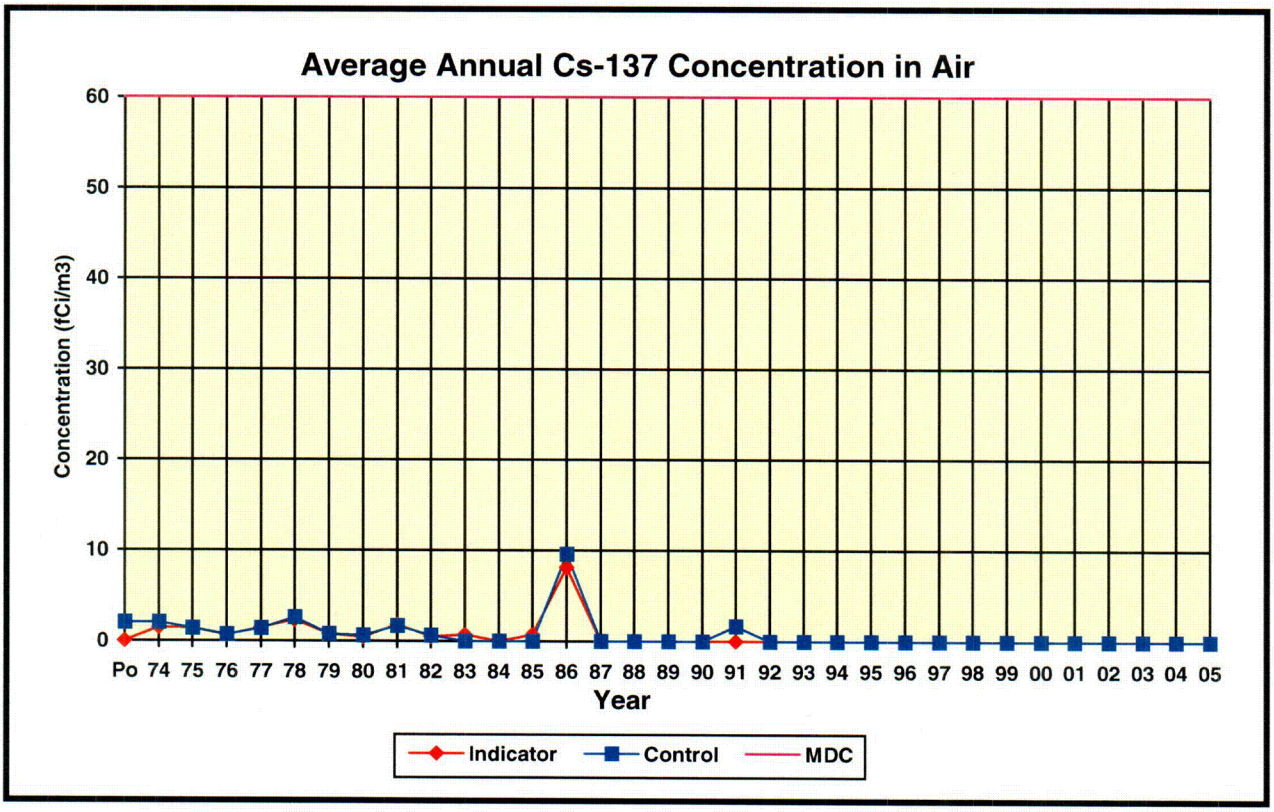
Table 4.2-1

Average Weekly Gross Beta Air Concentration

Year	Indicator (fCi/m3)	Control (fCi/m3)
Pre-op	140	140
1974	87	90
1975	85	90
1976	135	139
1977	239	247
1978	130	137
1979	38	39
1980	49	48
1981	191	203
1982	33	34
1983	31	30
1984	26	28
1985	22	21
1986	36	38
1987	23	22
1988	22.6	21.7
1989	18.4	17.8
1990	19.3	18.7
1991	18.1	18
1992	18.5	18.4
1993	20.4	20.7
1994	19.5	19.7
1995	21.7	21.7
1996	21.3	21.4
1997	20.3	20.7
1998	20.0	20.5
1999	21.3	21.3
2000	23.6	23.9
2001	21.5	21.0
2002	19.3	19.2
2003	18.8	18.2
2004	21.4	21.3
2005	19.7	19.4

During 2005, no man-made radionuclides were detected from the gamma isotopic analysis of the quarterly composites of the particulate air filters. During preoperation and during operation through 1986, a number of fission products and activation products were detected. These were generally attributed to the nuclear weapons tests and to the Chernobyl incident. On only one occasion since 1986, has a man-made radionuclide been detected in a quarterly composite. A small amount of Cs-137 (1.7 fCi/m3) was identified in the first quarter of 1991 at Station 304. The MDC and RL for Cs-137 in air are 60 and 20,000 fCi/m3, respectively. The historical trending of the average annual concentrations of detectable Cs-137 from quarterly air filter composites is provided in Figure 4.2-2 and Table 4.2-2.

Figure 4.2-2



C04

Table 4.2-2

Average Annual Cs-137 Concentration In Air

Year	Indicator (fCi/m3)	Control (fCi/m3)
Pre-op	NDM	2.0
1974	1.5	2.0
1975	1.4	1.4
1976	0.6	0.7
1977	1.5	1.4
1978	2.3	2.6
1979	0.8	0.8
1980	0.4	0.6
1981	1.8	1.7
1982	0.5	0.6
1983	0.7	NDM
1984	NDM	NDM
1985	0.7	NDM
1986	8.1	9.6
1987	NDM	NDM
1988	NDM	NDM
1989	NDM	NDM
1990	NDM	NDM
1991	NDM	1.7
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

No airborne I-131 was detected in the charcoal canisters in 2005. During 1976, 1977, and 1978, positive levels of I-131 were found in nearly all of the samples collected for a period of a few weeks following atmospheric nuclear weapons tests. Some of the concentrations were on the order of 70 fCi/m^3. In 1986, the same phenomenon occurred following the Chernobyl incident. The highest airborne I-131 concentration found to date in an individual charcoal canister was 217 fCi/m^3 in 1977. The MDC and RL for airborne I-131 are 70 fCi/m^3 and 900 fCi/m^3, respectively.

Table 4-3 lists REMP deviations that occurred in 2005. Two deviations involved air sampling. One of these deviations resulted in excluded data and is listed below.

For the period 2/28-3/7 at Station 107, heavy particulates were accumulated on the air filter resulting from a controlled burn by the Land Department. The sample results failed Chauvenet's Criterion and were excluded from the database.

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.

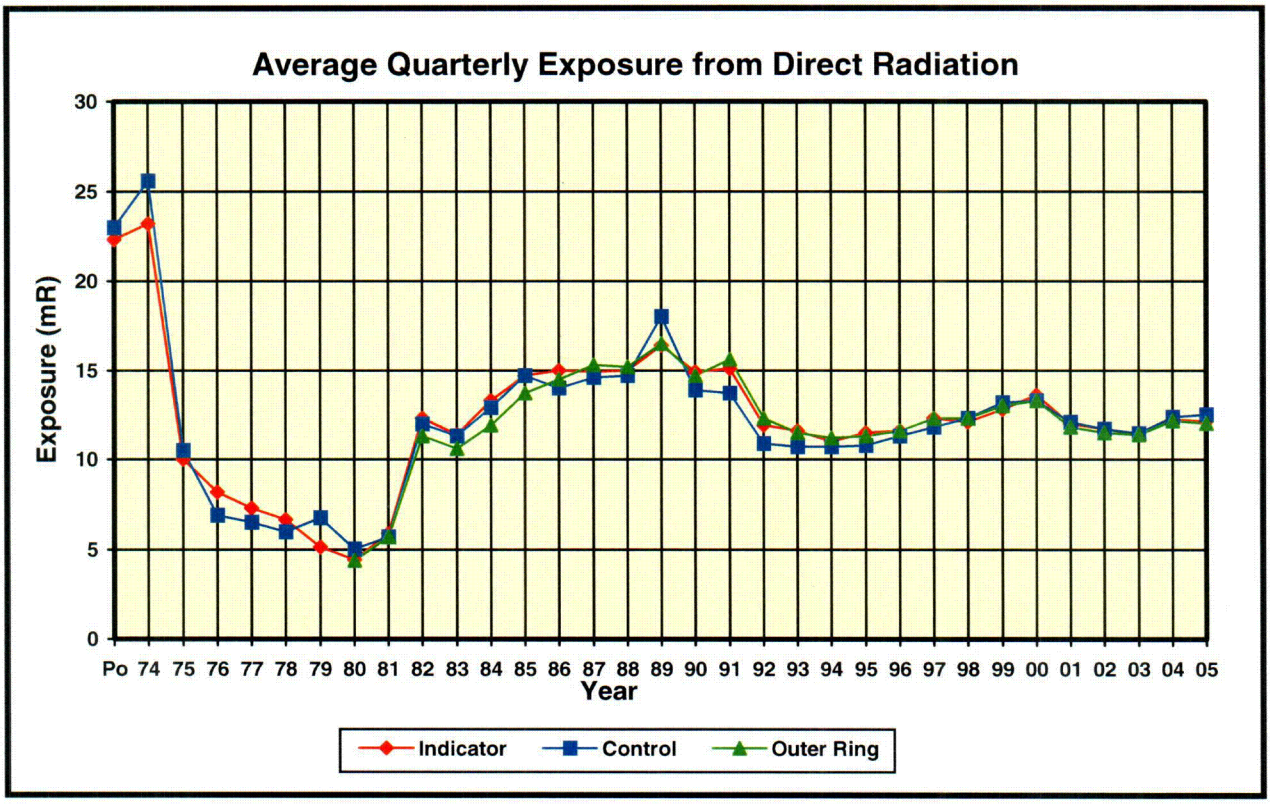
Two TLD stations are established in each of the 16 compass sectors around the plant to form 2 concentric rings, as seen in Figures 2-1 and 2-2. The two ring configuration of stations was established in 1980, in accordance with NRC Branch Technical Position "An Acceptable Radiological Environmental Monitoring Program", Revision 1, 1979. With the exception of the East sector, the inner ring stations (Nos. 101 through 116) are located near the site boundary and the outer ring stations (Nos. 201 through 216) are located at distances of 4 to 5 miles from the plant. The stations in the East sector are a few miles farther out than the other stations in their respective rings due to large swamps making normal access extremely difficult. The 16 stations forming the inner ring are designated as the indicator stations. The 3 control stations (Nos. 304, 309 and 416) are located 10 miles or more from the plant. Stations 064 and 301 monitor special interest areas. Station 064 is located at the onsite roadside park, while Station 301 is located near the Toombs Central School. Station 210, in the outer ring, is located near the Altamaha School (the only other nearby school).

As provided in Table 3-1, the average quarterly exposure measured at the indicator stations (inner ring) during 2005 was 12.1 mR. At the control stations, the average quarterly exposure was 12.5 mR. This difference is not statistically discernible since it is less than the MDD of 0.92 mR.

The quarterly exposures acquired at the outer ring stations during 2005 ranged from 9.2 to 17.3 mR, with an average of 12.0 mR. The average for the outer ring stations was 0.5 mR less than the average for the control stations. Since the results for the outer ring stations and the control stations differ by less than the MDD of 1.29 mR, there is no discernible difference between outer ring and control station results for 2005.

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



C05

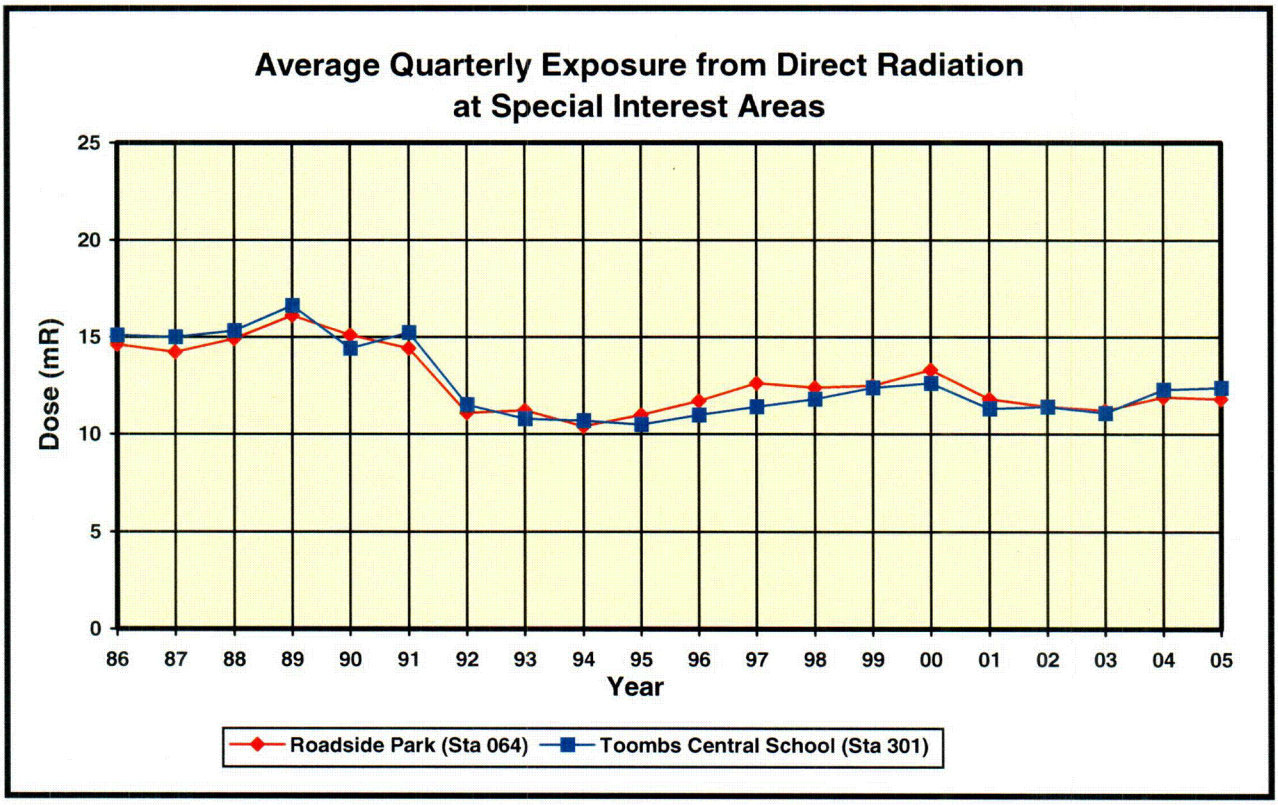
Table 4.3-1

Average Quarterly Exposure from Direct Radiation

Year	Indicator (mR)	Control (mR)	Outer Ring (mR)
Pre-op	22.3	23	NA
1974	23.2	25.6	NA
1975	10.0	10.5	NA
1976	8.18	6.9	NA
1977	7.31	6.52	NA
1978	6.67	6.01	NA
1979	5.16	6.77	NA
1980	4.44	5.04	4.42
1981	5.9	5.7	5.7
1982	12.3	12	11.3
1983	11.4	11.3	10.6
1984	13.3	12.9	11.9
1985	14.7	14.7	13.7
1986	15	14	14.5
1987	14.9	14.6	15.3
1988	15.0	14.7	15.2
1989	16.4	18.0	16.5
1990	14.9	13.9	14.7
1991	15.1	13.7	15.6
1992	11.9	10.9	12.3
1993	11.6	10.7	11.5
1994	11	10.7	11.2
1995	11.5	10.8	11.3
1996	11.6	11.3	11.6
1997	12.3	11.8	12.3
1998	12.1	12.3	12.3
1999	12.8	13.2	13.0
2000	13.6	13.3	13.3
2001	12.0	12.1	11.8
2002	11.7	11.7	11.5
2003	11.4	11.4	11.4
2004	12.2	12.4	12.2
2005	12.1	12.5	12.0

The historical trending of the average quarterly exposures at the special interest areas for the past 19 years is 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



C06

Table 4.3-2

Average Quarterly Exposure from Direct Radiation at Special Interest Areas

Period	Station 064 (mR)	Station 301 (mR)
1986	14.6	15.1
1987	14.2	15.0
1988	14.9	15.3
1989	16.1	16.6
1990	15.1	14.4
1991	14.4	15.2
1992	11.1	11.5
1993	11.2	10.8
1994	10.4	10.7
1995	11.0	10.5
1996	11.7	11.0
1997	12.6	11.4
1998	12.4	11.8
1999	12.5	12.4
2000	13.3	12.6
2001	11.8	11.3
2002	11.4	11.4
2003	11.2	11.1
2004	11.9	12.3
2005	11.8	12.4

As seen in Table 4-3, there were five deviations involving direct radiation measurements in 2005. Three of these deviations led to the loss of direct radiation data. The TLDs at Station 104 were underwater (but still dry in the holder bags) at the first quarter change out. At Station 213, the TLDs were missing at the end of the second quarter and found to be destroyed during logging operations. The TLDs at Station 104 were missing at the end of the fourth quarter. The results from Station 104 at the end of the first quarter failed Chauvenet's Criterion and were excluded from the direct radiation database. The other two stations were excluded due to missing data.

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 from the data set since the high standard deviation is interpreted as an indication of unacceptable variation in TLD response. In 2005, the following TLD results were excluded from the data set because their standard deviations were greater than 1.4:

First Quarter	None
Second Quarter	103A and 211A
Third Quarter	None
Fourth Quarter	212B

For these stations, the reading of the companion badge at each location was used to determine the quarterly exposure.

During 2005, no direct radiation station experienced both badges having standard deviations above the self-imposed limit of 1.4. For those instances in which one badge at a station exhibited a standard deviation greater than 1.4, the other badge of the two-badge set was available to give a valid reading for the particular location.

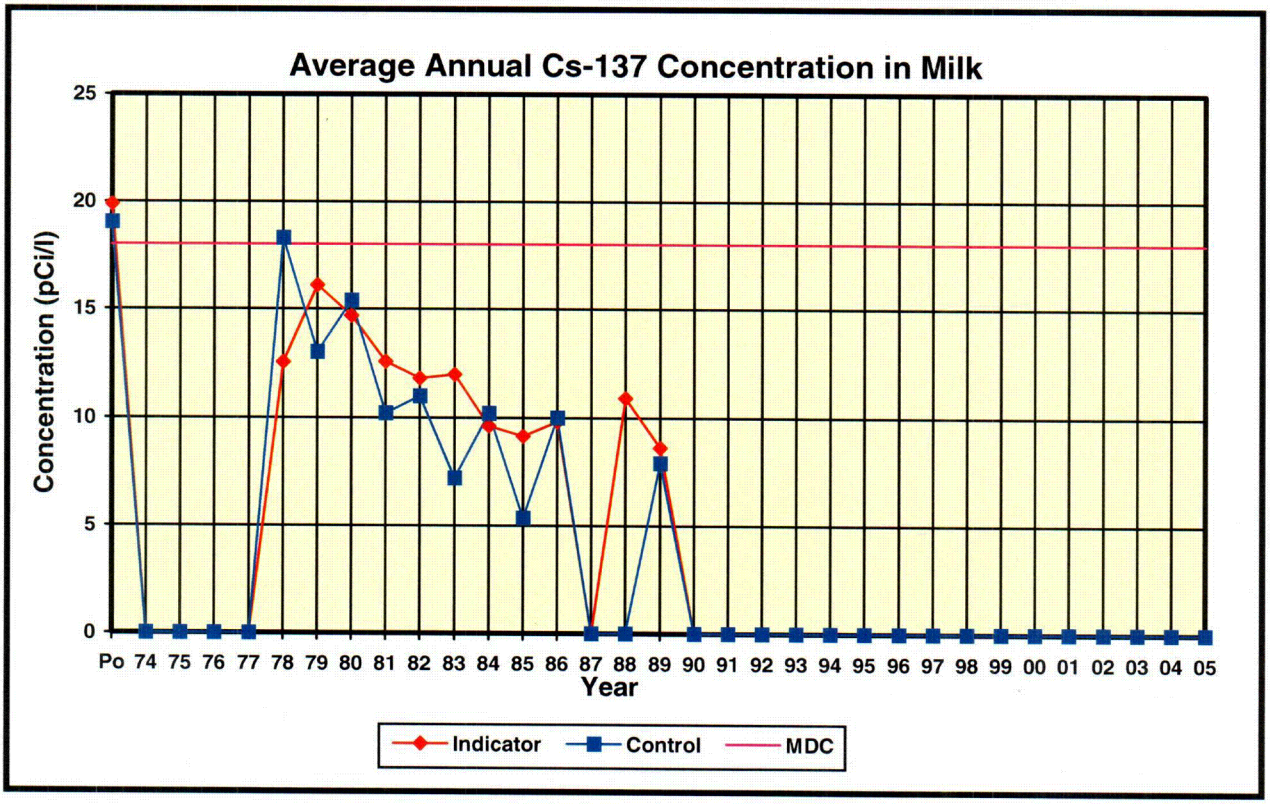
4.4 Milk

Milk samples are obtained biweekly from Station 304 (the state prison dairy) which is a control station located more than 10 miles from the plant. Gamma isotopic and I-131 analyses are performed on each sample as specified in Tables 2-1 and 2-2. Since 1989, efforts to locate a reliable milk sample source within 5 miles of the plant have been unsuccessful.

During 2005, as in the previous 13 years, no man-made radionuclides were detected from the gamma isotopic analysis of the milk samples. Except for 1987, Cs-137 was found in some of the samples each year from 1978 (when this analysis became a requirement) through 1989. No other man-made radionuclides have been detected by this analysis.

The MDC and RL for Cs-137 in milk are 18 and 70 pCi/l, respectively. The historical trending of the average annual detectable Cs-137 concentration in milk is provided in Figure 4.4-1 and Table 4.4-1.

Figure 4.4-1



C07

Table 4.4-1

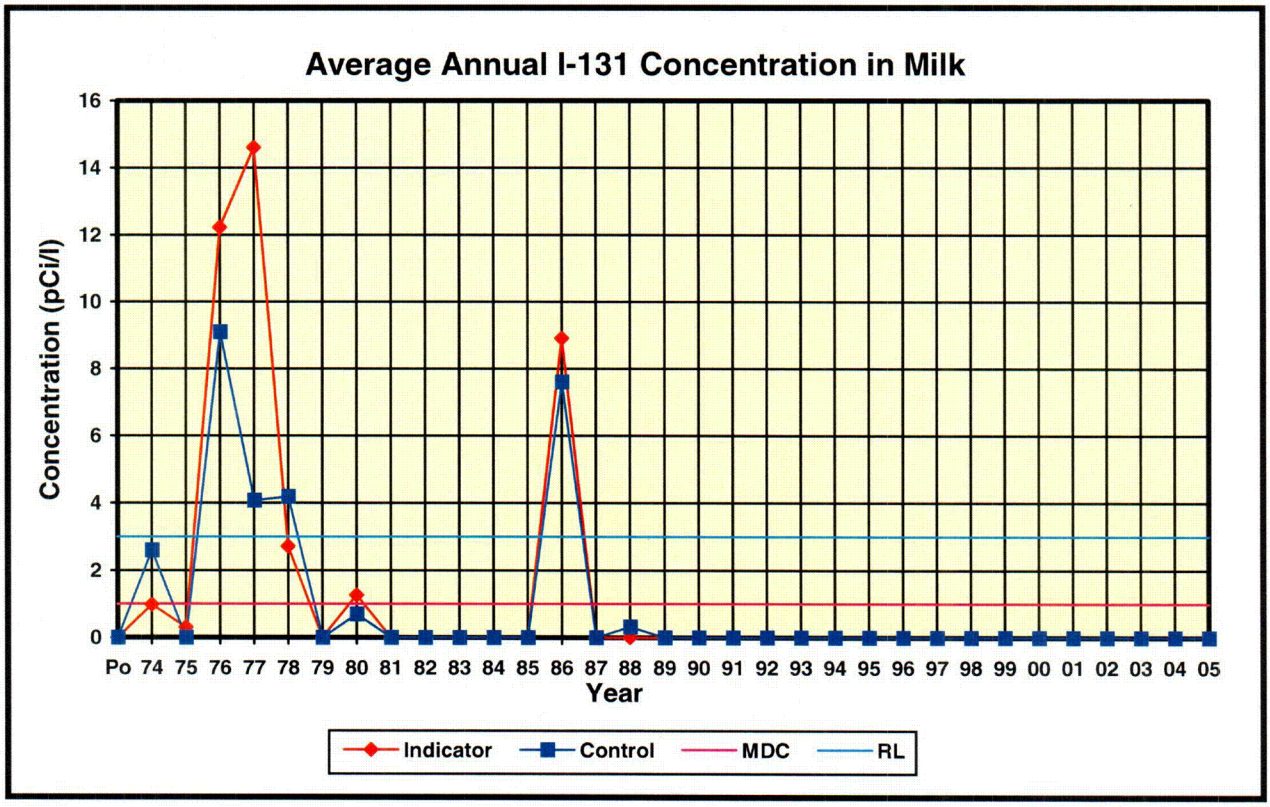
Average Annual Cs-137 Concentration in Milk

Year	Indicator (pCi/l)	Control (pCi/l)
Pre-op	19.9	19.4
1974	NDM	NDM
1975	NDM	NDM
1976	NDM	NDM
1977	NDM	NDM
1978	12.1	18.3
1979	16.1	13
1980	14.7	15.4
1981	12.57	10.2
1982	11.8	11
1983	12	7.2
1984	9.6	10.2
1985	9.14	5.35
1986	9.8	10
1987	NDM	NDM
1988	10.9	NDM
1989	8.6	7.9
1990	NDM	NDM
1991	NDM	NDM
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

During 2005 as in the previous 15 years, I-131 was not detected in any of the milk samples. During preoperation, all readings were less than 2 pCi/l which was the allowed MDC at that time. Figure 4.4-2 and Table 4.4-2 provide the historical trending of the average annual detectable concentration of I-131 in milk. In 1988, a single reading of 0.32 pCi/l, which was believed to have resulted from a procedural deficiency, was reported. The MDC and RL for I-131 in milk are 1 and 3 pCi/l, respectively.

All the detectable results for Cs-137 and I-131 are attributed to fallout from the nuclear weapons tests and the Chernobyl incident.

Figure 4.4-2



C08

Table 4.4-2

Average Annual I-131 Concentration in Milk

Year	Indicator (pCi/l)	Control (pCi/l)
Pre-op	NDM	NDM
1974	0.98	2.6
1975	0.3	NDM
1976	12.23	9.1
1977	14.61	4.08
1978	2.72	4.18
1979	NDM	NDM
1980	1.26	0.69
1981	NDM	NDM
1982	NDM	NDM
1983	NDM	NDM
1984	NDM	NDM
1985	NDM	NDM
1986	8.9	7.6
1987	NDM	NDM
1988	NDM	0.32
1989	NDM	NDM
1990	NDM	NDM
1991	NDM	NDM
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

4.5 Vegetation

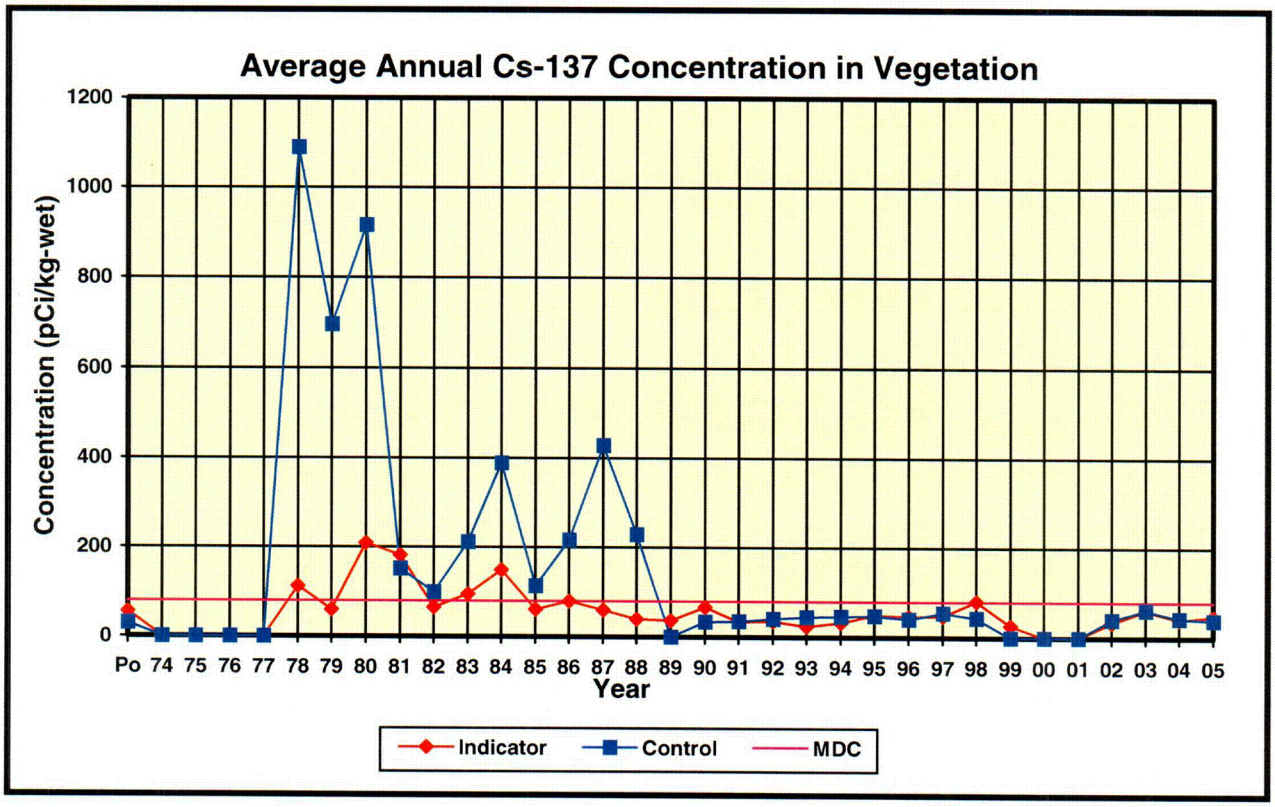
In accordance with Tables 2-1 and 2-2, grass samples are collected monthly from two indicator stations near the site boundary (Nos. 106 and 112) and at one control station located about 21 miles from the plant (No. 416). Gamma isotopic analyses are performed on each sample. Gamma isotopic analysis on vegetation samples began in 1978 when the analysis became a TS requirement.

The results presented in Table 3-1 show that Cs-137 was the only man-made radionuclide detected in vegetation samples during 2005. Cs-137 was detected in twelve samples collected at the indicator stations at an average value of 47.7 pCi/kg-wet; three samples collected at the control station had detectable Cs-137 at 39.8 pCi/kg-wet. The difference of 7.9 pCi/kg/wet between the control and the indicator averages is not statistically discernible since it is less than the MDD of 45.2 pCi/kg-wet.

Since 1986, Cs-137 has been the only man-made radionuclide found in vegetation samples. The MDC and RL for Cs-137 in vegetation samples are 80 pCi/kg-wet and 2000 pCi/kg-wet, respectively. The occasional presence of Cs-137 in vegetation samples is attributed primarily to fallout from nuclear weapons tests and the Chernobyl incident.

Figure 4.5-1 and Table 4.5-1 provide the historical trending of the average annual detectable Cs-137 concentration found in vegetation. Since 1978, the Cs-137 concentration has been on a decline, and since about 1989, generally occurring below the required MDC and very close to detectable levels.

Figure 4.5-1



C09

Table 4.5-1

Average Annual Cs-137 Concentration in Vegetation

Year	Indicator (pCi/kg-wet)	Control (pCi/kg-wet)
Pre-op	55	30
1974	NDM	NDM
1975	NDM	NDM
1976	NDM	NDM
1977	NDM	NDM
1978	112	1089
1979	59	695
1980	208	916
1981	182	152
1982	65	99
1983	95	211
1984	149	388
1985	60.9	113.3
1986	80	215
1987	60	428
1988	40.1	228.8
1989	37	NDM
1990	66.7	34.5
1991	34.1	36.1
1992	35.2	41.3
1993	24.7	45.8
1994	32.2	46.6
1995	49.8	47.6
1996	47.2	41.1
1997	48.4	54.9
1998	81.4	44.1
1999	26.9	NDM
2000	NDM	NDM
2001	NDM	NDM
2002	33.7	41.1
2003	61.0	62.8
2004	41.6	43.5
2005	47.7	39.8

4.6 River Water

Surface water from the Altamaha River is obtained at an upstream location (Station 170) and at a downstream location (Station 172) using automatic samplers. Small quantities are drawn at intervals not exceeding a few hours. The samples drawn are collected monthly and quarterly composites are produced from the monthly collections.

As specified in Table 2-1, a gamma isotopic analysis is conducted on each monthly sample. No man-made radionuclides were detected during 2005. The only man-made radionuclides previously detected are presented in the table below.

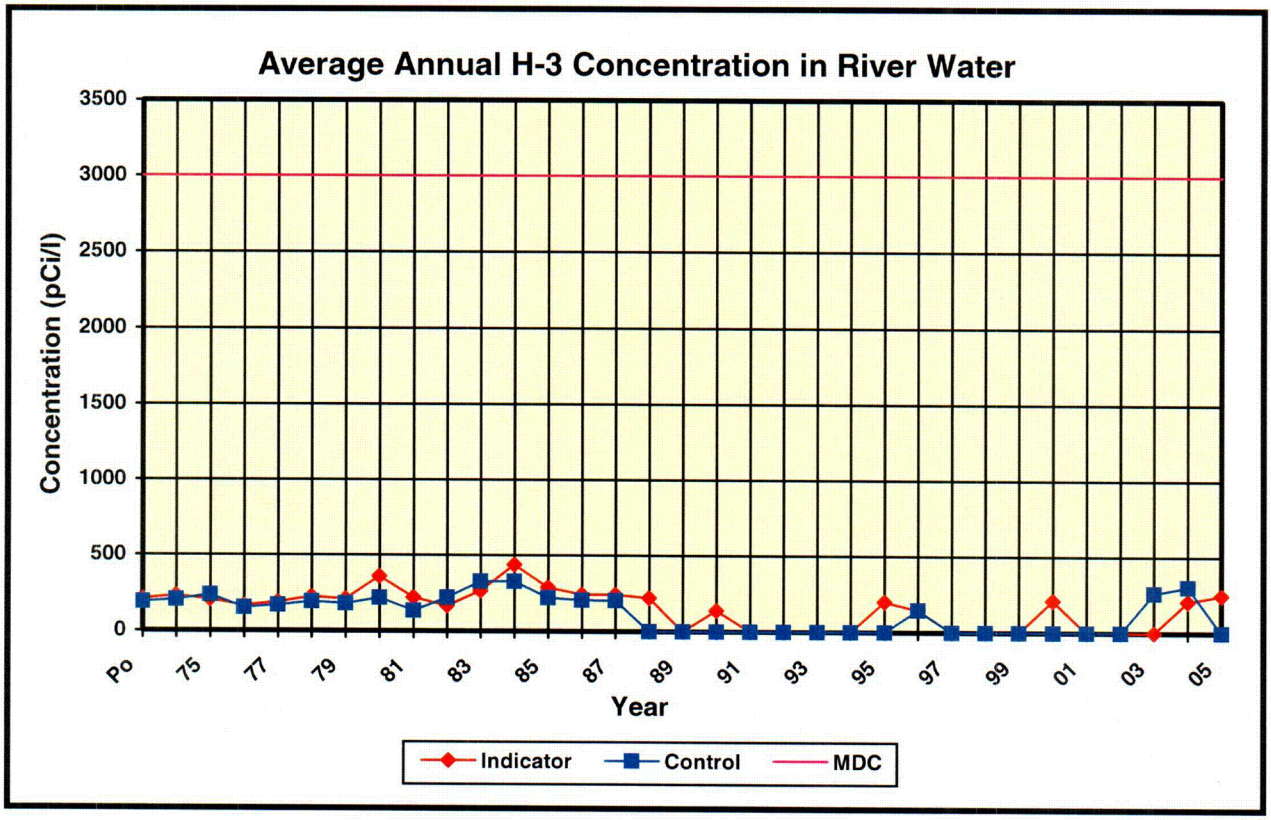
Year	Quarter	Station	Radionuclide	Level (pCi/l)
1975	4th	172	Ce-141	78.2
1986	2nd	170	La-140	18.0
1986	2nd	172	Cs-137	12.0
1988	2nd	170	Cs-137	6.8

A tritium analysis is performed on the quarterly composite. Prior to 1986, positive results were usually found in each quarterly composite at levels generally ranging from 200 and 400 pCi/l which is very close to background environmental levels (approximately 100-300 pCi/l). Subsequently, the number of positive results have diminished.

In 2005, tritium was not detected in any of the four quarterly samples at the upstream (control) location. Tritium was detected in two of the four quarterly samples at the downstream (indicator) location. The average of the two indicator samples was 245 pCi/l (the range was 215-275 pCi/l). This could be attributed to plant effluents since tritium was not detected at the control station in 2005. However, these low levels are very close to background environmental levels. The MDC and RL for tritium in river water are 3000 and 30,000 pCi/l, respectively. Figure 4.6-1 and Table 4.6-1 provide the historical trending of the annual average detectable tritium concentration in river water.

The annual 50 mile downstream survey of the Altamaha River to determine if river water is being withdrawn for drinking purposes is discussed in Section 4.1.

Figure 4.6-1



C10

Table 4.6-1

Average Annual H-3 Concentration in River Water

Year	Indicator (pCi/l)	Control (pCi/l)
Pre-op	210	191
1974	230	205
1975	205	238
1976	165	153
1977	189	170
1978	224	193
1979	210	180
1980	358	218
1981	220	135
1982	165	220
1983	265	328
1984	437	327
1985	288	220
1986	242	206
1987	241	204
1988	220	NDM
1989	NDM	NDM
1990	139	NDM
1991	NDM	NDM
1992	NDM	NDM
1993	NDM	NDM
1994	NDM	NDM
1995	200	NDM
1996	144	147
1997	NDM	NDM
1998	NDM	NDM
1999	NDM	NDM
2000	209	NDM
2001	NDM	NDM
2002	NDM	NDM
2003	NDM	261
2004	206	302
2005	245	NDM

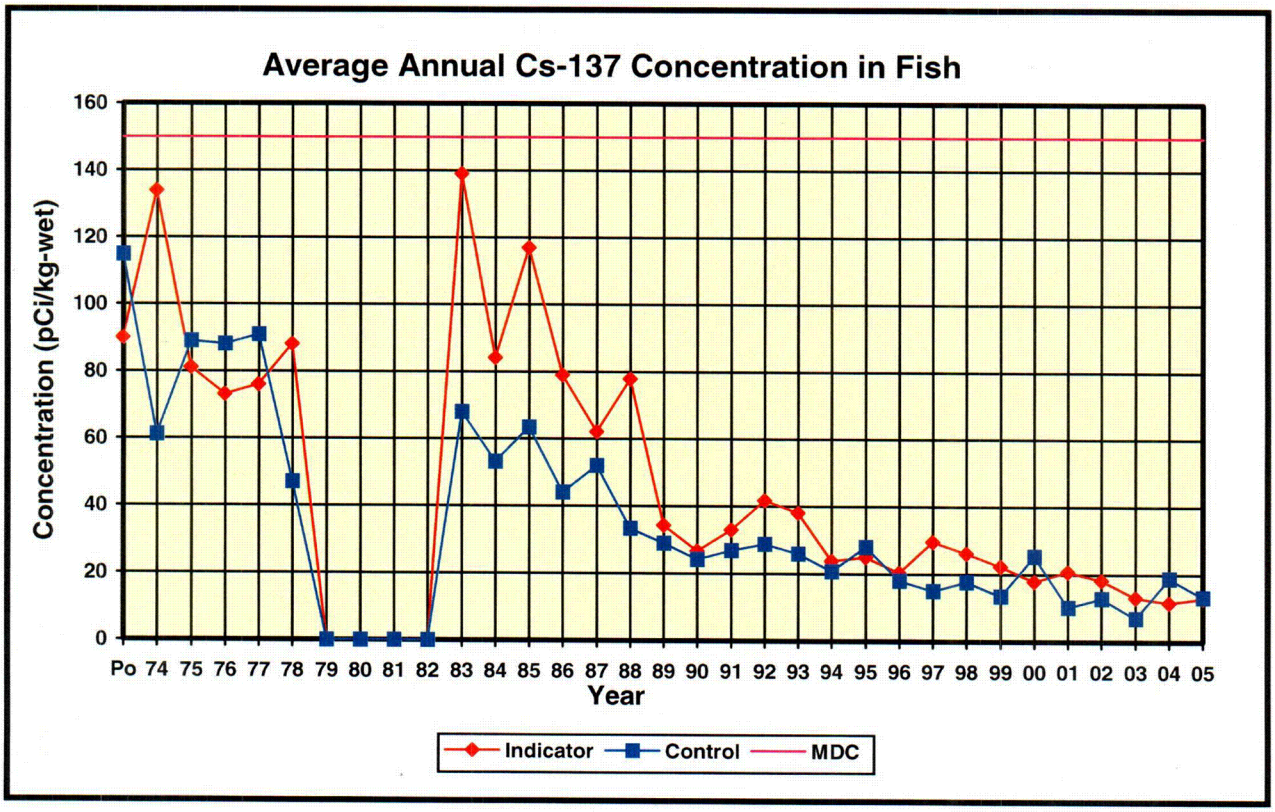
4.7 Fish

Gamma isotopic analyses were performed on the edible portion of the fish samples collected at the river stations on November 03, 2005. The control station (No. 170) is located upstream of the plant while the indicator station (No. 172) is located downstream. Fish are usually collected in the spring as well. However, the river levels were too high to support fish sampling during the first semi-annual period of 2005.

As shown in Table 3-1, Cs-137 was the only man-made radionuclide detected in fish during 2005. The average concentration of 13.0 pCi/kg-wet at the indicator station was 0.3 pCi/kg-wet less than the average concentration found at the control station (13.3 pCi/kg-wet). This difference is not statistically discernible since it is less than the calculated MDD of 25.1 pCi/kg-wet. Cs-137 in fish samples is attributed primarily to weapons testing and the Chernobyl incident. The MDC and RL for Cs-137 in fish are 150 and 2000 pCi/kg-wet, respectively.

The historical trending of the average annual detectable Cs-137 concentration in fish is provided in Figure 4.7-1 and Table 4.7-1. Figure 4.7-1 indicates, in general, a decline in the Cs-137 levels after 1983. (Note: From 1979 through 1982, clams were collected rather than fish.)

Figure 4.7-1



C11

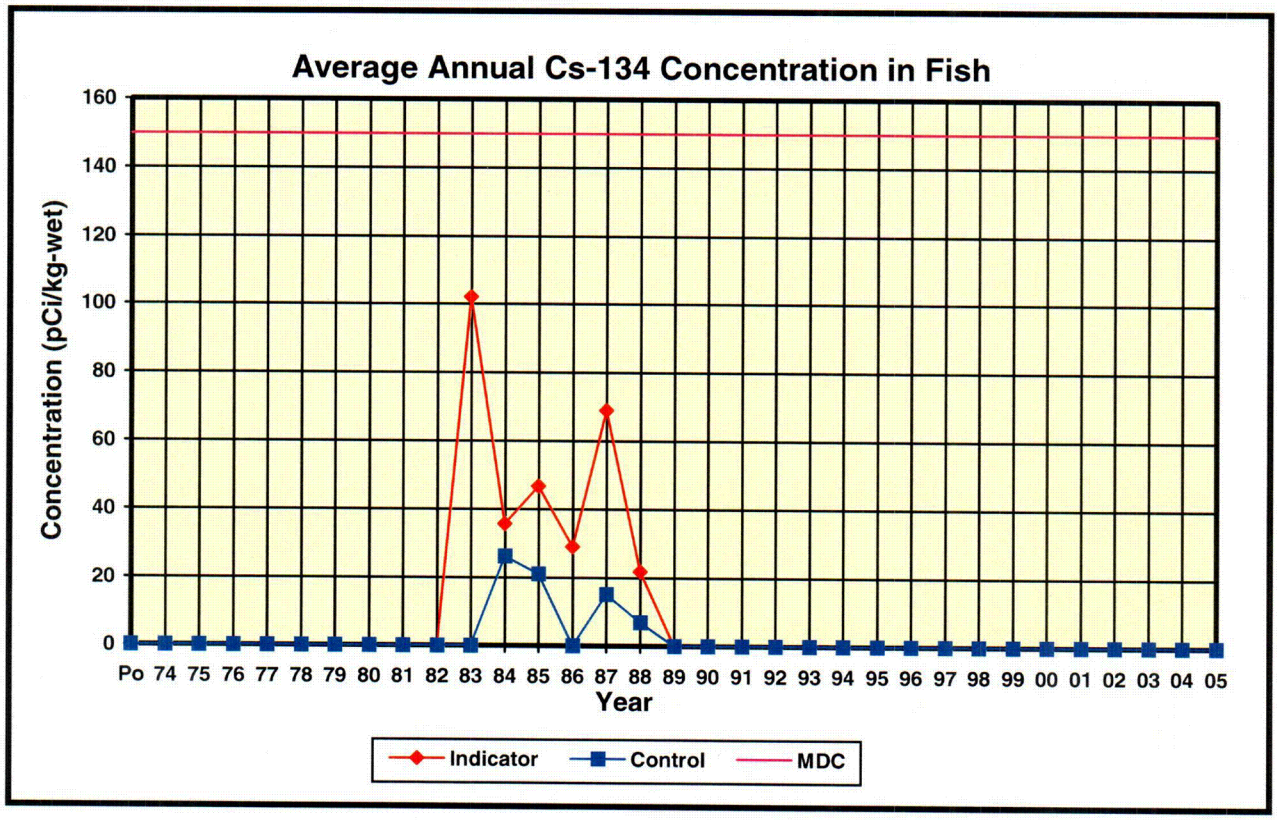
Table 4.7-1

Average Annual Cs-137 Concentration in Fish

Year	Indicator (pCi/kg-wet)	Control (pCi/kg-wet)
Pre-op	90	115
1974	134	61
1975	80.6	89.4
1976	73	88
1977	76	91
1978	88	47
1979	NDM	NDM
1980	NDM	NDM
1981	NDM	NDM
1982	NDM	NDM
1983	138.6	67.5
1984	84	53
1985	117	63.3
1986	79	44
1987	62	52
1988	77.8	33.3
1989	34.3	28.9
1990	26.7	24.2
1991	32.9	26.9
1992	41.6	28.8
1993	38.0	25.9
1994	23.8	20.7
1995	25.0	27.9
1996	20.4	18.0
1997	29.4	15.1
1998	26.1	17.7
1999	22.3	13.5
2000	17.9	25.3
2001	20.8	10.2
2002	18.2	13.0
2003	13.1	7.1
2004	11.6	18.8
2005	13.0	13.3

In the past, the only other man-made radionuclides detected in fish samples were Co-60 and Cs-134. During preoperation, Co-60 was detected in one fish sample at a very low concentration. During the period of 1983 through 1988, Cs-134 was found in about half of the samples at concentrations of the same order of magnitude as those found for Cs-137. The Co-60 and Cs-134 levels found in these samples are attributed to the nuclear weapons tests and the Chernobyl incident. Figure 4.7-2 and Table 4.7-2 show the historical trending of the annual average detectable concentration of Cs-134 in fish.

Figure 4.7-2



C12

Table 4.7-2

Average Annual Cs-134 Concentration in Fish

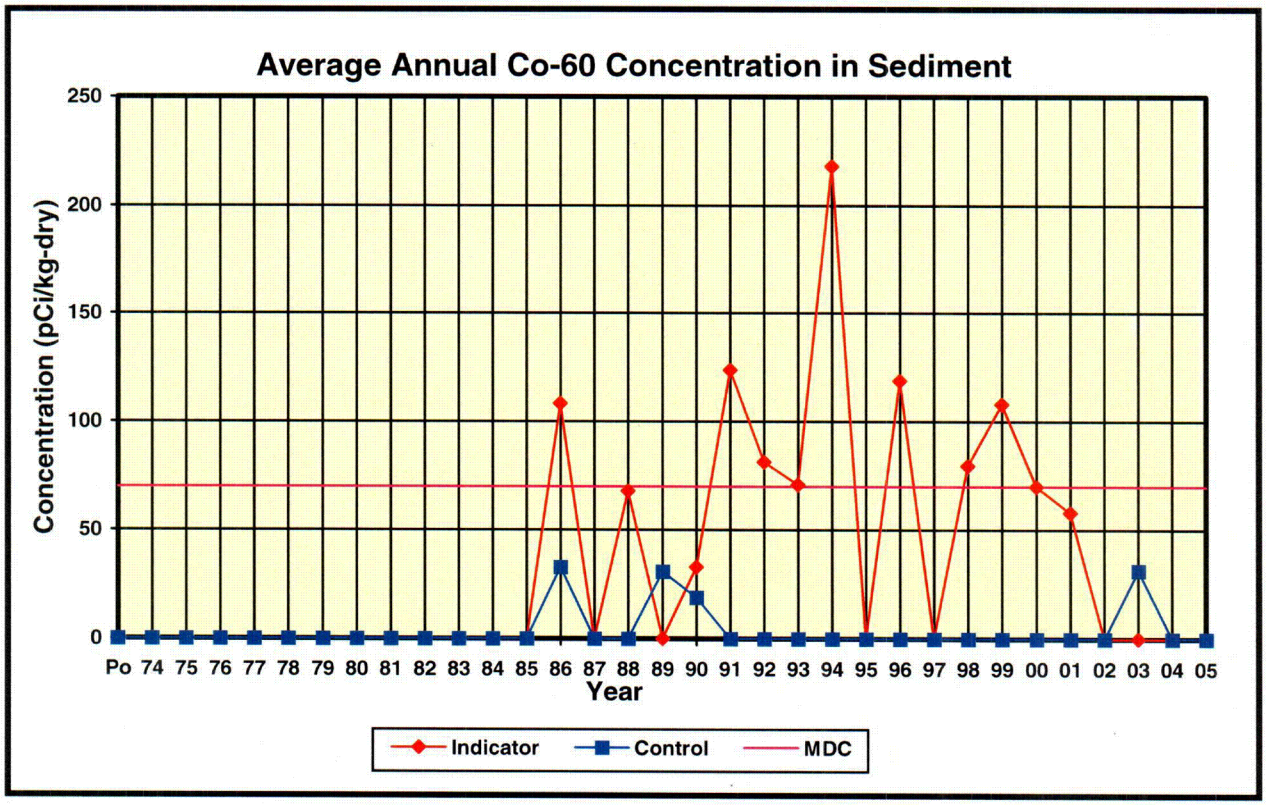
Year	Indicator (pCi/kg-wet)	Control (pCi/kg-wet)
Pre-op	NDM	NDM
1974	NDM	NDM
1975	NDM	NDM
1976	NDM	NDM
1977	NDM	NDM
1978	NDM	NDM
1979	NDM	NDM
1980	NDM	NDM
1981	NDM	NDM
1982	NDM	NDM
1983	101.8	NDM
1984	35.8	26.3
1985	46.7	21.1
1986	29	NDM
1987	69	15
1988	21.7	6.9
1989	NDM	NDM
1990	NDM	NDM
1991	NDM	NDM
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

4.8 Sediment

Sediment was collected along the shoreline of the Altamaha River on August 1 and November 7, 2005, at the upstream control station (No. 170) and the downstream indicator station (No. 172). A gamma isotopic analysis was performed on each sample.

Co-60 was not found in sediment samples in 2005. With the exception of six years, Co-60 has been found at either the indicator or the control station every year since 1986. There is no RL or MDC assigned to Co-60 in sediment in ODCM Tables 4-2 and 4-3 (Tables 4-2 and 4-1 of this report). The MDC assigned by the EL for Co-60 in sediment is 70 pCi/kg-dry. The historical trending of the average annual detectable Co-60 concentration in sediment is provided in Figure 4.8-1 and Table 4.8-1.

Figure 4.8-1



e13

Table 4.8-1

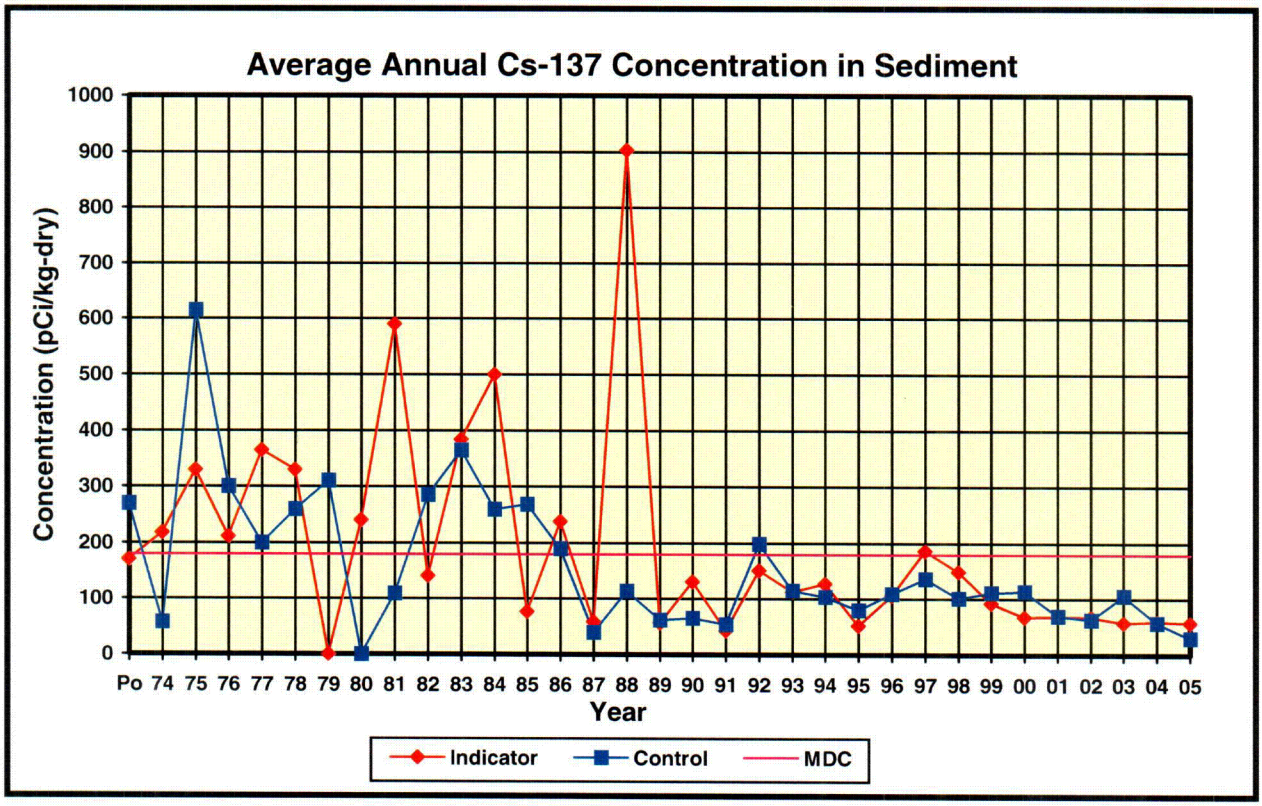
Average Annual Co-60 Concentration in Sediment

Year	Indicator (pCi/kg-dry)	Control (pCi/kg-dry)
Pre-op	NDM	NDM
1974	NDM	NDM
1975	NDM	NDM
1976	NDM	NDM
1977	NDM	NDM
1978	NDM	NDM
1979	NDM	NDM
1980	NDM	NDM
1981	NDM	NDM
1982	NDM	NDM
1983	NDM	NDM
1984	NDM	NDM
1985	NDM	NDM
1986	108	33
1987	NDM	NDM
1988	67.8	NDM
1989	NDM	31
1990	33	19
1991	123.6	NDM
1992	81.4	NDM
1993	70.7	NDM
1994	218	NDM
1995	NDM	NDM
1996	118.5	NDM
1997	NDM	NDM
1998	79.4	NDM
1999	107.7	NDM
2000	70.0	NDM
2001	58.1	NDM
2002	NDM	NDM
2003	NDM	31.5
2004	NDM	NDM
2005	NDM	NDM

Co-60 was not detected in sediment samples near the plant until 1986, the year of the Chernobyl incident. However, because Co-60 has been detected in indicator station samples more often than in control station samples in recent years, some contribution from plant effluents cannot be ruled out.

In 2005, Cs-137 was detected in both indicator and control station sediment samples. It has been found in over 95% of all of the sediment samples collected back through preoperation, and is generally attributed to the atmospheric nuclear weapons tests or to the Chernobyl incident. As shown in Table 3-1, the average at the indicator station was 57.2 pCi/kg-dry and at the control station the average was 30.3 pCi/kg-dry. However, the difference (26.9 pCi/kg-dry) between the stations is not statistically discernible since it is less than the MDD of 144 pCi/kg-dry. The MDC for Cs-137 in sediment is 180 pCi/kg-dry. The historical trending of the average annual detectable Cs-137 concentration in sediment is provided in Figure 4.8-2 and Table 4.8-2.

Figure 4.8-2



C14

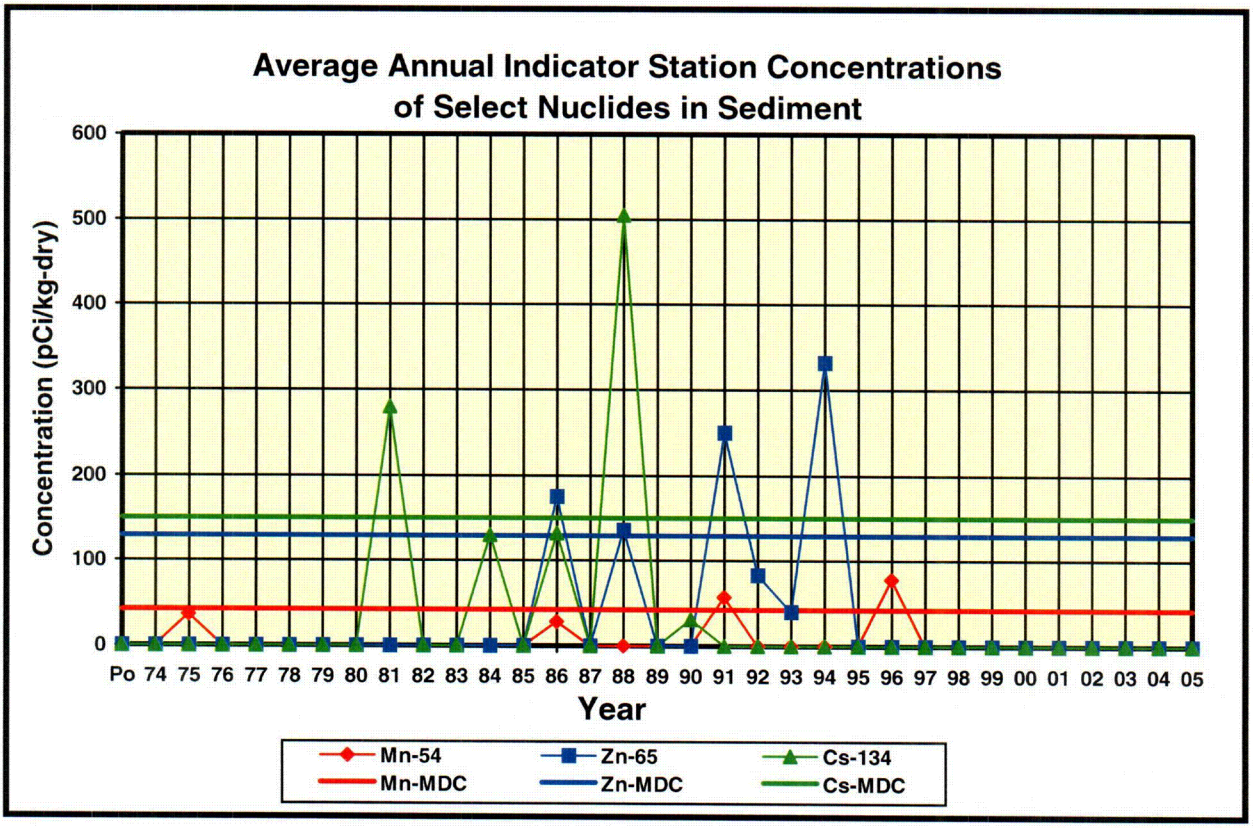
Table 4.8-2

Average Annual Cs-137 Concentration in Sediment

Year	Indicator (pCi/kg-dry)	Control (pCi/kg-dry)
Pre-op	170	270
1974	218	57
1975	330	615
1976	211	300
1977	364	200
1978	330	260
1979	NDM	310
1980	240	NDM
1981	590	110
1982	141	285
1983	384	365
1984	500	260
1985	76.5	269
1986	238	190
1987	59	39
1988	903	114
1989	56	62
1990	130.5	66
1991	43.1	54.5
1992	151	198.5
1993	113	115
1994	127	104
1995	52.3	80.6
1996	106	110
1997	186	137
1998	148.5	101.4
1999	92	111.8
2000	68.1	114.5
2001	68.7	69.6
2002	68.1	62.8
2003	57.3	106
2004	59.5	57.1
2005	57.2	30.3

Other man-made nuclides, besides Co-60 and Cs-137, were occasionally found in past years. Their presence was generally attributed to the nuclear weapons tests or to the Chernobyl incident, although plant releases were not ruled out. Mn-54, Co-58, and Zn-65, which have relatively short half-lives, are most likely a result of plant releases and have been plotted in Figure 4.8-3 along with their MDCs. All the man-made nuclides detected in sediment except for Co-60 and Cs-137 have been listed in Table 4.8-3. The Cs-134 MDC (150 pCi/kg-dry) is defined in ODCM Table 4-3 (Table 4-1 of this report). The MDCs for Mn-54 (42 pCi/kg-dry) and Zn-65 (129 pCi/kg-dry) were determined by the EL since no values are provided in ODCM Table 4-3.

Figure 4.8-3



C15

Table 4.8-3

Sediment Nuclide Concentrations Other Than Co-60 & Cs-137

Nuclide	YEAR	Indicator (pCi/kg-dry)	Control (pCi/kg-dry)
Ce-141	1976	340	254
	1977	141	
Ce-144	Preop		720
	1974	363	
	1975	342	389
	1978	700	
	1981	1290	
Co-58	1994	22.2	
Cs-134	Preop		40
	1981	280	
	1984	130	40
	1986	132	
	1988	505	
	1990	31	
Mn-54	1975	36.1	
	1986	28	26
	1991	57.2	
	1996	77.7	
Ru-103	1974	81	
	1976	158	
	1977	195	
	1981	220	
Zn-65	1986	175	
	1988	136	
	1991	250.5	
	1992	83	
	1993	39.9	
	1994	332	
Zr-95	Preop		180
	1974	138	
	1976	427	170
	1977	349	294
	1978	220	230
	1981	860	280

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.

In 2005, the laboratory analyzed 9 samples for 46 parameters and completed a gamma analysis investigation of Fe-59 in water. The 2005 analyses included tritium, gross beta, Fe-55, Sr-89/90 and gamma emitting radio-nuclides in different matrices. Two analyses were outside the control limit for precision. The precision deviations were for the determination of gross alpha in water and Sr-90 in an air filter.

The gross alpha in water was analyzed in triplicate with an average value reported. The high range may be attributed to one of the samples not dispersing evenly in the planchet causing alpha absorption. The second quarter alpha sample was in control so no further investigation will be performed. The second quarter air filter sample analyzed for Sr-90 had a high precision value. The low activity in the sample produced small detector counts, thus causing the elevated error. No further investigation will be performed.

The 2004 Fe-59 analysis in water investigation was completed. The efficiencies used in determining the activity were obtained from a calibration curve. The curve was determined to be lower at higher energies due to summing effects from the calibration nuclides. A curve will be produced using a standard containing nuclides without summing gamma energies. The difference in efficiencies of the curves will be applied to the analysis to compensate for the summing losses. This is a known bias for gamma spectroscopy measurements and does not significantly effect radiological environmental monitoring measurements.

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	09/15/05	75.00	71.80	2.90	0.80	5.60	0.77

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	09/15/05	161.80	163.00	5.42	1.82	4.69	-0.16
Co-58	09/15/05	46.30	44.50	4.79	0.49	12.39	0.31
Co-60	09/15/05	113.20	117.00	1.06	1.30	3.80	-0.88
Cr-51	09/15/05	260.80	237.00	6.53	2.63	8.14	1.12
Cs-134	09/15/05	80.00	85.70	3.86	0.95	6.27	-1.14
Cs-137	09/15/05	145.60	137.00	8.07	1.52	6.67	0.89
Fe-59	09/15/05	53.40	42.70	3.91	0.49	11.03	1.82
Mn-54	09/15/05	70.40	64.50	1.22	0.72	5.11	1.65
Zn-65	09/15/05	105.10	86.50	5.51	0.96	7.88	2.24

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	06/09/05	97.60	92.40	12.37	1.03	7.95	0.67
Co-58	06/09/05	NA	NA	NA	NA	NA	NA
Co-60	06/09/05	144.20	145.00	5.62	1.61	5.94	-0.09
Cr-51	06/09/05	286.60	303.00	28.38	3.37	15.87	-0.36
Cs-134	06/09/05	93.10	95.00	6.43	1.06	8.75	-0.24
Cs-137	06/09/05	194.30	189.00	6.24	2.10	5.60	0.49

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	06/09/05	70.30	63.90	8.92	0.71	17.92	0.51
I-131	06/09/05	93.00	86.90	6.93	0.97	10.63	0.61
Mn-54	06/09/05	127.70	125.00	3.73	1.39	6.61	0.31
Zn-65	06/09/05	163.50	155.00	12.09	1.72	10.90	0.48

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	03/17/05	276.00	268.00	4.66	2.98	6.00	0.45
	06/09/05	214.20	214.00	17.96	2.37	8.39	0.01

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	03/17/05	222.00	221.00	9.6	2.46	5.13	0.09
Co-58	03/17/05	115.40	111.00	7.4	1.24	9.21	0.41
Co-60	03/17/05	142.80	139.00	6.4	1.54	7.91	0.34
Cr-51	03/17/05	370.30	322.00	46.1	3.57	14.70	0.89
Cs-134	03/17/05	138.60	134.00	6.1	1.49	5.46	0.61

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	03/17/05	131.40	125.00	7.3	1.39	6.53	0.75
Fe-59	03/17/05	125.60	107.00	9.5	1.19	12.06	1.23
I-131	03/17/05	76.10	65.90	7.1	0.73	11.84	1.13
Mn-54	03/17/05	157.00	154.00	8	1.71	5.63	0.34
Zn-65	03/17/05	219.60	191.00	14.9	2.12	10.82	1.20

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	03/17/05	5388.00	6040.00	132.04	133.33	4.10	-2.96
	06/09/05	9879.10	9100.00	133.48	200.00	2.60	2.62

6.0 CONCLUSIONS

This report confirms the licensee's conformance with the requirements of Chapter 4 of the ODCM during 2005. It provides a summary and discussion of the results of the laboratory analyses for each type of sample.

All of the radiological levels were low and are generally trending downward.

In 2005, there was one sample type where the indicator station readings were discernible from the control station readings. Two of four quarterly composite samples from the river water indicator station were positive for tritium. The average value of the two positive samples was 245 pCi/l. There were no positive values at the control station. Therefore, this tritium concentration could be attributed to plant releases.

Although no drinking water pathway via river water exists in the plant vicinity, a potential dose from tritium due to drinking water was calculated using methodology from the HNP ODCM. This dose was calculated assuming that a person regularly consumed drinking water from the river downstream of the plant discharge near the indicator station. Under these assumed circumstances, the potential dose to such an individual would be about 1.9E-2 mrem in a year. This dose would be less than 1% of the annual dose limit (3 mrem) for the total body, due to liquid effluents.

Another pathway to obtain dose from tritium in the river would be through consumption of fish. The potential total body dose for an adult who consumed fish regularly from the river would be about 4.9E-4 mrem in a year. This extremely small dose is less than 0.02% of the annual limit for the total body due to liquid effluents.

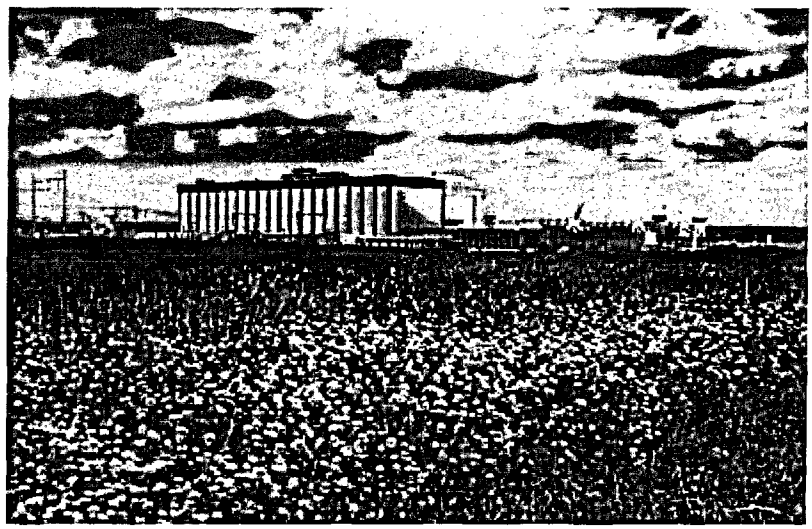
A third pathway to potentially obtain dose from tritium in the river would be from consumption of crops which were irrigated by river water. In 2005, there was one irrigation withdrawal noted in the annual River Water User's Survey (discussed in Section 4.1). The location was about 3.75 miles downstream of the plant. The potential dose to a member of the public who would receive the highest dose from regular consumption of crops which were irrigated with river water would be 5.7E-3 mrem in a year. This extremely small dose is less than 0.2% of the annual limit for the total body due to liquid effluents.

No discernible radiological impact upon the environment or the public as a consequence of plant discharges to the atmosphere or to the river was established for any other REMP samples for 2005.

ENCLOSURE 2

Joseph M. Farley Nuclear Plant
Annual Radiological Environmental Operating Report for 2005

JOSEPH M. FARLEY NUCLEAR PLANT
ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 2005



SOUTHERN COMPANY

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

Acronyms presented in alphabetical order

Acronym	Definition
APCo	Alabama Power Company
ASTM	American Society for Testing and Materials
CL	Confidence Level
EL	Georgia Power Company Environmental Laboratory
EPA	Environmental Protection Agency
FNP	Joseph M. Farley Nuclear Plant
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

1.0 INTRODUCTION

The Radiological Environmental Monitoring Program (REMP) for 2005 was conducted in accordance with Chapter 4 of the Offsite Dose Calculation Manual (ODCM). The REMP activities for 2005 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 Joseph M. Farley Nuclear Plant (FNP).

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.

FNP is owned by Alabama Power Company (APCo) and operated by Southern Nuclear Operating Company. It is located in Houston County, Alabama approximately fifteen miles east of Dothan, Alabama on the west bank of the Chattahoochee River. Unit 1, a Westinghouse Electric Corporation Pressurized Water Reactor (PWR) with a licensed core thermal power output of 2775 MegaWatts thermal (MWt), achieved initial criticality on August 9, 1977 and was declared "commercial" on December 1, 1977. Unit 2, also a 2775 MWt Westinghouse PWR, achieved initial criticality on May 8, 1981 and was declared "commercial" on July 30, 1981.

The preoperational stage of the REMP began with initial sample collections in January of 1975. The transition from the preoperational to the operational stage of the REMP was marked by Unit 1 initial criticality.

A description of the REMP is provided in Section 2 of this report. An annual summary of the results of the analyses of REMP samples is provided in Section 3. A discussion of the results, including assessments of any radiological impacts upon the environment and the results of the land use census are provided 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 describes the locations of the indicator, community and control stations as described in ODCM Table 4-4 and the identification of each sample according to station location and analysis type. The stations are also depicted on maps in Figures 2-1 through 2-3.

The location of each REMP station for gaseous releases is described by its direction and distance from a point midway between the Unit 1 and Unit 2 plant vent stacks. The surrounding area is divided into 16 azimuthal sectors which are centered on the major compass points; each sector is numbered sequentially clockwise and oriented so that the centerline of sector 16 is due north. Each sampling station is identified by a four digit number. The first two digits indicate the sector number, and the last two digits indicate the distance from the origin to the nearest mile. For example, air monitoring station 0215 is located approximately 15 miles northeast of the origin. The locations for the sampling stations along the river are identified by the nearest River Mile (RM) which is the distance along the navigable portion of the Chattahoochee River upstream of the Jim Woodruff Dam near Chattahoochee, Florida. The approximate locations of the plant discharge and intake structures are at RM 43.5 and 43.8, respectively.

The samples are collected by the plant's technical staff, except for fish and river sediment samples which are collected by APCo Environmental Field Services personnel.

All laboratory analyses were performed by Georgia Power Company's Environmental Laboratory (EL) in Smyrna, Georgia.

TABLE 2-1 (SHEET 1 of 7)

SUMMARY DESCRIPTION OF RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway with Sample Types and Locations (sector-miles)	Sample Identification	Sampling and Collection Frequency	Type and Frequency of Analysis
AIRBORNE Particulates		Continuous sampler operation with sample collection weekly.	Particulate sampler: Analyze for gross beta radioactivity ≥ 24 hours following filter change. Perform gamma isotopic analysis on each sample when gross beta activity is > 10 times the yearly mean of control samples. Perform gamma isotopic analysis on composite sample (by location) quarterly.
Indicator Stations: River Intake Structure (ESE-0.8) South Perimeter (SSE-1.0) Plant Entrance (WSW-0.9) North Perimeter (N-0.8)	 PI-0501 PI-0701 PI-1101 PI-1601		
Control Stations: Blakely GA (NE-15) Neals Landing, FL (SSE-18) Dothan, AL (W-18)	 PB-0215 PB-0718 PB-1218		
Community Stations: GA Pacific Paper Co. (SSE-3) Ashford, AL (WSW-8) Columbia, AL (N-5)	 PC-0703 PC-1108 PC-1605		

TABLE 2-1 (SHEET 2 of 7)

SUMMARY DESCRIPTION OF RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway with Sample Types and Locations (sector-miles)	**Sample Identification**	**Sampling and Collection Frequency**	**Type and Frequency of Analysis**
Iodine		Continuous sampler operation with sample collection weekly	Radioiodine canister: Analyze each sample for I-131 weekly.
Indicator Stations: River Intake Structure (ESE-0.8) South Perimeter (SSE-1.0) Plant Entrance (WSW-0.9) North Perimeter (N-0.8)	 II-0501 II-0701 II-1101 II-1601		
Control Station: Blakely, GA (NE-15) Neals Landing, FL (SSE-18) Dothan, AL (W-18)	 IB-0215 IB-0718 IB-1218		
Community Station: GA Pacific Paper Co. (SSE-3)	IC-0703		
DIRECT RADIATION TLD		Quarterly	Gamma dose: Read each badge quarterly
Indicator Stations: Plant Perimeter (NNE-0.9) (NE-1.0) (ENE-0.9) (E-0.8) (ESE-0.8)	 RI-0101 RI-0201 RI-0301 RI-0401 RI-0501		

TABLE 2-1 (SHEET 3 of 7)

SUMMARY DESCRIPTION OF RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway with Sample Types and Locations (sector-miles)	Sample Identification	Sampling and Collection Frequency	Type and Frequency of Analysis
(SE-1.1)	RI-0601		
(SSE-1.0)	RI-0701		
(S-1.0)	RI-0801		
(SSW-1.0)	RI-0901		
(SW-0.9)	RI-1001		
(WSW-0.9)	RI-1101		
(W-0.8)	RI-1201		
(WNW-0.8)	RI-1301		
(NW-1.1)	RI-1401		
(NNW-0.9)	RI-1501		
(N-0.8)	RI-1601		
Control Stations:			
Blakely, GA (NE-15)	RB-0215		
Neals Landing, FL (SSE-18)	RB-0718		
Dothan, AL (W-15)	RB-1215		
Dothan, AL (W-18)	RB-1218		
Webb, AL (WNW-11)	RB-1311		
Haleburg, AL (N-12)	RB-1612		
Community Station By sector			
(NNE-4)	RC-0104		
(NE-4)	RC-0204		
(ENE-4)	RC-0304		
(E-5)	RC-0405		
(ESE-5)	RC-0505		
(SE-5)	RC-0605		
(SSE-3)	RC-0703		

TABLE 2-1 (SHEET 4 of 7)

SUMMARY DESCRIPTION OF RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway with Sample Types and Locations (sector-miles)	Sample Identification	Sampling and Collection Frequency	Type and Frequency of Analysis
(S-5) (SSW-4) (SW-5) (WSW-4) (W-4) (WNW-4) (NW-4) (NNW-4) (N-5) Of Special Interest: Nearest Residence (SW-1.2) City of Ashford, AL (WSW-8.0)	RC-0805 RC-0904 RC-1005 RC-1104 RC-1204 RC-1304 RC-1404 RC-1504 RC-1605 RC-1001 RC-1108		
WATERBORNE Surface Water		Aliquots taken with proportional semi-continuous sampler, having a minimum sampling frequency not exceeding two hours, collected weekly for 4 week composites and quarterly composites	Gamma isotopic analysis of each 4 week composite sample. Tritium analysis for each quarterly composite.
Indicator Station: Paper Mill, (~3 miles downstream of plant discharge, RM 40)	WRI		
Control Station: Upstream of Andrews Lock and dam (~3 miles upstream of the plant intake, RM 47)	WRB		

TABLE 2-1 (SHEET 5 of 7)

SUMMARY DESCRIPTION OF RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway with Sample Types and Locations (sector-miles)	**Sample Identification**	**Sampling and Collection Frequency**	**Type and Frequency of Analysis**
Ground Water		Grab sample quarterly	Gamma isotopic, I-131 and tritium analyses of each sample quarterly
Indicator Station: Paper Mill Well (SSE-4)	WGI-07		
Control Station: Whatley Residence Well (SW-1.2)	WGB-10		
River Sediment		Grab sample semiannually	Gamma isotopic analysis of each sample semiannually
Indicator Station: Downstream of plant discharge at Smith's Bend (RM 41)[a]	RSI		
Control Station: Upstream of plant discharge at Andrews Lock & Dam Reservoir (RM 48)[a]	RSB		
INGESTION Milk		Grab sample biweekly	Gamma isotopic and I-131 analyses of each sample biweekly
Control Station: Robert Weir Dairy Donaldsonville, GA (SSE - 14)	MB-0714		

TABLE 2-1 (SHEET 6 of 7)

SUMMARY DESCRIPTION OF RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway with Sample Types and Locations (sector-miles)	**Sample Identification**	**Sampling and Collection Frequency**	**Type and Frequency of Analysis**
Fish		Grab sample semiannually for Game Fish and Bottom Feeding Fish	Gamma isotopic analysis on the edible portions of each sample semiannually
Indicator Stations: Downstream of plant discharge in vicinity of Smith's Bend (RM 41)[b]	FGI & FBI		
Control Station: Upstream of plant discharge in Andrews Lock & Dam Reservoir (RM 48)[b]	FGB & FBB		
Forage		Grab sample from forage every 4 weeks.	Gamma isotopic analysis of each sample every 4 weeks.
Indicator Station: South Southeast Perimeter (SSE-1.0) North Perimeter (N-0.8)	FI-0701 FI-1601		
Control Station: Dothan, AL (W-18)	FB-1218		

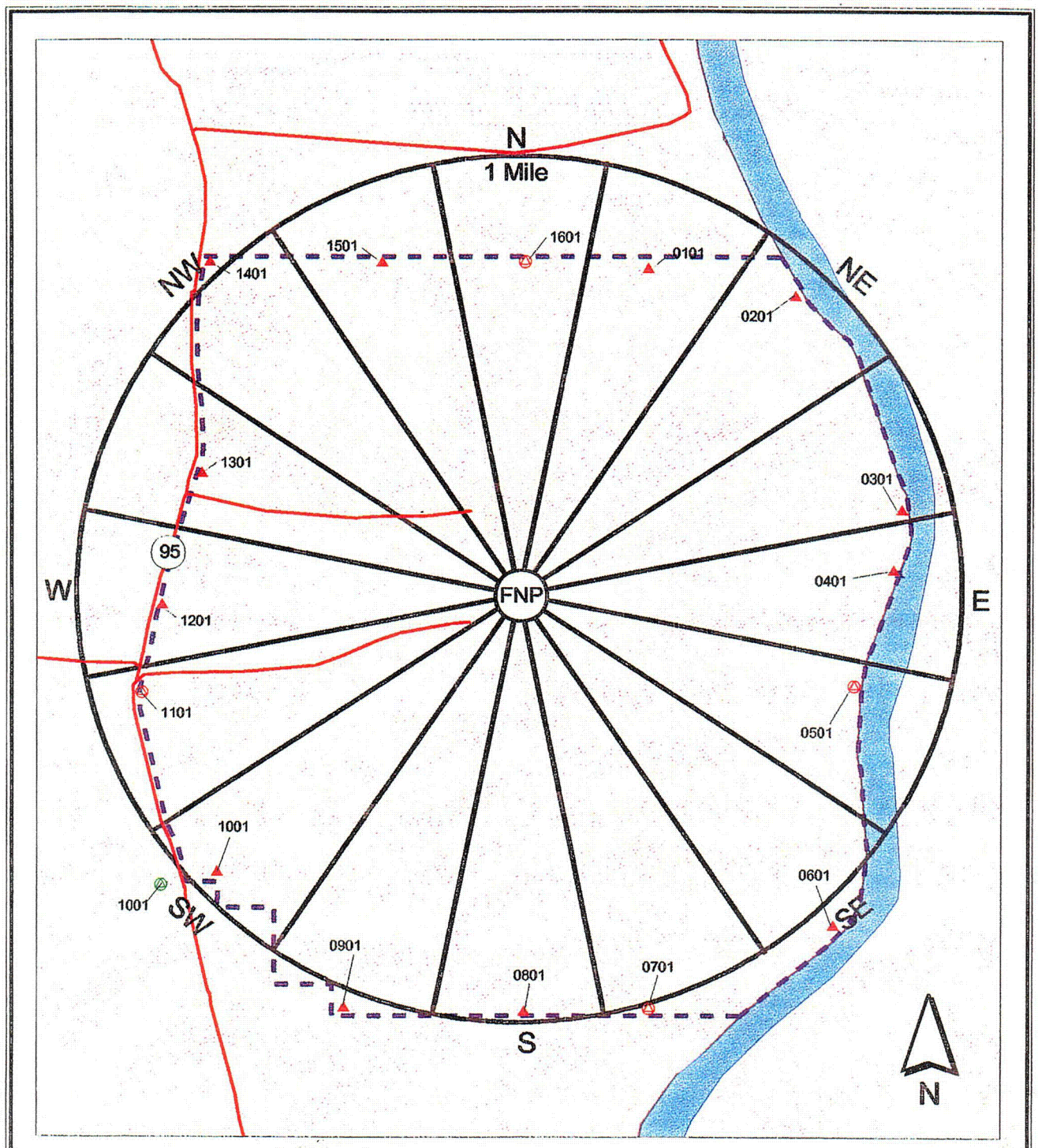
TABLE 2-1 (SHEET 7 of 7)

SUMMARY DESCRIPTION OF RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

NOTATIONS

a. These collections are normally made at river mile 41.3 for the indicator station and river mile 47.8 for the control station; however, due to river bottom sediment shifting caused by high flows, dredging, etc., collections may be made from river mile 40 to 42 for the indicator station and from river mile 47 to 49 for the control station.

b. Since a few miles of river water may be needed to obtain adequate fish samples, these river mile positions represent the approximate locations about which the catches are taken. Collections for the indicator station should be from river mile 37.5 to 42.5 and for the control station from river mile 47 to 52.



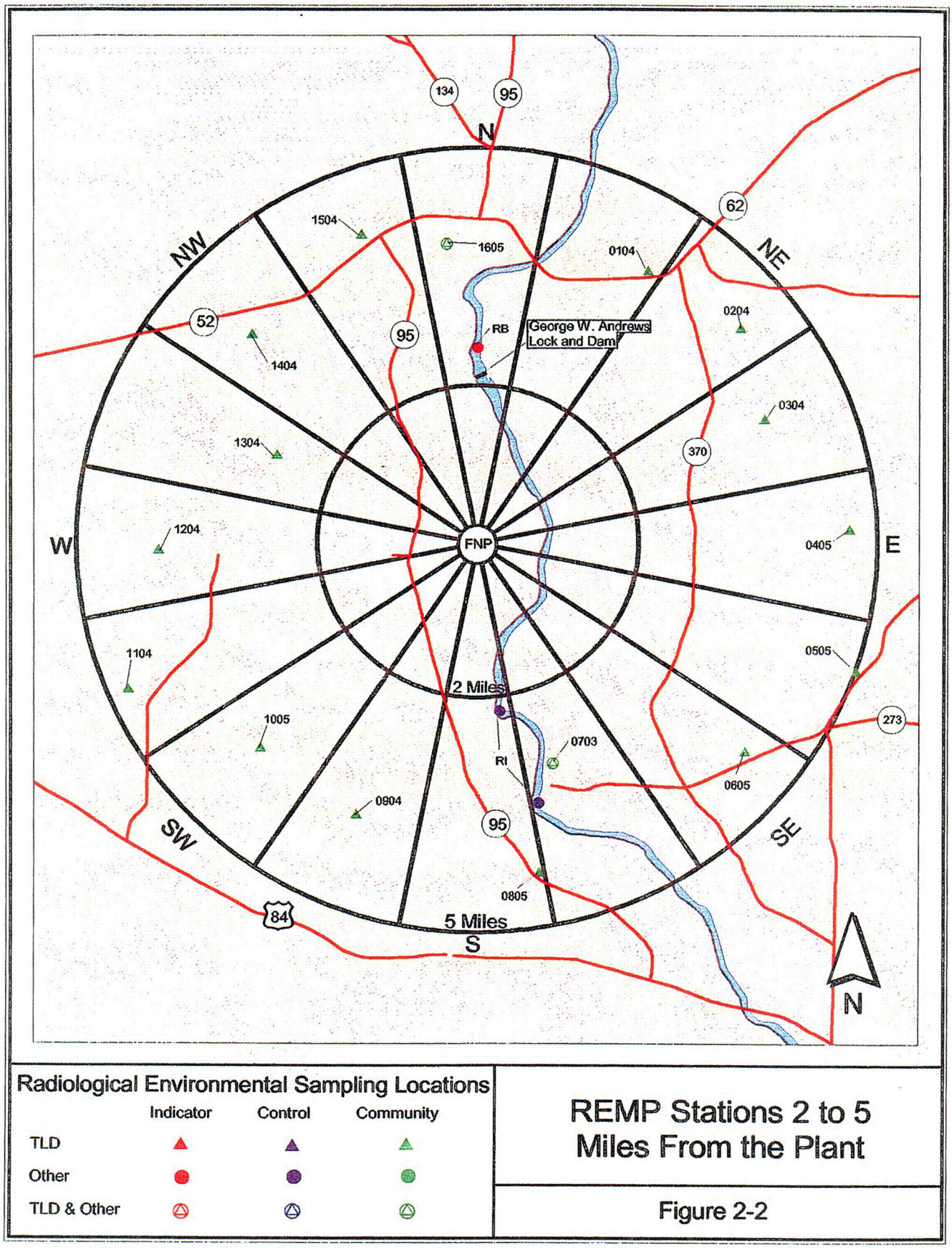
Radiological Environmental Sampling Locations

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

REMP Stations Near the Plant Perimeter

Figure 2-1

C16

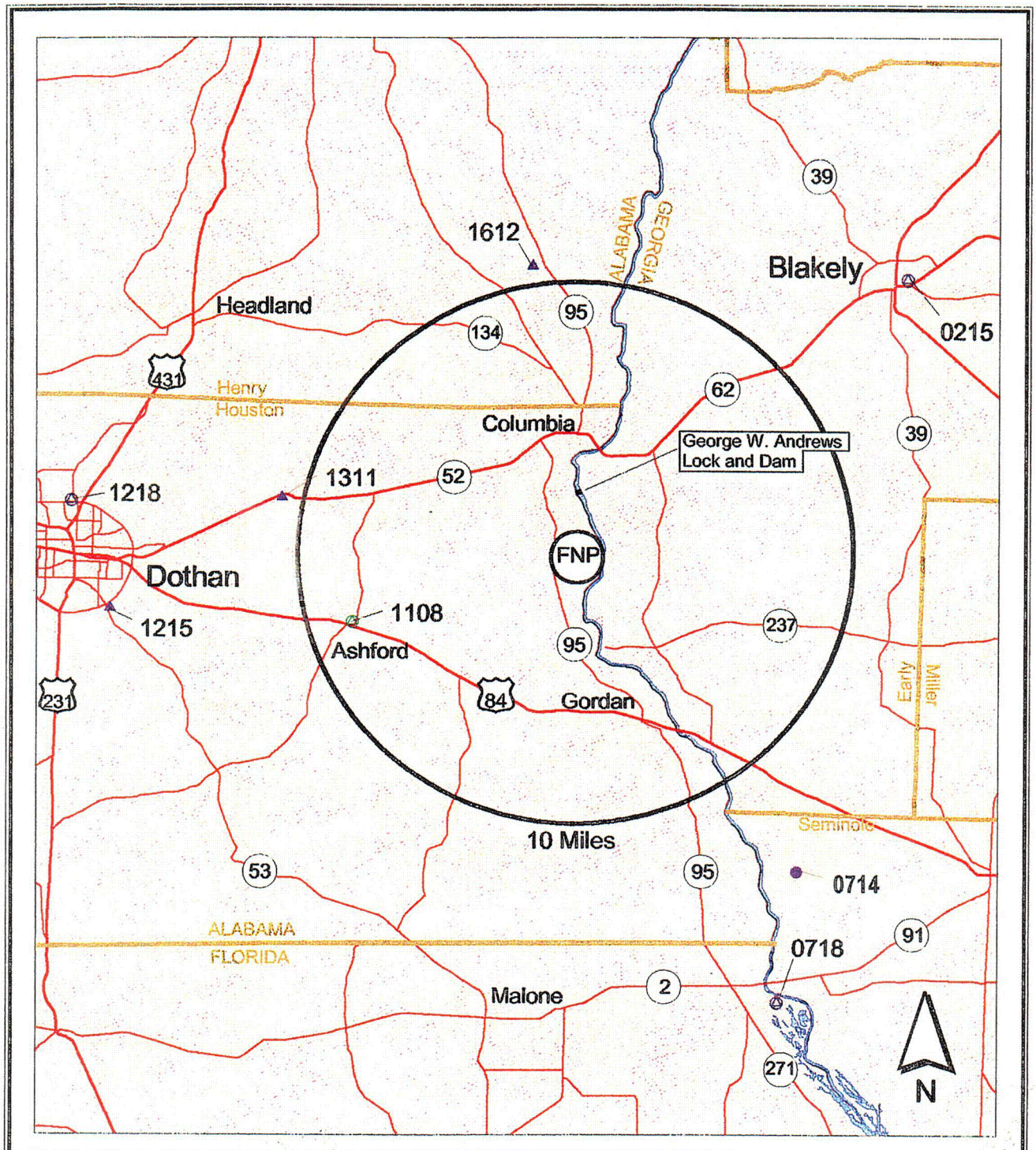


Radiological Environmental Sampling Locations			
	Indicator	Control	Community
TLD	▲	▲	▲
Other	●	●	●
TLD & Other	△	△	△

REMP Stations 2 to 5 Miles From the Plant

Figure 2-2

C17



Radiological Environmental Sampling Locations			
	Indicator	Control	Community
TLD	▲	▲	▲
Other	●	●	●
TLD & Other	△	△	△

REMP Stations Beyond 5 Miles From the Plant

Figure 2-3

C106

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, community 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 those listed in Table 2-1 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. Be-7, which occurs abundantly in nature, has been found in some years in the plant effluents. No other naturally occurring radionuclides have been found in effluents. Therefore, the only radionuclides of interest in the REMP are the man-made radionuclides and Be-7, when it is detected in the plant's liquid or gaseous effluents. During 2005, Be-7 was detected in Farley's liquid effluents.

TABLE 3-1 (SHEET 1 of 6)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

Farley Nuclear Plant, Docket Nos. 50-348 and 50-364
Houston County, Alabama

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)	Indicator Location with the Highest Annual Mean		Community Locations Mean (b), Range (Fraction)	Control Locations Mean(b), Range (Fraction)
				Name Distance & Direction	Mean (b), Range (Fraction)		
Airborne Particulates (fCi/m3)	Gross Beta 517	10	18.4 5.2-44.4 (207/207)	South Perimeter 1.0 miles, SSE	20.7 6.1-44.4 (52/52)	19.0 6.9-39.5 (154/154)	19.3 5.4-50.4 (156/156)
	Gamma Isotopic 40						
	I-131	70	NDM(c) (0/16)	NA(d)		NDM (0/12)	NDM (0/12)
	Cs-134	50	NDM (0/16)	NA		NDM (0/12)	NDM (0/12)
	Cs-137	60	NDM (0/16)	NA		NDM (0/12)	NDM (0/12)
Airborne Radioiodine (fCi/m3)	I-131 415	70	NDM (0/207)	NA		NDM (0/52)	NDM (0/156)
Direct Radiation (mR/91 days)	Gamma Dose 160	NA	14.7 10.3-21.7 (64/64)	RI-0401 Plt. Perimeter 0.8 miles, E	21.1 19.7-21.7 (4/4)	12.5 10.0-16.6 (72/72)	13.4 10.6-16.7 (24/24)
Milk (pCi/l)	Gamma Isotopic 26						
	Cs-134	15	NA	NA		NA	NDM (0/26)
	Cs-137	18	NA	NA		NA	NDM (0/26)
	Ba-140	60	NA	NA		NA	NDM (0/26)
	La-140	15	NA	NA		NA	NDM (0/26)
	I-131 26	1	NA	NA		NA	NDM (0/26)

TABLE 3-1 (SHEET 2 of 6)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

Farley Nuclear Plant, Docket Nos. 50-348 and 50-364
Houston County, Alabama

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)	Indicator Location with the Highest Annual Mean		Community Locations Mean (b), Range (Fraction)	Control Locations Mean(b), Range (Fraction)
				Name Distance & Direction	Mean (b), Range (Fraction)		
Forage (pCi/kg wet)	Gamma Isotopic 36						
	I-131	60	NDM (0/24)	NA		NA	NDM (0/12)
	Cs-134	60	NDM (0/24)	NA		NA	NDM (0/12)
	Cs-137	80	NDM (0/24)	NA		NA	23.1 (1/12)
Ground Water (pCi/l)	H-3 8	2000	264 (1/4)	Ga Pacific Paper Mill Well (SSE-4)	264 (1/4)	NA	360 (1/4)
	I-131 8	1	NDM (0/4)	NA		NA	NDM (0/4)
	Gamma Isotopic 8						
	Mn-54	15	NDM (0/4)	NA		NA	NDM (0/4)
	Fe-59	30	NDM (0/4)	NA		NA	NDM (0/4)
	Co-58	15	NDM (0/4)	NA		NA	NDM (0/4)
	Co-60	15	NDM (0/4)	NA		NA	NDM (0/4)
	Zn-65	30	NDM (0/4)	NA		NA	NDM (0/4)
	Zr-95	30	NDM (0/4)	NA		NA	NDM (0/4)
	Nb-95	15	NDM (0/4)	NA		NA	NDM (0/4)

TABLE 3-1 (SHEET 3 of 6)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

Farley Nuclear Plant, Docket Nos. 50-348 and 50-364
Houston County, Alabama

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)	Indicator Location with the Highest Annual Mean		Community Locations Mean (b), Range (Fraction)	Control Locations Mean(b), Range (Fraction)
				Name Distance & Direction	Mean (b), Range (Fraction)		
	Cs-134	15	NDM (0/4)	NA		NA	NDM (0/4)
	Cs-137	18	NDM (0/4)	NA		NA	NDM (0/4)
	Ba-140	60	NDM (0/4)	NA		NA	NDM (0/4)
	La-140	15	NDM (0/4)	NA		NA	NDM (0/4)
Surface Water (pCi/l)	H-3 8	3000	215 177-287 (3/4)	Ga Pacific Paper Co. RM 40	215 177-287 (3/4)	NA	173 (1/4)
	Gamma Isotopic 26						
	Be-7	124 (e)	NDM (0/13)	NA		NA	NDM (0/13)
	Mn-54	15	NDM (0/13)	NA		NA	NDM (0/13)
	Fe-59	30	NDM (0/13)	NA		NA	NDM (0/13)
	Co-58	15	NDM (0/13)	NA		NA	NDM (0/13)
	Co-60	15	NDM (0/13)	NA		NA	NDM (0/13)
	Zn-65	30	NDM (0/13)	NA		NA	NDM (0/13)
	Zr-95	30	NDM (0/13)	NA		NA	NDM (0/13)
	Nb-95	15	NDM (0/13)	NA		NA	NDM (0/13)

TABLE 3-1 (SHEET 4 of 6)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

Farley Nuclear Plant, Docket Nos. 50-348 and 50-364
Houston County, Alabama

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)	Indicator Location with the Highest Annual Mean		Community Locations Mean (b), Range (Fraction)	Control Locations Mean(b), Range (Fraction)
				Name Distance & Direction	Mean (b), Range (Fraction)		
	I-131	15 (f)	NDM (0/13)	NA		NA	NDM (0/13)
	Cs-134	15	NDM (0/13)	NA		NA	NDM (0/13)
	Cs-137	18	NDM (0/13)	NA		NA	NDM (0/13)
	Ba-140	60	NDM (0/13)	NA		NA	NDM (0/13)
	La-140	15	NDM (0/13)	NA		NA	NDM (0/13)
Bottom Feeding Fish (pCi/kg wet)	Gamma Isotopic 4						
	Be-7	655 (e)	NDM (0/2)	NA		NA	NDM (0/2)
	Mn-54	130	NDM (0/2)	NA		NA	NDM (0/2)
	Fe-59	260	NDM (0/2)	NA		NA	NDM (0/2)
	Co-58	130	NDM (0/2)	NA		NA	NDM (0/2)
	Co-60	130	NDM (0/2)	NA		NA	NDM (0/2)
	Zn-65	260	NDM (0/2)	NA		NA	NDM (0/2)
	Cs-134	130	NDM (0/2)	NA		NA	NDM (0/2)
	Cs-137	150	NDM (0/2)	NA		NA	9.6 (1/2)

TABLE 3-1 (SHEET 5 of 6)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

Farley Nuclear Plant, Docket Nos. 50-348 and 50-364
Houston County, Alabama

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)	Indicator Location with the Highest Annual Mean		Community Locations Mean (b), Range (Fraction)	Control Locations Mean(b), Range (Fraction)
				Name Distance & Direction	Mean (b), Range (Fraction)		
Game Fish (pCi/kg wet)	Gamma Isotopic 4						
	Be-7	655 (e)	NDM (0/2)	NA		NA	NDM (0/2)
	Mn-54	130	NDM (0/2)	NA		NA	NDM (0/2)
	Fe-59	260	NDM (0/2)	NA		NA	NDM (0/2)
	Co-58	130	NDM (0/2)	NA		NA	NDM (0/2)
	Co-60	130	NDM (0/2)	NA		NA	NDM (0/2)
	Zn-65	260	NDM (0/2)	NA		NA	NDM (0/2)
	Cs-134	130	NDM (0/2)	NA		NA	NDM (0/2)
	Cs-137	150	15.7 11.5-19.9 (2/2)	Downstream, near Smith's Bend (RM 41)	15.7 11.5-19.9 (2/2)	NA	NDM (0/2)
River Shoreline Sediment (pCi/kg dry)	Gamma Isotopic 4						
	Be-7	655 (e)	NDM (0/2)	NA		NA	NDM (0/2)
	Cs-134	150	NDM (0/2)	NA		NA	NDM (0/2)
	Cs-137	180	14.5 (1/2)	Downstream, near Smith's Bend (RM 41)	14.5 (1/2)	NA	NDM (0/2)

TABLE 3-1 (SHEET 6 of 6)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

Farley Nuclear Plant, Docket Nos. 50-348 and 50-364
Houston County, Alabama

NOTATIONS

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 (Table 4-1 of this report). 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 parentheses.

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 Table 4-1 of this report.

f. If a drinking water pathway exists, a value of 1 pCi/l would be used. See note b of Table 4-1 of this report.

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, or, community 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 which was less than the MDD was considered to be statistically indiscernible.

The 2005 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 plotted as 0's and listed in the tables as NDM.

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) dry
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 1940's through 1980 distributed man-made nuclides around the world. The most recent atmospheric tests in the 1970's 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.

Significant upward trends also followed the Chernobyl incident, which began on April 26, 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.

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 variation. 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 (SHEET 1 of 3)

DEVIATIONS FROM RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

COLLECTION PERIOD	AFFECTED SAMPLE(S)	DEVIATION	CAUSE	RESOLUTION
01/04/05-01/11/05 CR 2005100470	PI-1601 and II-1601	Time clock short approximately 2 hours.	Reason unknown – potential power interruption.	If power loss occurred, sampler restarted and was operating properly at sample c/o. Will monitor time clock operation.
01/11/05-01/18/05 CR 2005100694	PC-1605	Air sample was not continuously collected throughout sample period. Operated only 45 minutes.	Sample pump found not operating.	Sample pump restarted and sampler returned to service. Will monitor sample pump operation.
04/05/05-04/12/05 CR 2005103865	PI-1601 and II-1601	Lost approximately 1.75 hours sampling time.	Potential power interruption due to adverse weather.	If power loss occurred, sampler restarted and was operating properly at sample c/o. Will monitor time clock operation.
04/05/05-04/12/05 CR 2005103865	PC-1605	Lost approximately 4.25 hours sampling time.	Potential power interruption due to adverse weather.	If power loss occurred, sampler restarted and was operating properly at sample c/o. Will monitor time clock operation.
05/10/05-05/17/05 CR 2005104838	PI-0701 and II-0701	Lost approximately 27.5 hours sampling time.	Loss of power at plant firing range affected air sampler operation.	Sampler resumed operation when power was restored.
05/17/05-05/24/05 CR 2005105094	PI-0701 and II-0701	Lost approximately 25 hours sampling time.	Loss of power at plant firing range affected air sampler operation.	Sampler resumed operation when power was restored. Encouraged prior notification of power outages at plant firing range so that alternate power could be considered.

TABLE 4-3 (SHEET 2 of 3)

DEVIATIONS FROM RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

COLLECTION PERIOD	AFFECTED SAMPLE(S)	DEVIATION	CAUSE	RESOLUTION
05/17/05-05/24/05 CR 2005105095	PC-0703 and IC-0703	Lost approximately 2.5 hours sampling time.	Reason unknown – potential power interruption.	If power loss occurred, sampler restarted and was operating properly at sample c/o. Will monitor sample pump operation
05/24/05-05/31/05 CR 2005105269	PC-1108	Air sample was not continuously collected throughout sample period.	Sample system malfunction resulting in loss of sample flow.	Sample system repaired.
05/31/05-06/07/05 CR 2005105662	PB-0718 and IB-0718	Lost approximately 3 hours sampling time.	Potential power interruption due to adverse weather.	If power loss occurred, sampler restarted and was operating properly at sample c/o. Will monitor time clock operation.
05/31/05-06/07/05 CR 2005105662	PI-0701 and II-0701	Lost approximately 1.75 hours sampling time.	Power interruption at plant firing range affected air sampler operation.	Sampler resumed operation when power was restored.
06/07/05-06/14/05 CR 2005105822	PI-0701 and II-0701	Lost approximately 2 hours sampling time.	Power interruption at plant firing range affected air sampler operation.	Sampler resumed operation when power was restored.
07/05/05-07/12/05 CR 2005106898	PB-0718 and IB-0718	Sample time short approximately 25 hours.	Power interruption to air station due to Hurricane Dennis.	Sampler resumed operation when power was restored.
3RD Quarter CR -- none	TLD RC-0703B	TLD rendered suspect by the presence of water in the holding bag.	Moisture / rain water entered holding bag.	Replaced TLDs at beginning of quarter.

TABLE 4-3 (SHEET 3 of 3)

DEVIATIONS FROM RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

COLLECTION PERIOD	AFFECTED SAMPLE(S)	DEVIATION	CAUSE	RESOLUTION
10/04/05-10/11/05 CR 2005109985	PI-0701 and II-0701	Lost approximately 3.5 hours sampling time.	APCO maintenance work on power lines.	Sampler resumed operation when power was restored.
09/13/05-10/11/05 CR 2005109408	WRB Andrews Dam	43 river water sample aliquots missed.	Power loss of river water sampler due to bad battery.	Battery was replaced and sampler returned to service.
11/01/05-11/08/05 CR 2005111626	PC-0703 and IC-0703	Lost approximately 1 hour sampling time.	Potential power interruption due to shutdown activities at the Cedar Springs Paper Mill.	If power loss occurred, sampler restarted and was operating properly at sample c/o.
10/11/05-11/08/05 CR 2005111445	WRI CedarSprings Paper Mill	Sample flow to river water sampler interrupted.	River water intake pumps at paper mill shutdown from 11/5/05-11/10/05.	Requested to be informed prior to shutdown at paper mill.
11/08/05-11/15/05 CR 2005111626	PC-0703 and IC-0703	Lost approximately 1 hour sampling time.	Potential power interruption due to shutdown activities at the Cedar Springs Paper Mill.	If power loss occurred, sampler restarted and was operating properly at sample c/o.
11/08/05-11/15/05 CR 2005111625	PI-1101 and II-1101	Insufficient air volume sampled.	Air sampling pump malfunction.	Sample pump replaced.
11/08/05-12/06/05 CR 2005111445	WRI CedarSprings Paper Mill	Sample flow to river water sampler interrupted.	River water intake pumps at paper mill shutdown from 11/5/05-11/10/05.	Requested to be informed prior to shutdown at paper mill.

4.1 Land Use Census

In accordance with ODCM 4.1.2, a land use census was conducted during the month of June 2005. The land use census is used to determine the locations of the nearest permanent residence and milk animal in each of the 16 compass sectors within a distance of 5 miles. A milk animal is a cow or goat producing milk for human consumption. The 2005 survey revealed no significant changes from the 2004 survey. No milk animals were found within a 5 mile distance. 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
N	2.6	none
NNE	2.5	none
NE	2.4	none
ENE	2.4	none
E	2.8	none
ESE	3.0	none
SE	3.4	none
SSE	none	none
S	4.3	none
SSW	2.9	none
SW	1.2	none
WSW	2.4	none
W	1.3	none
WNW	2.1	none
NW	1.5	none
NNW	3.4	none

The Houston County, Alabama and the Early County, Georgia Extension Agents were contacted for assistance in locating commercial dairy farms and privately owned milk animals within 5 miles of the plant. A list of commercial dairy farms in Houston County was provided; there are no commercial dairy farms in Early County. Neither agent knew of privately owned milk animals within 5 miles of FNP. In addition, field surveys were conducted in the plant vicinity along the state and county highways and the interconnecting secondary roads. No milk animals were found within 5 miles of the plant.

ODCM 4.1.2.2.1 requires a new controlling receptor to be determined, if the land use census identifies a location that yields a calculated receptor dose greater than the one in current use. Neither current sampling locations nor the controlling receptor were affected by the 2005 land use census results. The current controlling receptor as described in ODCM Table 3-7 remains a child in the SW Sector at 1.2 miles.

4.2 Airborne

As specified in Table 2-1 and shown in Figures 4.2-1 and 4.2-2, airborne particulate filters and charcoal canisters are collected weekly at 4 indicator, 3 control and 3 community stations. Particulate filters are collected at all of the stations while the charcoal canisters are collected at all but 2 of the community stations. At each location, air is continuously drawn through a glass fiber filter to retain airborne particulates and, as appropriate, an activated charcoal canister is placed in series 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.

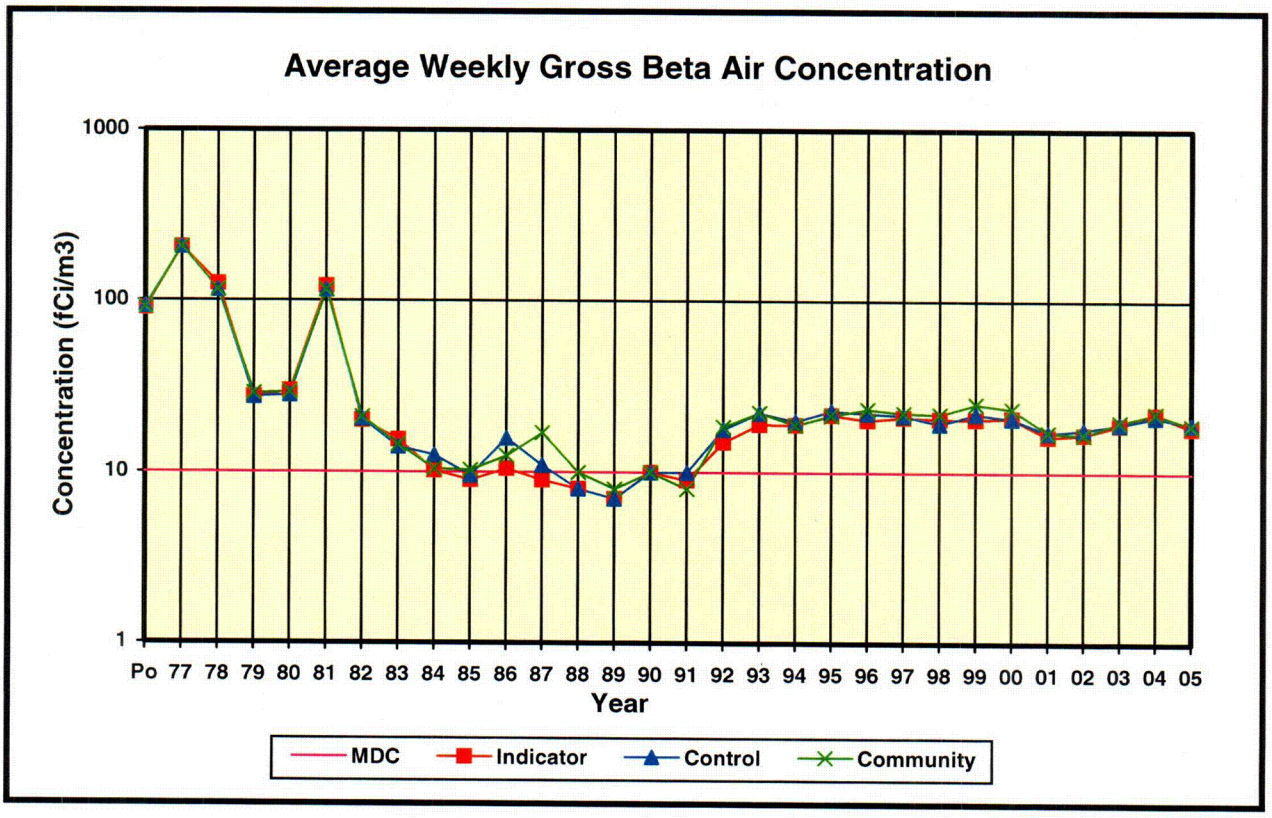
As provided in Table 3-1, the 2005 annual average weekly gross beta activity was 18.4 fCi/m^3 at the indicator stations and 19.3 fCi/m^3 at the control stations. However, the difference of 0.9 fCi/m^3 between the two averages is not statistically discernible since the MDD for these two average values is 1.93 fCi/m^3.

As shown in Table 3-1, the 2005 annual average weekly gross beta concentration was 19.0 fCi/m^3 at community stations. The community stations average was 0.3 fCi/m^3 less than the average for the control stations. The difference is not statistically discernible since it is less than the MDD of 2.02 fCi/m^3 between the two averages.

Due to the weapons tests during preoperation and the early years of operation, the average gross beta concentrations were 5 to 10 times greater than those currently being measured. By the mid 1980s, the readings had diminished to about half the current levels. These annual averages approximately doubled as a consequence of the Chernobyl incident in 1986; this impact faded away in approximately 2 years. The installation of new air monitoring equipment in 1992 yielded an approximate factor of 2 increase in the readings. Since then, the levels have been fairly flat.

The historical trending of the average weekly gross beta air concentrations for each year of operation and the preoperational period 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's contribution to gross beta concentration in air is insignificant.

Figure 4.2-1



C19

Table 4.2-1

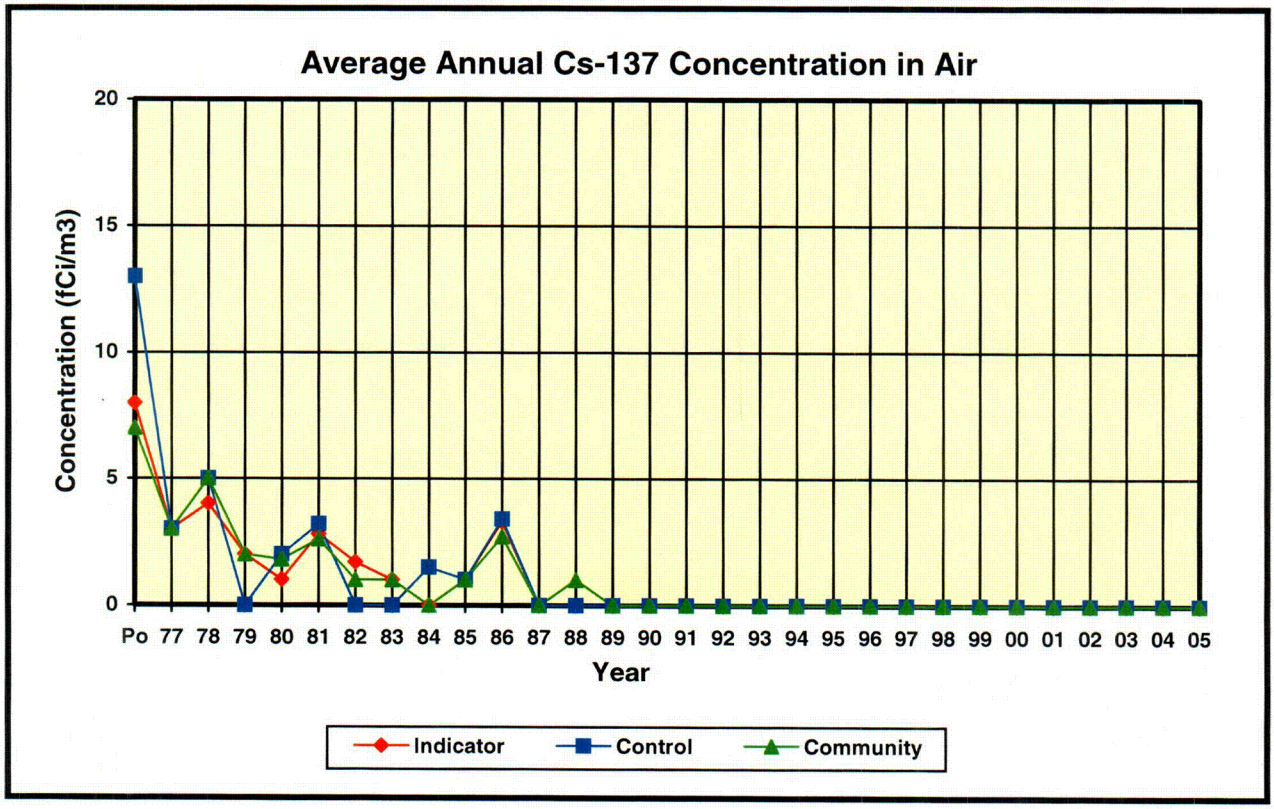
Average Weekly Gross Beta Air Concentration

Period	Indicator (fCi/m3)	Control (fCi/m3)	Community (fCi/m3)
Pre-op	90	92	91
1977	205	206	206
1978	125	115	115
1979	27.3	27.3	28.7
1980	29.7	28.1	29.2
1981	121	115	115
1982	20.0	20.4	21.0
1983	15.5	14.1	14.5
1984	10.2	12.6	10.5
1985	9.0	9.6	10.3
1986	10.5	15.8	12.5
1987	9.0	11.0	17.0
1988	8.0	8.0	10.0
1989	7.0	7.0	8.0
1990	10.0	10.0	10.0
1991	9.0	10.0	8.0
1992	15.0	17.9	18.5
1993	19.1	22.3	22.4
1994	19.0	20.0	19.0
1995	21.7	22.9	21.6
1996	20.3	22.3	23.5
1997	21.1	21.6	22.4
1998	20.6	19.3	22.0
1999	20.5	22.1	25.2
2000	20.9	20.8	23.6
2001	16.3	17.2	17.3
2002	16.8	18.0	16.8
2003	19.1	19.3	19.9
2004	22.0	21.3	22.4
2005	18.4	19.3	19.0

During 2005, no man-made radionuclides were detected from the gamma isotopic analysis of the quarterly composites of the air particulate filters. This has generally been the case since the impact of the weapons tests and the Chernobyl incident have faded. During preoperation and the early years of operation, a number of fission and activation products were detected. During preoperation, the average levels for Cs-134 and Cs-137 were 22 and 9 fCi/m^3, respectively. In 1986, as a consequence of the Chernobyl incident, Cs-134 and Cs-137 levels of 3 to 4 fCi/m^3 were found. The MDC and RL for Cs-134 are 50 and 10,000 fCi/m^3 and the MDC and RL for Cs-137 are 60 and 20,000 fCi/m^3 respectively.

The historical trending of the annual detectable Cs-137 concentrations for the indicator, control and community stations is provided in Figure 4.2-2 and Table 4.2-2. The trend has been generally downward since preoperation and no positive results have been observed since 1988.

Figure 4.2-2



C20

Table 4.2-2

Average Annual Cs-137 Concentration in Air

Period	Indicator (fCi/m3)	Control (fCi/m3)	Community (fCi/m3)
Pre-op	8	13	7
1977	3.0	3.0	3.0
1978	4.0	5.0	5.0
1979	2.0	NDM	2.0
1980	1.0	2.0	1.8
1981	2.8	3.2	2.6
1982	1.7	NDM	1.0
1983	1.0	NDM	1.0
1984	NDM	1.5	NDM
1985	1.0	1.0	1.0
1986	3.3	3.4	2.7
1987	NDM	NDM	NDM
1988	NDM	NDM	1
1989	NDM	NDM	NDM
1990	NDM	NDM	NDM
1991	NDM	NDM	NDM
1992	NDM	NDM	NDM
1993	NDM	NDM	NDM
1994	NDM	NDM	NDM
1995	NDM	NDM	NDM
1996	NDM	NDM	NDM
1997	NDM	NDM	NDM
1998	NDM	NDM	NDM
1999	NDM	NDM	NDM
2000	NDM	NDM	NDM
2001	NDM	NDM	NDM
2002	NDM	NDM	NDM
2003	NDM	NDM	NDM
2004	NDM	NDM	NDM
2005	NDM	NDM	NDM

Airborne I-131 was not detected in the charcoal canisters during 2005. In 1978, levels between 40 and 50 fCi/m^3 were found in a few samples and attributed to the Chinese weapons tests; then after the Chernobyl incident, levels up to a few hundred fCi/m^3 were found in some samples. At no other times has airborne I-131 been detected in the environmental samples. The MDC and RL for airborne I-131 are 70 and 900 fCi/m3 respectively.

Table 4-3 lists REMP deviations that occurred during 2005. Although there were 16 air sampling deviations listed in Table 4-3, only 3 required data to be excluded from the calculation of the mean values. Ten of the sixteen were minor deviations where the sample system lost approximately 4 hours or less of sampling time for the week due to power interruptions.

Three air filter sample results and one air charcoal sample result were excluded for failing Chauvenet's Criterion following equipment malfunctions. PC-1605 was excluded for sample period 1/11/05-1/18/05, PC-1108 was excluded for sample period 5/24/05-5/31/05, and PI-1101 / II-1101 were excluded for sample period 11/08/05-11/15/05. All of these were due to sample pump malfunctions resulting in an insufficient collection volume.

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 two 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.

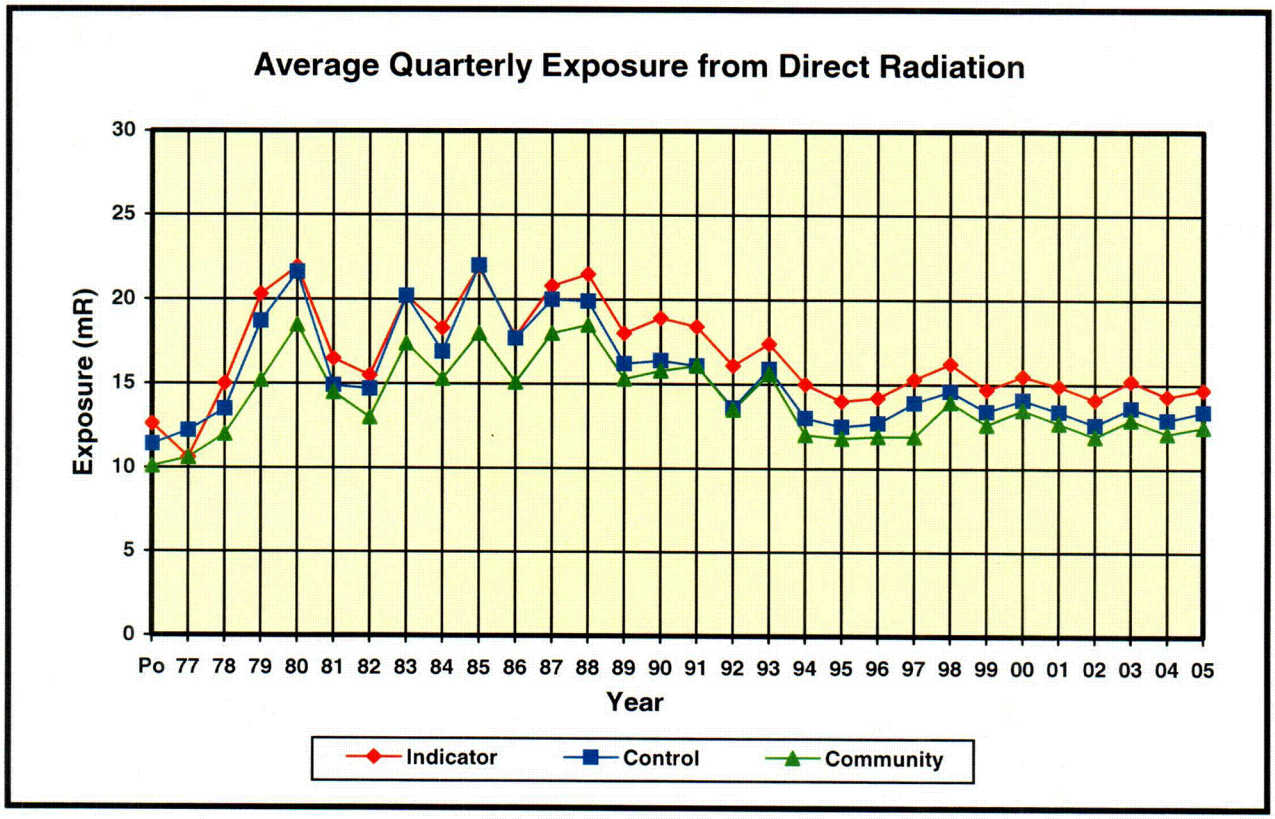
Two TLD stations are established in each of the 16 sectors, to form 2 concentric rings. The inner ring stations are located near the plant perimeter, as shown in Figure 2-1, and the outer ring stations are located at distances of approximately 3 to 5 miles from the plant, as shown in Figure 2-2. The stations forming the inner ring are designated as the indicator stations. The 6 control stations are located at distances greater than 10 miles from the plant, as shown in Figure 2-3. Stations are also provided which monitor special interest areas: the nearest occupied residence (SW at 1.2 miles), as shown in Figure 2-1, and the city of Ashford (WSW at 8 miles), as shown in Figure 2-3. The 16 outer ring stations and the 2 special interest stations are designated as community stations.

As provided in Table 3-1, the average quarterly exposure measured at the indicator stations (inner ring) during 2005 was 14.7 mR which was 1.3 mR greater than the 13.4 mR which was acquired at the control stations. This difference is less than the MDD of 1.38 mR and is therefore not statistically discernible. The difference of 0.9 mR found between the control stations (13.4 mR) and community stations (12.5 mR) is statistically discernible since the difference is slightly greater than the MDD of 0.82 mR. This difference is consistent with what has been seen in previous years.

The historical trending of the average quarterly exposures in units of mR at the indicator, control and community locations are plotted in Figure 4.3-1 and listed in Table 4.3-1. During preoperation the average exposure at the indicator stations was 1.2 mR greater than that for the control stations, but the average over the entire period of operation was only 1.1 mR greater. During preoperation, the average exposure at the control stations was 1.3 mR greater than that at the community stations and the average over the period of operation is 1.5 mR greater. This supports the position that the plant is not contributing significantly to direct radiation in the environment.

Table 4-3 lists the REMP program deviations that occurred in 2005. There was one deviation involving a TLD badge in 2005. This deviation did not lead to a loss of direct radiation data since the companion badge, RC-0703A, was in satisfactory condition. During the third quarter, Station RC-0703B had moisture in the holding bag. The result failed Chauvent's Criterion so it was excluded from the statistical analysis and only the valid data from the companion badge, RC-703A was used.

Figure 4.3-1



C21

Table 4.3-1

Average Quarterly Exposure from Direct Radiation

Period	Indicator (mR)	Control (mR)	Community (mR)
Pre-op	12.6	11.4	10.1
1977	10.6	12.2	10.6
1978	15.0	13.5	12.0
1979	20.3	18.7	15.2
1980	21.9	21.6	18.5
1981	16.5	14.9	14.5
1982	15.5	14.7	13.0
1983	20.2	20.2	17.4
1984	18.3	16.9	15.3
1985	21.9	22.0	18.0
1986	17.8	17.7	15.1
1987	20.8	20.0	18.0
1988	21.5	19.9	18.5
1989	18.0	16.2	15.3
1990	18.9	16.4	15.8
1991	18.4	16.1	16.1
1992	16.1	13.6	13.5
1993	17.4	15.9	15.6
1994	15.0	13.0	12.0
1995	14.0	12.5	11.8
1996	14.2	12.7	11.9
1997	15.3	13.9	11.9
1998	16.2	14.6	13.9
1999	14.7	13.4	12.6
2000	15.5	14.1	13.5
2001	14.9	13.4	12.7
2002	14.1	12.6	11.9
2003	15.2	13.6	12.9
2004	14.3	12.9	12.1
2005	14.7	13.4	12.5

The standard deviation for the quarterly result for each badge was subjected to a self imposed limit of 1.4. This limit is calculated using a method developed by the American Society for Testing and Materials (ASTM) (ASTM Special Technical Publication 15D, ASTM Manual on Presentation of Data and Control Chart Analysis, Fourth Revision, Philadelphia, PA, October 1976). The calculation is based upon the standard deviations obtained by the EL with the Panasonic UD-814 badges during 1992. This 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 TLD results from the following stations were excluded from the data set because their standard deviations were greater than 1.4:

Quarter 1 – RB-0718A
Quarter 2 – RB-1215A, RC-0703A, RI-1501B
Quarter 3 – RC-1108A and RC-1404B
Quarter 4 – RI-1001B

For the seven TLD stations where these badges were located, only the reading of the companion badge was used to determine the quarterly exposure for the station.

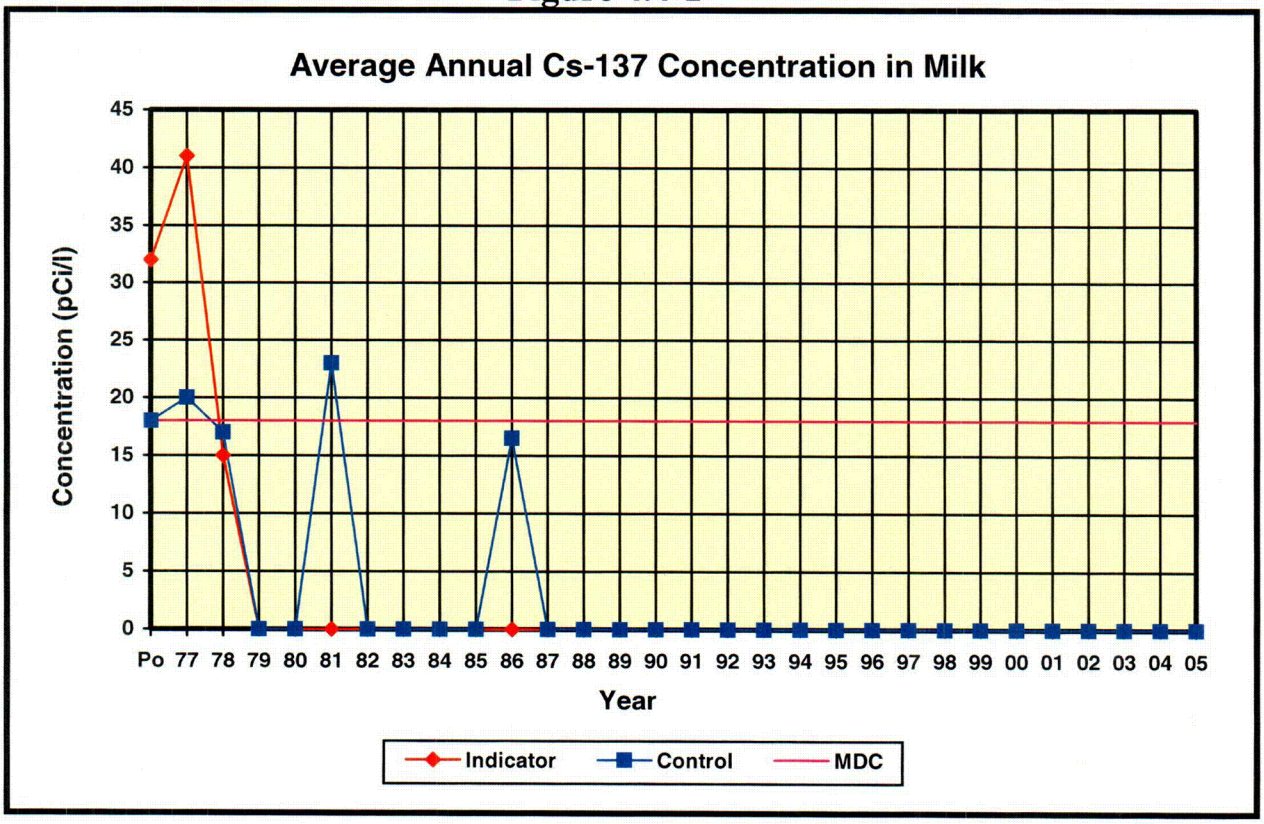
The affected badges were visually inspected under a microscope and the glow curve and test results for the anneal data and the element correction factors were reviewed. No reason was found for the high standard deviations.

4.4 Milk

In accordance with Table 2-1, milk samples are collected biweekly from a control location. No indicator station (a location within five miles of the plant) has been available for milk sampling since 1987. As discussed in Section 4.0, no milk animals were found within five miles of the plant during the 2005 land use census.

Gamma isotopic analyses were performed on each sample as specified in Table 2-1. No man-made radionuclides were identified from the gamma isotopic analysis of the milk samples during 2005. The MDC and RL for Cs-137 in milk are 18 and 70 pCi/l, respectively. The historical trending of the average annual detectable Cs-137 concentration in milk samples is shown in Figure 4.4-1 and Table 4.4-1. Cs-137 has not been detected in milk since 1986. Its presence at that time is attributed to the Chernobyl incident. The earlier detectable results were attributed to the weapons tests.

Figure 4.4-1



C22

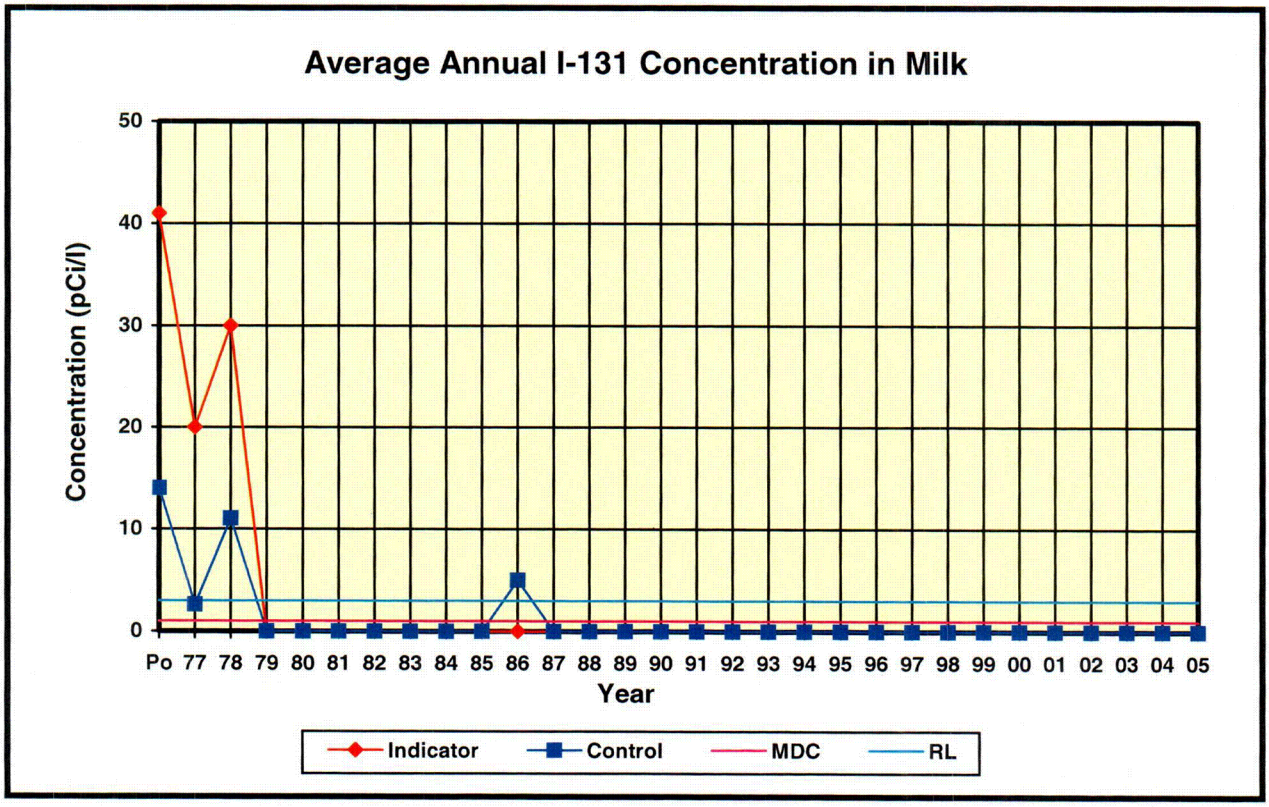
Table 4.4-1

Average Annual Cs-137 Concentration in Milk

Period	Indicator (pCi/l)	Control (pCi/l)
Pre-op	32	18
1977	41	20
1978	15	17
1979	NDM	NDM
1980	NDM	NDM
1981	NDM	23.0
1982	NDM	NDM
1983	NDM	NDM
1984	NDM	NDM
1985	NDM	NDM
1986	NDM	16.5
1987	NDM	NDM
1988	NDM	NDM
1989	NDM	NDM
1990	NDM	NDM
1991	NDM	NDM
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

As specified in Table 2-1, each sample was analyzed for I-131, which has not been detected in milk since 1986. The presence of I-131 at that time is attributed to the Chernobyl incident. The earlier detectable results were attributed to the weapons tests. The MDC and RL for I-131 are 1 and 3 pCi/l, respectively. Figure 4.4-2 and Table 4.4-2 show the historical trending of the average annual detectable I-131 concentration in milk samples.

Figure 4.4-2



C23

Table 4.4-2

Average Annual I-131 Concentration in Milk

Period	Indicator (pCi/l)	Control (pCi/l)
Pre-op	41	14
1977	20	2.6
1978	30	11
1979	NDM	NDM
1980	NDM	NDM
1981	NDM	NDM
1982	NDM	NDM
1983	NDM	NDM
1984	NDM	NDM
1985	NDM	NDM
1986	NDM	5.0
1987	NDM	NDM
1988	NDM	NDM
1989	NDM	NDM
1990	NDM	NDM
1991	NDM	NDM
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

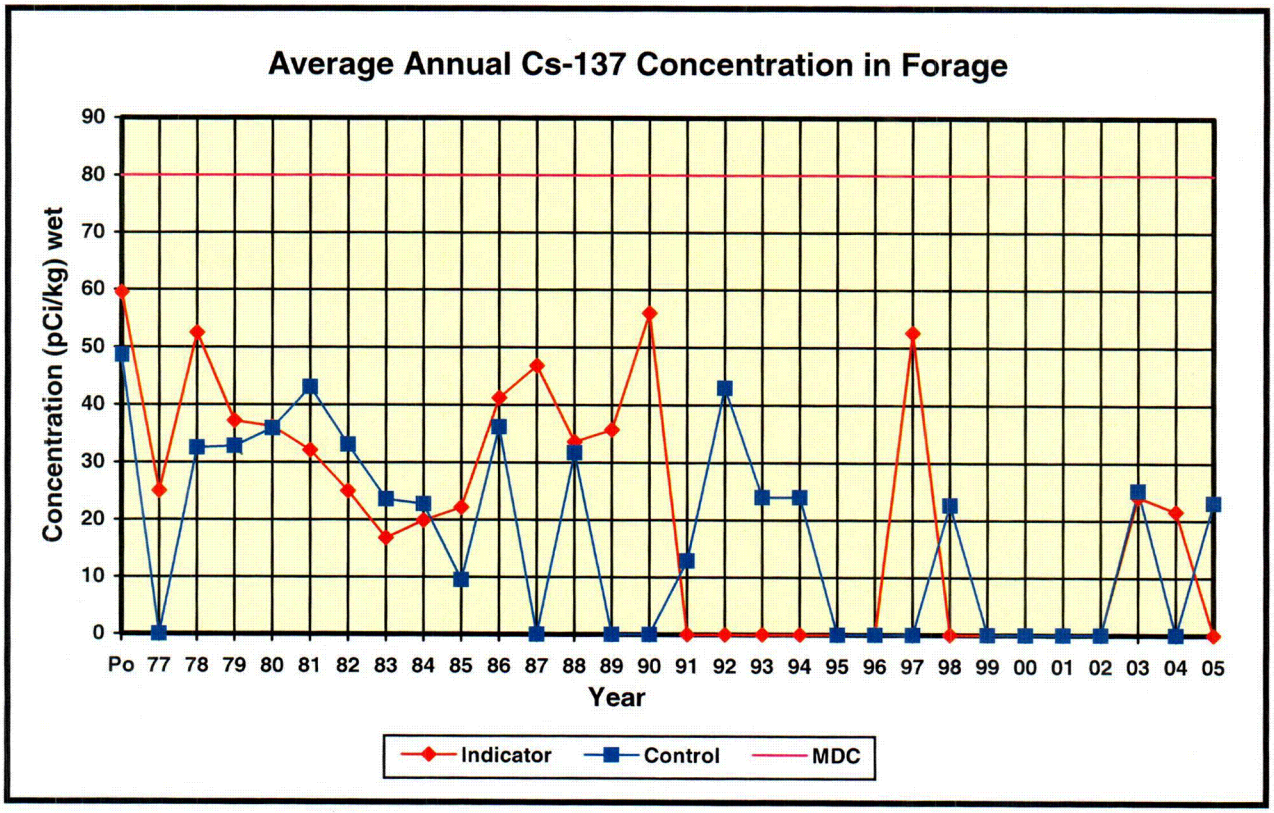
4.5 Forage

In accordance with Table 2-1, forage samples are collected every 4 weeks at two indicator stations on the plant perimeter, and at one control station located approximately 18 miles west of the plant, in Dothan. Gamma isotopic analyses are performed on each sample.

During preoperation and the years of operation through 1986 (the year of the Chernobyl incident), Cs-137 was typically found in about a third of the 35 to 40 forage samples collected per year. In 1987 and 1988 the number dropped to about a seventh of the total samples and from 1989 through 1994, it was only found in one or two samples every year. From 1994 to 2004, Cs-137 was detected in only a few samples, three indicator samples and three control samples.

In 2005, Cs-137 was detected in one of the 12 control samples and not detected in any of the 24 indicator samples. Since there was only one positive result in all of the samples, no statistical analysis can be performed. The occasional presence of Cs-137 in vegetation samples is attributed primarily to fallout from nuclear weapons tests and from the Chernobyl incident. The level seen in 2005 in the one positive control sample (23.1 pCi/kg wet) is less than 2% of the reporting level. The MDC and RL for Cs-137 in forage are 80 and 2000 pCi/kg wet, respectively. Table 4.5-1 presents the average detectable results of Cs-137 found in forage over the life of the plant and Figure 4.5-1 shows the historical trending of this data.

Figure 4.5-1



C24

Table 4.5-1

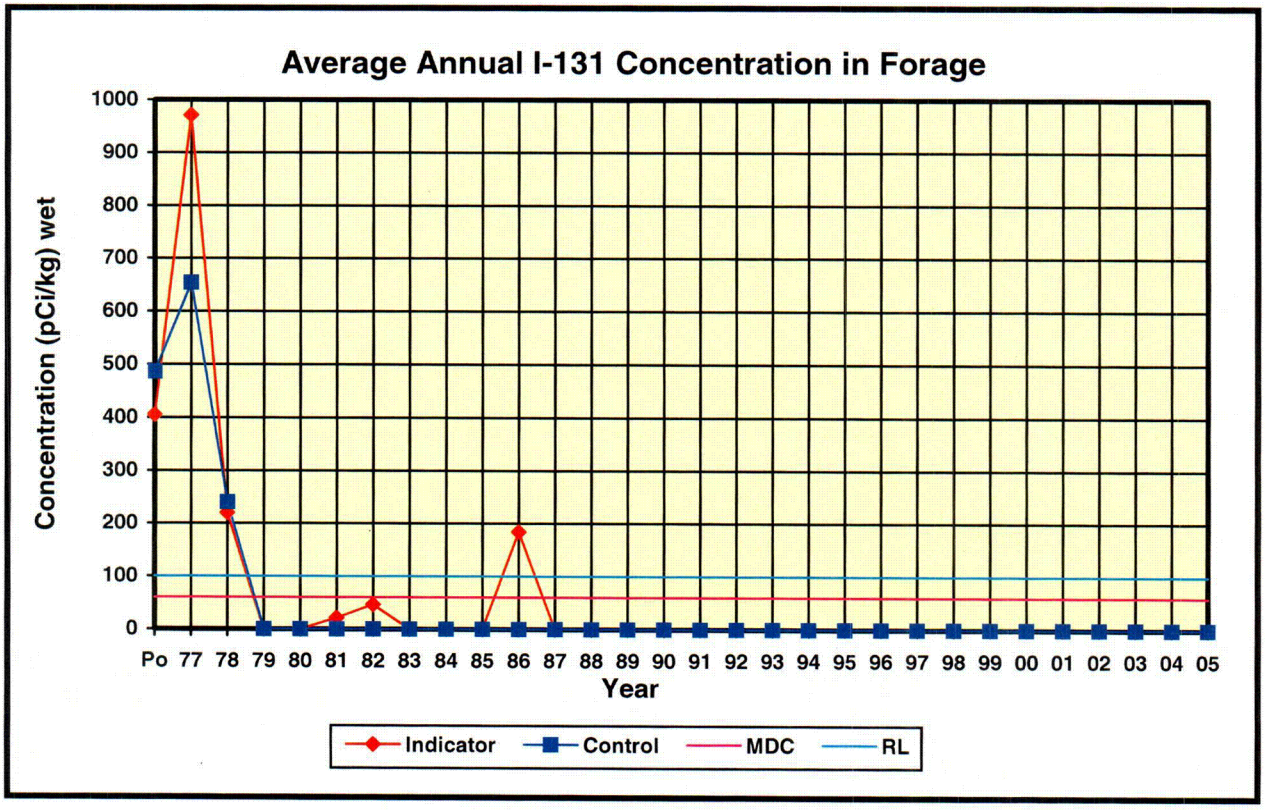
Average Annual Cs-137 Concentration in Forage

Period	Indicator (pCi/kg) wet	Control (pCi/kg) wet
Pre-op	59.4	48.6
1977	25.0	NDM
1978	52.5	32.5
1979	37.2	32.8
1980	36.2	35.9
1981	32.1	43.1
1982	25.0	33.1
1983	16.8	23.6
1984	19.9	22.8
1985	22.2	9.5
1986	41.2	36.2
1987	46.8	NDM
1988	33.6	31.7
1989	35.7	NDM
1990	56.0	NDM
1991	NDM	12.9
1992	NDM	43.0
1993	NDM	24.0
1994	NDM	24
1995	NDM	NDM
1996	NDM	NDM
1997	52.6	NDM
1998	NDM	22.7
1999	NDM	NDM
2000	NDM	NDM
2001	NDM	NDM
2002	NDM	NDM
2003	24.1	25.2
2004	21.6	NDM
2005	NDM	23.1

During preoperation and in the early years of operation, I-131 was found in 10% to 25% of the forage samples at very high levels which ranged from around 100 to 1,000 pCi/kg wet. In 1986 (Chernobyl incident), I-131 reappeared after not having been detected for 3 years. The MDC and RL for I-131 are 60 and 100 pCi/kg wet, respectively. Table 4.5-2 lists the average detectable results of I-131 found in forage over the life of the plant and Figure 4.5-2 plots the historical trending of this data.

I-131 has not been detected in forage samples since the 1986 Chernobyl accident.

Figure 4.5-2



C25

Table 4.5-2

Average Annual I-131 Concentration in Forage

Period	Indicator (pCi/kg) wet	Control (pCi/kg) wet
Pre-op	405	486
1977	971	654
1978	220	240
1979	NDM	NDM
1980	NDM	NDM
1981	21.4	NDM
1982	46.4	NDM
1983	NDM	NDM
1984	NDM	NDM
1985	NDM	NDM
1986	184	NDM
1987	NDM	NDM
1988	NDM	NDM
1989	NDM	NDM
1990	NDM	NDM
1991	NDM	NDM
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

These forage analyses results show the impact of the weapons tests during preoperation and the early years of operation and of the Chernobyl incident in 1986 and for a few years afterwards. The impact is reflected by the number of different radionuclides detected, the fraction of samples with detectable results, as well as the magnitude of the results. During preoperation and for the first few years of operation, 11 different radionuclides from fission and activation products were detected. By 1985, only 2 different radionuclides were detected and the fraction of samples with detectable results had diminished. In 1986, the same two nuclides as seen in 1985 appeared at a significantly higher magnitude and I-131 reappeared. In the years following 1986, only Cs-137 has been found in forage and it has been found in a decreasing fraction of the samples.

4.6 Ground Water

In the FNP environs, there are no true indicator sources of ground water. A well, located about four miles south-southeast of the plant on the east bank of the Chattahoochee River, serves Georgia Pacific Paper Company as a source of potable water and is designated as the indicator station. A deep well located about 1.2 miles southwest of the plant, which supplies water to the Whatley residence, is designated as the control station. Samples are collected quarterly and analyzed for gamma isotopic, I-131 and tritium as specified in Table 2-1. In 2005, one of 4 indicator samples was positive for tritium and one of 4 control samples was positive for tritium. No other radionuclides were detected.

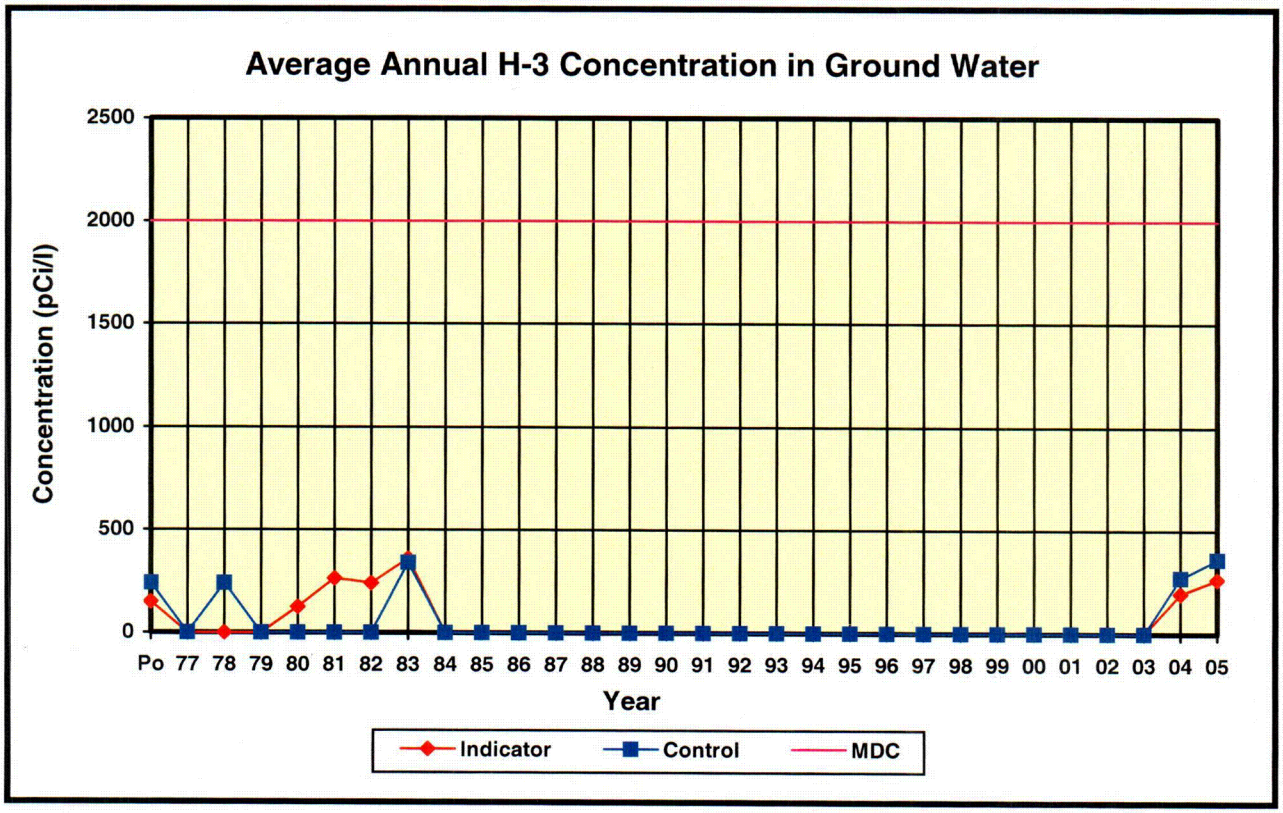
In 1983, 1985, and 1986, Cs-134 was detected in single samples at levels ranging from 3 to 13 pCi/l. The MDC and RL for Cs-134 in water are 15 and 30 pCi/l, respectively.

During preoperation, Cs-137 was detected in two of the samples at levels of 15 and 17 pCi/l. Then in 1984 and 1985, Cs-137 was again detected in a few samples with levels ranging from 4 to 5 pCi/l. The MDC and RL for Cs-137 in water are 18 and 50 pCi/l, respectively.

I-131 has never been detected in ground water samples. From 1986-2003, no radionuclides were detected. In 2005, tritium was detected at very low concentrations (near the instrument detection level). One of four indicator samples was positive (264 pCi/L), and one of four control samples was positive (360 pCi/L). These levels are very close to environmental background concentrations which are approximately 100-300 pCi/l. The positive results are less than 2% of the reporting level for tritium. The MDC and RL for tritium in drinking water are 2,000 and 20,000 pCi/l, respectively.

Figure 4.6-1 and Table 4.6-1 show the historical trending of the average annual detectable tritium concentration in ground water.

Figure 4.6-1



C20

Table 4.6-1

Average Annual H-3 Concentration in Ground Water

Period	Indicator (pCi/l)	Control (pCi/l)
Pre-op	150	240
1977	NDM	NDM
1978	NDM	240
1979	NDM	NDM
1980	124	NDM
1981	264	NDM
1982	240	NDM
1983	360	341
1984	NDM	NDM
1985	NDM	NDM
1986	NDM	NDM
1987	NDM	NDM
1988	NDM	NDM
1989	NDM	NDM
1990	NDM	NDM
1991	NDM	NDM
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	194	271
2005	264	360

4.7 Surface Water

As specified in Table 2-1 and shown in Figure 2-2, water samples are collected from the Chattahoochee River at a control station approximately 3 miles upstream of the intake structure and at an indicator station approximately 4 miles downstream of the discharge structure. Small quantities are collected during the week at periodic intervals using automatic samplers. For each station, one liter from each of four consecutive weekly samples is combined into a composite sample which is analyzed for gamma emitters. In addition, 0.075 liters is collected from 13 consecutive weekly samples for each station to form composite quarterly samples which are analyzed for tritium.

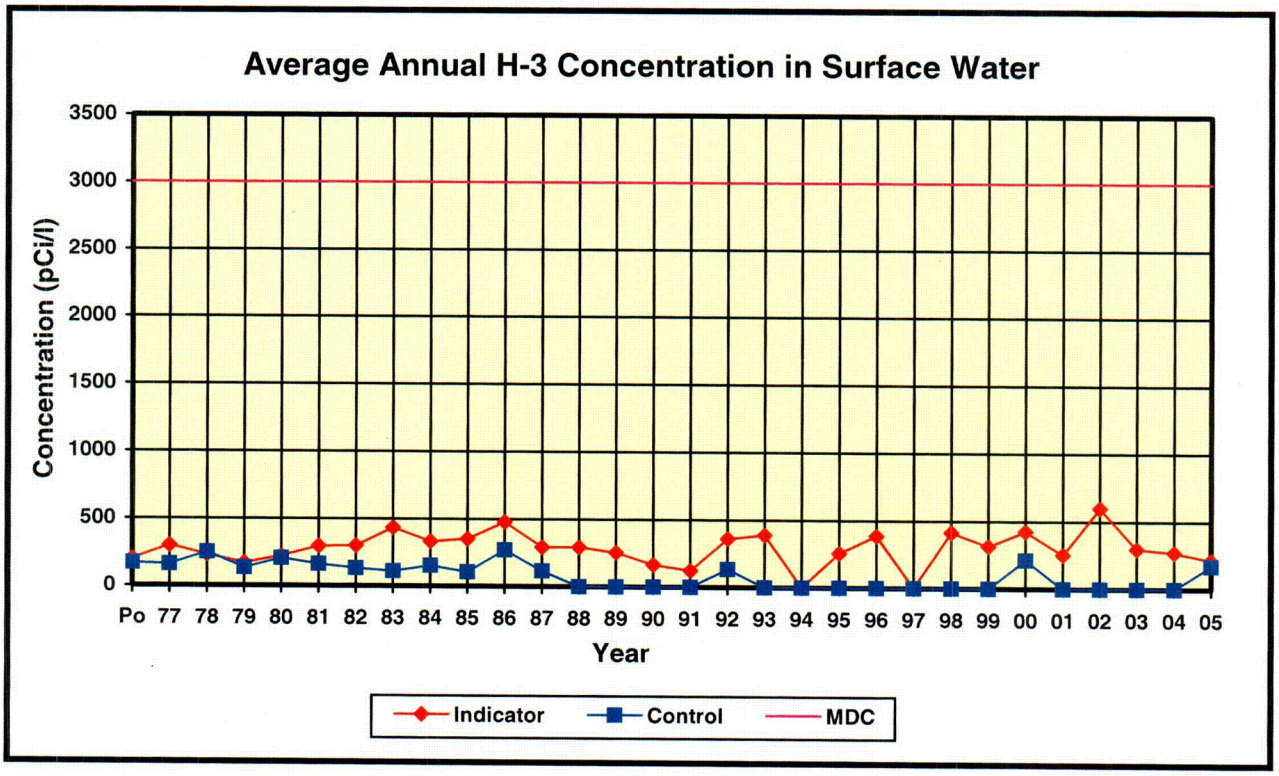
No detectable results have been found from these gamma isotopic analyses since 1988. During preoperation and in every year of operation through 1988 (except 1979 and 1980), a few samples showed at least one of nine different activation or fission products at levels less than or on the order of their MDCs. During preoperation, Cs-137 was found in about 3% of the samples. From 1981 through 1988, it was found in about 15% of the samples. Cs-134 was found in about 15% of the samples from 1981 to 1986. All of these gamma emitters are attributed to the weapons tests and the Chernobyl incident.

As shown in Table 3-1, tritium was detected in 3 out of 4 composite samples collected at the indicator station and in 1 out of 4 composite samples collected at the control station. The average concentration at the indicator station was 215 pCi/l. At the control station, the single positive result was 173 pCi/l. An MDD could not be calculated because there was only one positive value at the control station. Using the modified Student's t-test, the difference between the average at the indicator station and the single detectable sample at the control station was not statistically discernible. The positive results seen at both stations are very close to the instrument detection threshold. The background levels commonly seen in the environment are 100-300 pCi/l.

Historical trending of the detectable concentrations of tritium in surface water is provided in Figure 4.7-1 and Table 4.7-1. The slightly elevated plot of the indicator stations could be indicative of plant tritium contributions to surface water. However, it is noteworthy that the annual average levels are less than 10% of the MDC and less than 1% of the RL. The MDC and RL for tritium in surface water are 3000 and 30,000, respectively.

As shown in Table 4-3, there were three deviations involving surface water sampling in 2005. Two of these were due to an outage at the Cedar Springs Paper Mill in which the river water pumps were shutdown. The other was due to a battery failure at the Andrews Dam sampler. None of the deviations resulted in excluded data.

Figure 4.7-1



C27

Table 4.7-1

Average Annual H-3 Concentration in Surface Water

Period	Indicator (pCi/l)	Control (pCi/l)
Pre-op	200	170
1977	300	160
1978	230	250
1979	169	135
1980	221	206
1981	294	162
1982	300	132
1983	434	111
1984	333	152
1985	351	105
1986	478	272
1987	291.8	116.5
1988	293.3	NDM
1989	253.8	NDM
1990	166	NDM
1991	122	NDM
1992	360.5	134
1993	388.8	NDM
1994	NDM	NDM
1995	257	NDM
1996	386	NDM
1997	NDM	NDM
1998	415	NDM
1999	314	NDM
2000	424	212
2001	252	NDM
2002	598	NDM
2003	296	NDM
2004	270	NDM
2005	215	173

4.8 Fish

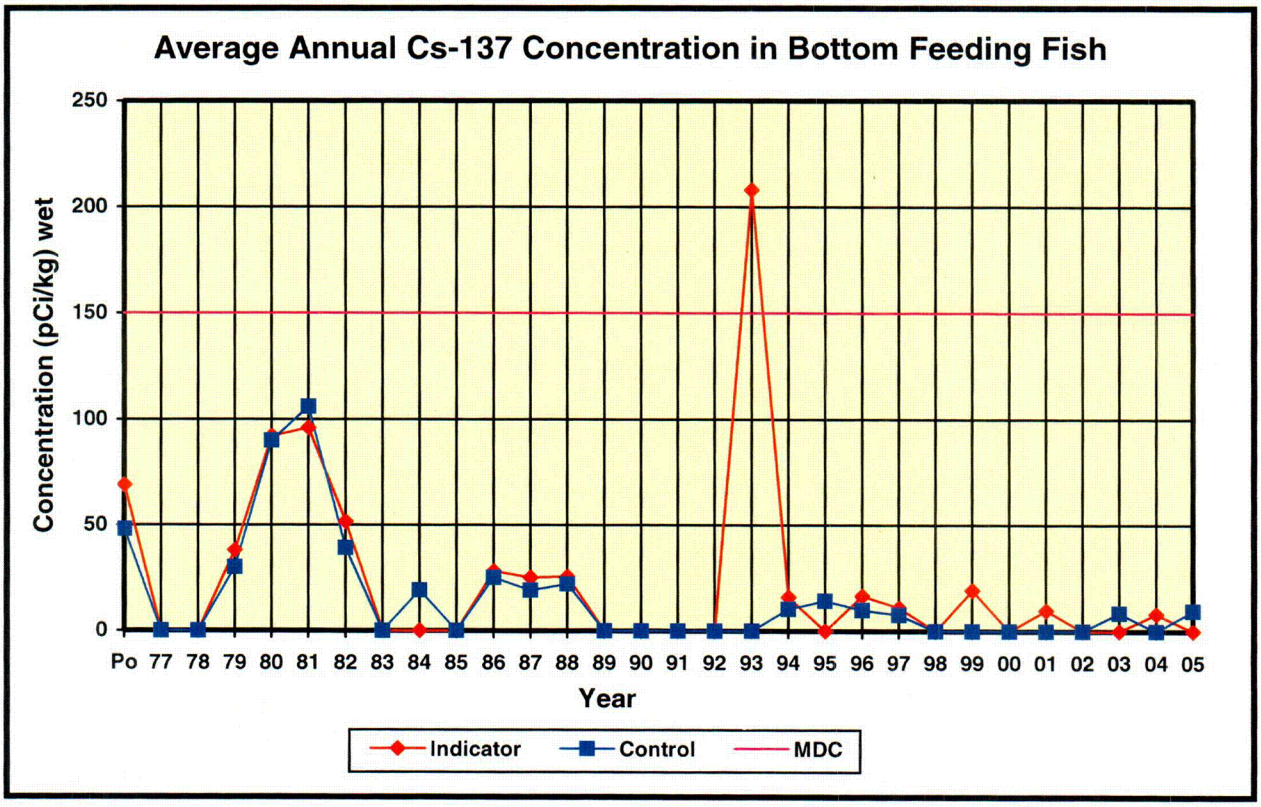
Two types of fish (bottom feeding and game) are collected semiannually from the Chattahoochee River at a control station several miles upstream of the plant intake structure and at an indicator station a few miles downstream of the plant discharge structure. These locations are shown in Figure 2-2. Gamma isotopic analysis is performed on the edible portions of each sample as specified in Table 2-1.

As provided in Table 3-1, Cs-137 was the only radionuclide of interest that was found from the gamma isotopic analysis of fish samples in 2005. Cs-137 was detected in both the fall and spring collection of game fish samples at the indicator station. The average was 15.7 pCi/kg wet. No Cs-137 was detected in the game fish samples at the control station. The low levels seen at the indicator station were less than 1% of the reporting level. The MDC for Cs-137 in fish is 150 pCi/kg wet and the RL is 2000 pCi/kg wet.

In the spring, Cs-137 was detected in the bottom feeding fish sample at the control location (9.6 pCi/kg wet). Cs-137 was not detected in any of the other bottom feeding fish samples. The single positive value at the control station was near the detection threshold for the instrument and is less than 1% of the reporting level. The MDC for Cs-137 in fish is 150 pCi/kg wet and the RL is 2000 pCi/kg wet.

Historically, Cs-137 has been found in approximately 30% of the bottom feeding fish samples and in 80% of the game fish samples. Figures 4.8-1 and 4.8-2 and Tables 4.8-1 and 4.8-2 provide the historical trending of the average annual detectable concentrations of Cs-137 in pCi/kg wet in bottom feeding and game fish, respectively. Since the early 1980s, values have generally decreased for both indicator and control groups, with the exception of the bottom feeding fish collected at the indicator station in 1993. While some contribution from the plant cannot be ruled out, most of the Cs-137 in these samples may be attributed to the nuclear weapons tests and the Chernobyl incident, as evidenced by the normally close agreement between the control and indicator station results.

Figure 4.8-1



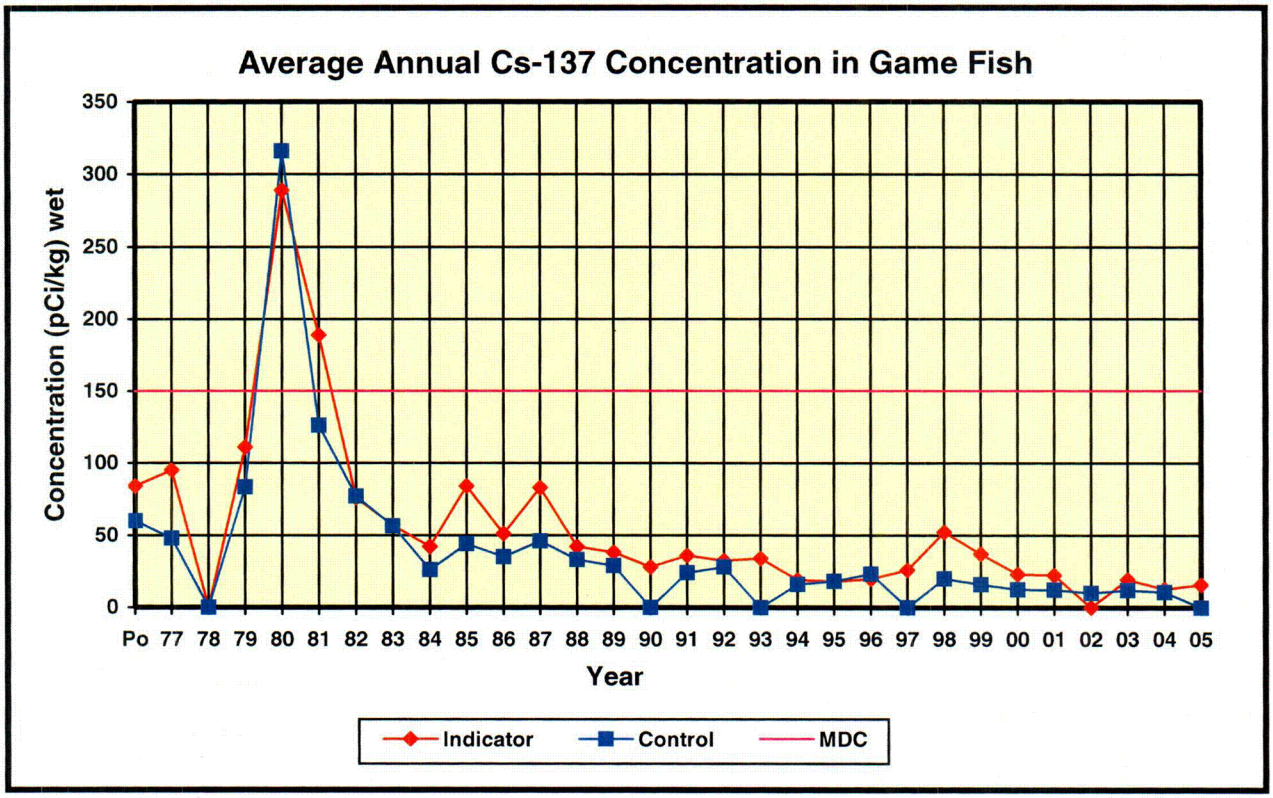
C20

Table 4.8-1

Average Annual Cs-137 Concentration in Bottom Feeding Fish

Period	Indicator (pCi/kg) wet	Control (pCi/kg) wet
Pre-op	69	48
1977	NDM	NDM
1978	NDM	NDM
1979	38	30
1980	92	90
1981	96	106
1982	51.5	39.0
1983	NDM	NDM
1984	NDM	19
1985	NDM	NDM
1986	28	25
1987	25	19
1988	25.5	22.0
1989	NDM	NDM
1990	NDM	NDM
1991	NDM	NDM
1992	NDM	NDM
1993	208	NDM
1994	15.9	10.3
1995	NDM	14.2
1996	16.4	9.9
1997	10.9	7.7
1998	NDM	NDM
1999	19.2	NDM
2000	NDM	NDM
2001	9.8	NDM
2002	NDM	NDM
2003	NDM	8.5
2004	8.1	NDM
2005	NDM	9.6

Figure 4.8-2



C29

Table 4.8-2

Average Annual Cs-137 Concentration in Game Fish

Period	Indicator (pCi/kg) wet	Control (pCi/kg) wet
Pre-op	84	60
1977	95	48
1978	NDM	NDM
1979	111	83.5
1980	289	316
1981	189	126
1982	76	77
1983	57	56.5
1984	42	26
1985	84	44
1986	51	35
1987	83	46
1988	42	33
1989	38	29
1990	28	NDM
1991	36	24
1992	32.5	28
1993	34	NDM
1994	19	16
1995	17.9	18.2
1996	19.6	23.1
1997	25.9	NDM
1998	52	20
1999	36.9	15.9
2000	22.9	12.5
2001	22.4	12.3
2002	NDM	10.1
2003	19.3	12.0
2004	12.7	10.8
2005	15.7	NDM

Radionuclides of interest other than Cs-137 have been found in only a few samples in the past. The following table provides a summary of the results in pCi/kg wet compared with the applicable MDCs.

YEAR	Nuclide	Fish Type	Indicator (pCi/kg)	Control (pCi/kg)	MDC (pCi/kg)
1978	Ce-144	Bottom Feeding	NDM	200	
1981	Nb-95	Bottom Feeding	38	NDM	50 (a)
1982	Nb-95	Game	31	NDM	50 (a)
1986	Co-60	Game	25	NDM	130

(a) Determined by the EL. Not defined in ODCM Table 4-3 (Table 4-1 of this report)

4.9 Sediment

River sediment samples are collected semiannually on the Chattahoochee River at a control station which is approximately 4 miles upstream of the intake structure and at an indicator station which is approximately 2 miles downstream of the discharge structure as shown in Figure 2-2. A gamma isotopic analysis is performed on each sample as specified in Table 2-1. During 2005, the only nuclide of interest detected was Cs-137. It was detected in one of the sediment indicator samples (14.5 pCi/kg dry). Although it had been several years since a positive Cs-137 result has been seen, this level was near the instrument detection threshold and was well below the MDC of 180 pCi/l dry.

Historically, Be-7, Cs-134, Cs-137, and Nb-95 have been detected in some samples. These positive results were generally for samples collected at the control station. A summary of the positive historical results for these nuclides along with their applicable MDCs in units of pCi/kg dry is provided in Table 4.9. Cs-134 and Cs-137 data are plotted in Figures 4.9-1 and 4.9-2, respectively.

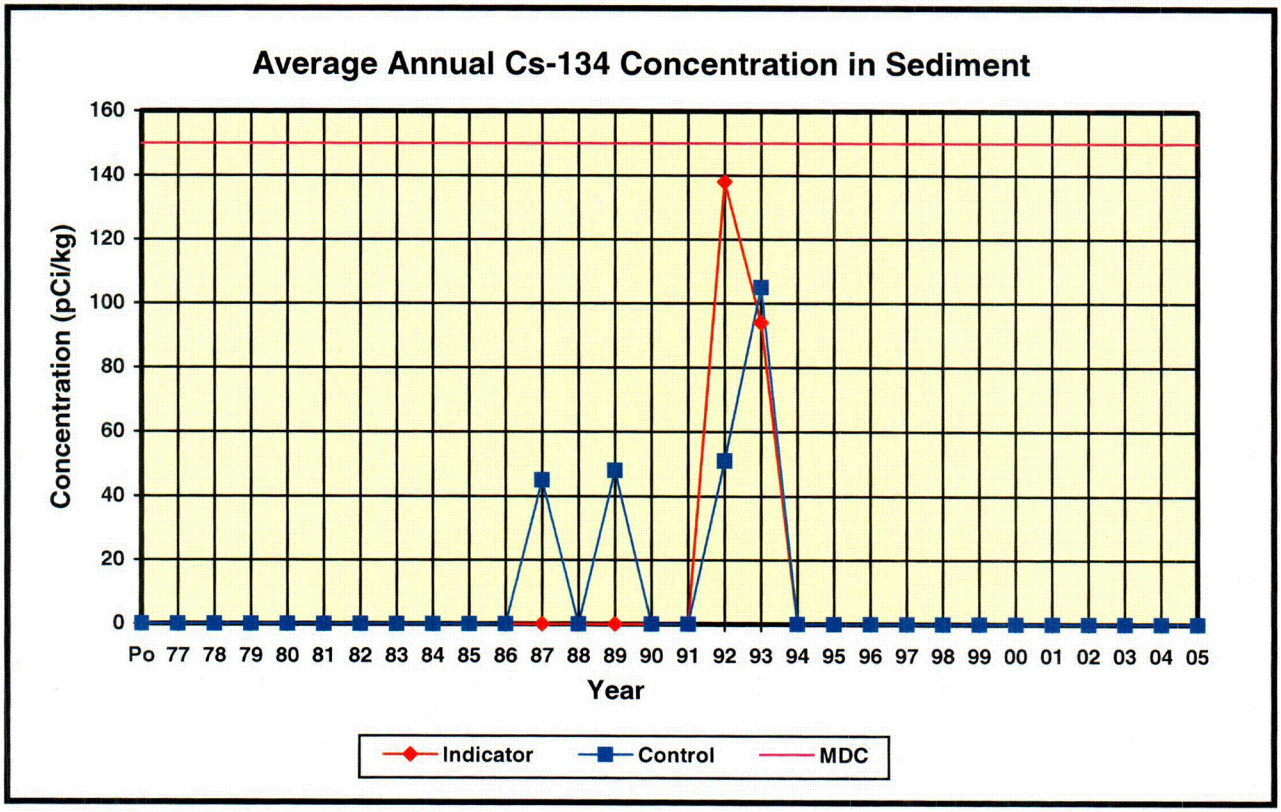
Table 4.9

Sediment Nuclide Concentrations

Nuclide	YEAR	Indicator (pCi/kg)	Control (pCi/kg)	MDC (pCi/kg)
Be-7	**1985**	535	945	655 (a)
	2003	199	NDM	
Cs-134	**1987**	NDM	45	150
	1989	NDM	48	
	1992	138	51	
	1993	94	105	
Cs-137	**1981**	NDM	185	180
	1985	NDM	97	
	1989	NDM	39	
	1994	29	11	
	1996	11.8	NDM	
	2005	14.5	NDM	
Nb-95	**1981**	52	113	50 (a)

(a) Determined by the EL. Not defined in ODCM Table 4-3 (Table 4-1 of this report).

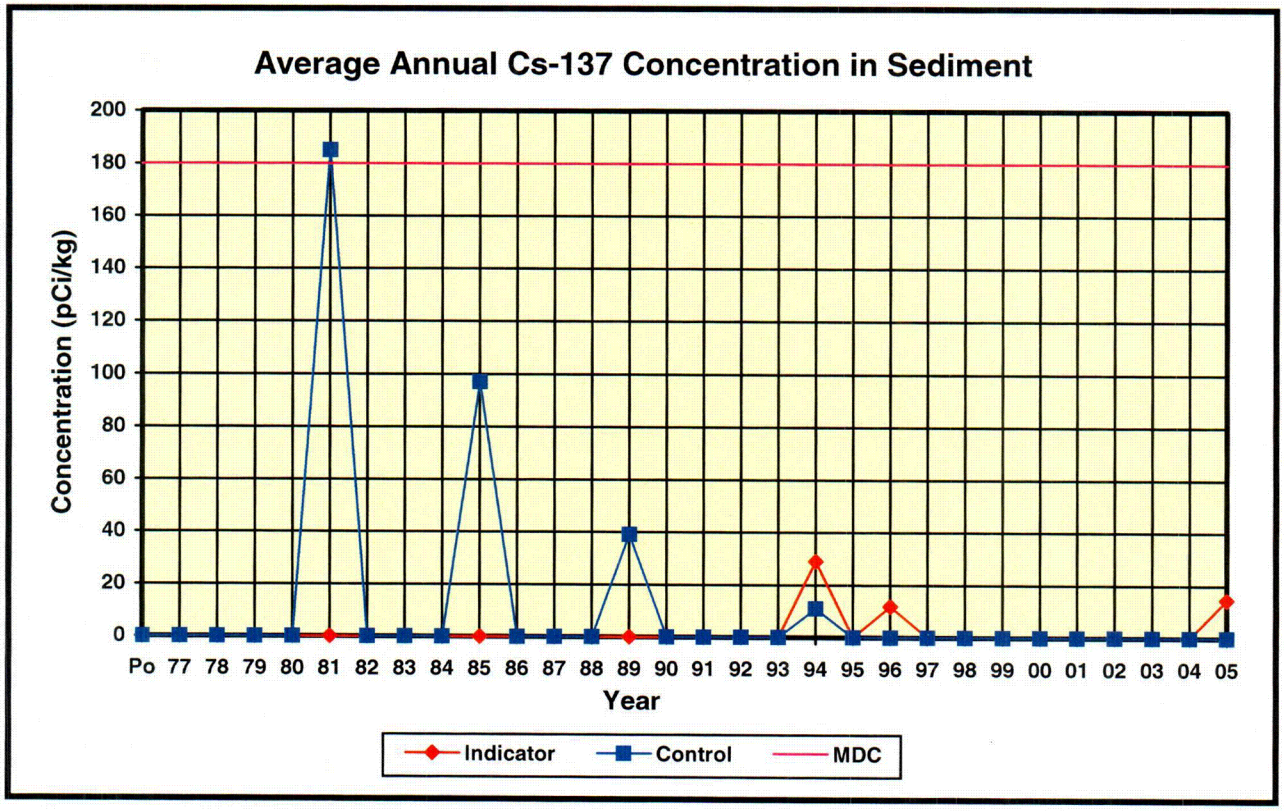
Figure 4.9-1



The positive results for Cs-134 appear mostly at the control station. Due to its relatively short half-life of approximately 2 years, the positive results may be attributed to the Chernobyl incident. The overall plotting of the positive results does not show any discernible trends.

C30

Figure 4.9-2



Cs-137 appears to be trending down since the ceasing of above ground weapons testing and the majority of the positive results appear at the control stations. Therefore in general, the positive results can be attributed to the weapons tests and the Chernobyl incident.

C31

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.

In 2005, the laboratory analyzed 9 samples for 46 parameters and completed a gamma analysis investigation of Fe-59 in water. The 2005 analyses included tritium, gross beta, Fe-55, Sr-89/90 and gamma emitting radio-nuclides in different matrices. Two analyses were outside the control limit for precision. The precision deviations were for the determination of gross alpha in water and Sr-90 in an air filter.

The gross alpha in water was analyzed in triplicate with an average value reported. The high range may be attributed to one of the samples not dispersing evenly in the planchet causing alpha absorption. The second quarter alpha sample was in control so no further investigation will be performed. The second quarter air filter sample analyzed for Sr-90 had a high precision value. The low activity in the sample produced small detector counts, thus causing the elevated error. No further investigation will be performed.

The 2004 Fe-59 analysis in water investigation was completed. The efficiencies used in determining the activity were obtained from a calibration curve. The curve was determined to be lower at higher energies due to summing effects from the calibration nuclides. A curve will be produced using a standard containing nuclides without summing gamma energies. The difference in efficiencies of the curves will be applied to the analysis to compensate for the summing losses. This is a known bias for gamma spectroscopy measurements and does not significantly effect radiological environmental monitoring measurements.

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	09/15/05	75.00	71.80	2.90	0.80	5.60	0.77

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	09/15/05	161.80	163.00	5.42	1.82	4.69	-0.16
Co-58	09/15/05	46.30	44.50	4.79	0.49	12.39	0.31
Co-60	09/15/05	113.20	117.00	1.06	1.30	3.80	-0.88
Cr-51	09/15/05	260.80	237.00	6.53	2.63	8.14	1.12
Cs-134	09/15/05	80.00	85.70	3.86	0.95	6.27	-1.14
Cs-137	09/15/05	145.60	137.00	8.07	1.52	6.67	0.89
Fe-59	09/15/05	53.40	42.70	3.91	0.49	11.03	1.82
Mn-54	09/15/05	70.40	64.50	1.22	0.72	5.11	1.65
Zn-65	09/15/05	105.10	86.50	5.51	0.96	7.88	2.24

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	06/09/05	97.60	92.40	12.37	1.03	7.95	0.67
Co-58	06/09/05	NA	NA	NA	NA	NA	NA
Co-60	06/09/05	144.20	145.00	5.62	1.61	5.94	-0.09
Cr-51	06/09/05	286.60	303.00	28.38	3.37	15.87	-0.36
Cs-134	06/09/05	93.10	95.00	6.43	1.06	8.75	-0.24
Cs-137	06/09/05	194.30	189.00	6.24	2.10	5.60	0.49

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	06/09/05	70.30	63.90	8.92	0.71	17.92	0.51
I-131	06/09/05	93.00	86.90	6.93	0.97	10.63	0.61
Mn-54	06/09/05	127.70	125.00	3.73	1.39	6.61	0.31
Zn-65	06/09/05	163.50	155.00	12.09	1.72	10.90	0.48

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	03/17/05	276.00	268.00	4.66	2.98	6.00	0.45
	06/09/05	214.20	214.00	17.96	2.37	8.39	0.01

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	03/17/05	222.00	221.00	9.6	2.46	5.13	0.09
Co-58	03/17/05	115.40	111.00	7.4	1.24	9.21	0.41
Co-60	03/17/05	142.80	139.00	6.4	1.54	7.91	0.34
Cr-51	03/17/05	370.30	322.00	46.1	3.57	14.70	0.89
Cs-134	03/17/05	138.60	134.00	6.1	1.49	5.46	0.61

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	03/17/05	131.40	125.00	7.3	1.39	6.53	0.75
Fe-59	03/17/05	125.60	107.00	9.5	1.19	12.06	1.23
I-131	03/17/05	76.10	65.90	7.1	0.73	11.84	1.13
Mn-54	03/17/05	157.00	154.00	8	1.71	5.63	0.34
Zn-65	03/17/05	219.60	191.00	14.9	2.12	10.82	1.20

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	03/17/05	5388.00	6040.00	132.04	133.33	4.10	-2.96
	06/09/05	9879.10	9100.00	133.48	200.00	2.60	2.62

6.0 CONCLUSIONS

This report confirms the licensee's conformance with the requirements of Chapter 4 of the ODCM during 2005. It provides a summary and discussion of the results of the laboratory analyses for each type of sample.

All of the radiological levels were low and are generally trending downward.

In 2005, there were two sample types (game fish and river sediment) which showed low levels of Cs-137 in the indicator station samples but no positive results for Cs-137 in the control station samples. These results could potentially be attributed to plant effluents and are discussed below.

Cesium-137 was detected in the game fish samples at the indicator station in the spring and fall collections with no Cs-137 detected at the control station. The average value at the indicator station was 15.7 pCi/kg wet. If an adult consumed game fish regularly from the river, the dose this person could potentially receive would be 2.35E-2 mrem in a year due to Cs-137. This dose is approximately 0.8% of the annual dose limit of 3 mrem to the total body due to liquid effluents.

Cesium-137 was detected at the indicator station in one of the two sediment collections. The positive result was 14.5 pCi/kg dry. There were no positive Cs-137 results at the control station. The potential dose to a member of the public expected to receive the highest dose would be 1.63E-4 mrem in a year which is 0.01% of the annual dose limit.

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.

ENCLOSURE 3

Vogtle Electric Generating Plant
Annual Radiological Environmental Operating Report for 2005

VOGTLE ELECTRIC GENERATING PLANT ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR 2005

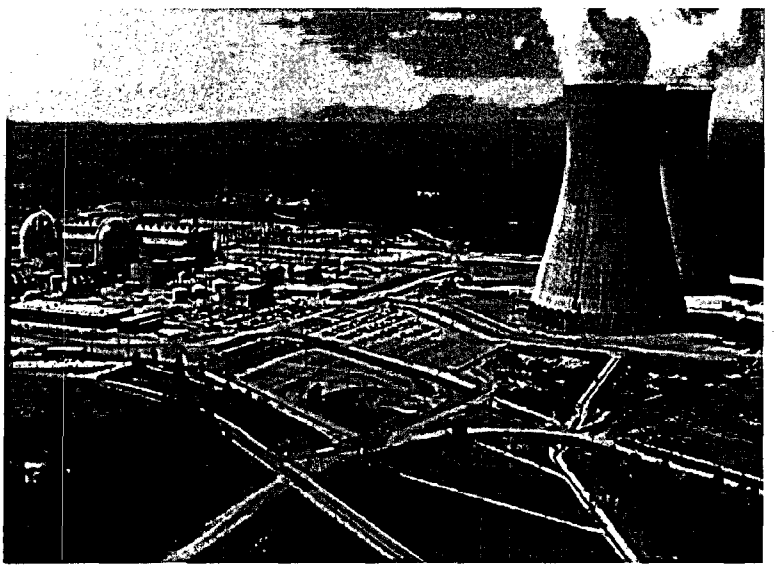


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TABLE OF CONTENTS

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 2005 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 two 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]
98	Control	W.C. Dixon Dairy	SE	9.8	Milk
99[7]	Control	Boyceland Dairy	W	20.9	Milk
100[8]	Control	Coble Dairy	WNW	16.2	Milk

TABLE 2-2 (SHEET 3 of 3)

RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

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.

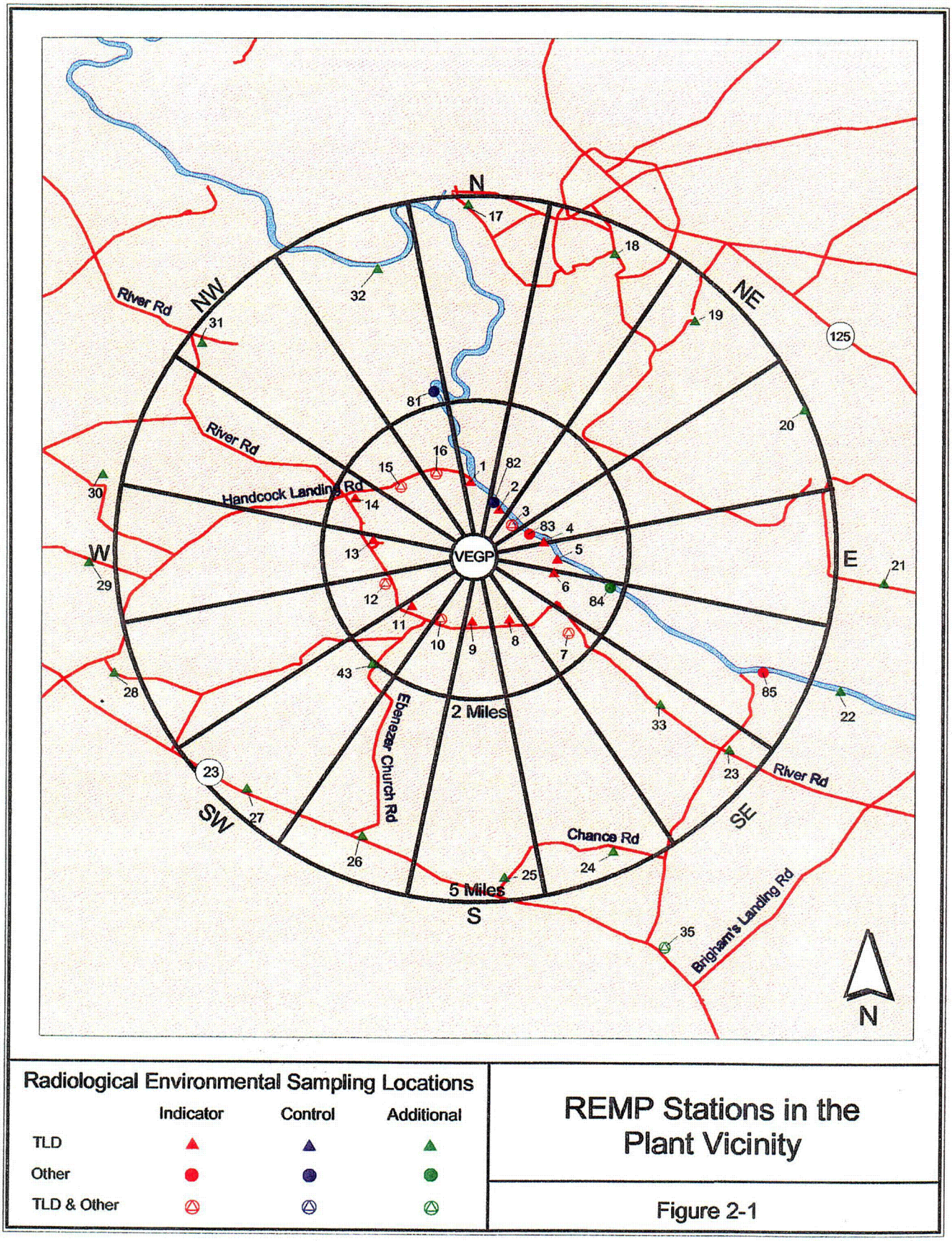
(4) Sediment is collected at locations with existing or potential recreational value. Because high water, shifting of the river bottom, or other reasons could cause a suitable location for sediment collections to become unavailable or unsuitable, a stretch of the river between RM 148.5 and 150.5 was 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.

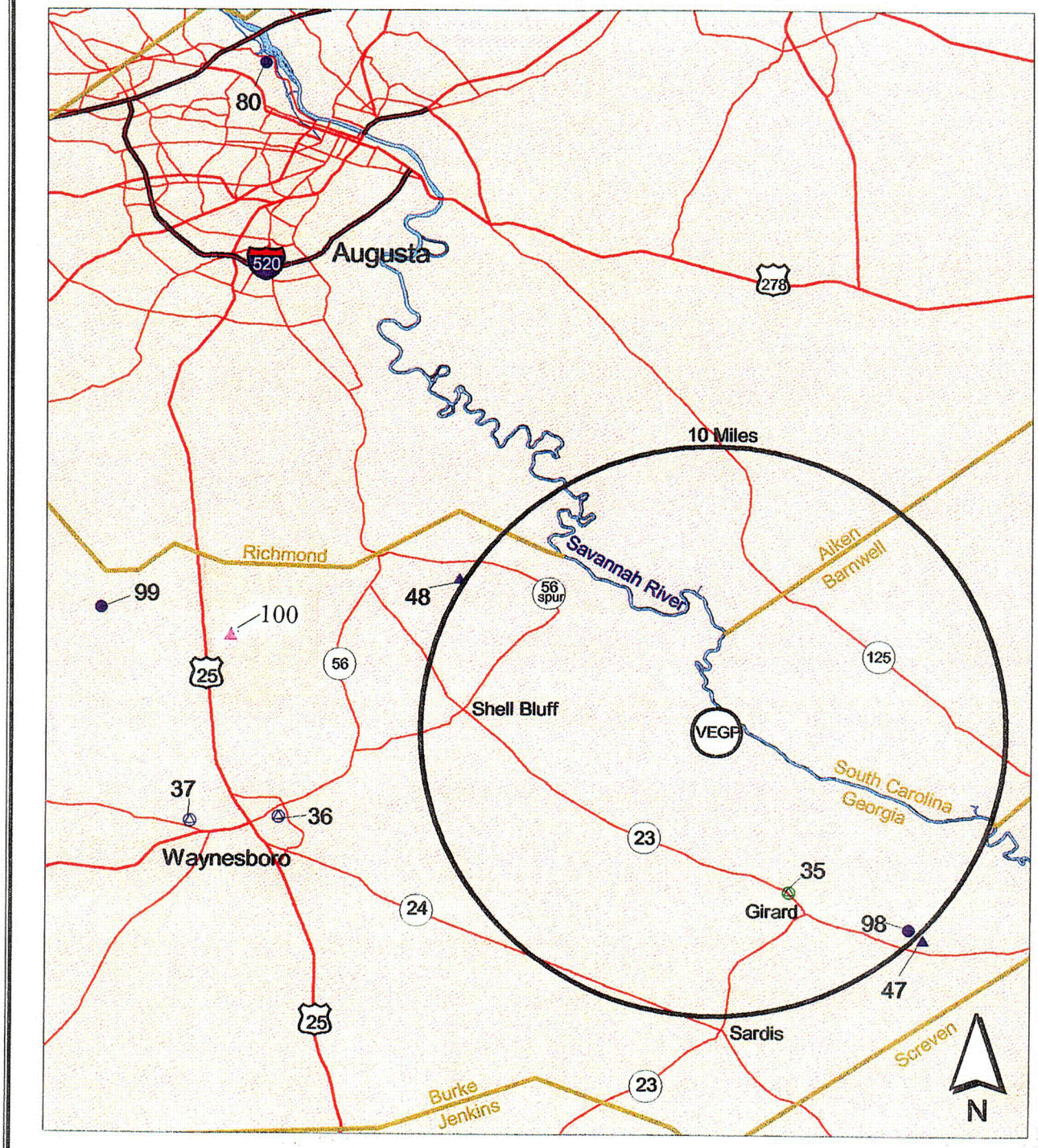
(7) Dairy operations ceased and milk sampling was discontinued at location 99 on September 3, 2003.

(8) Milk sample collection began at location 100 on September 30, 2003.



Radiological Environmental Sampling Locations				REMP Stations in the Plant Vicinity
	Indicator	Control	Additional	
TLD	▲	▲	▲	
Other	●	●	●	
TLD & Other	△	△	△	Figure 2-1

C32

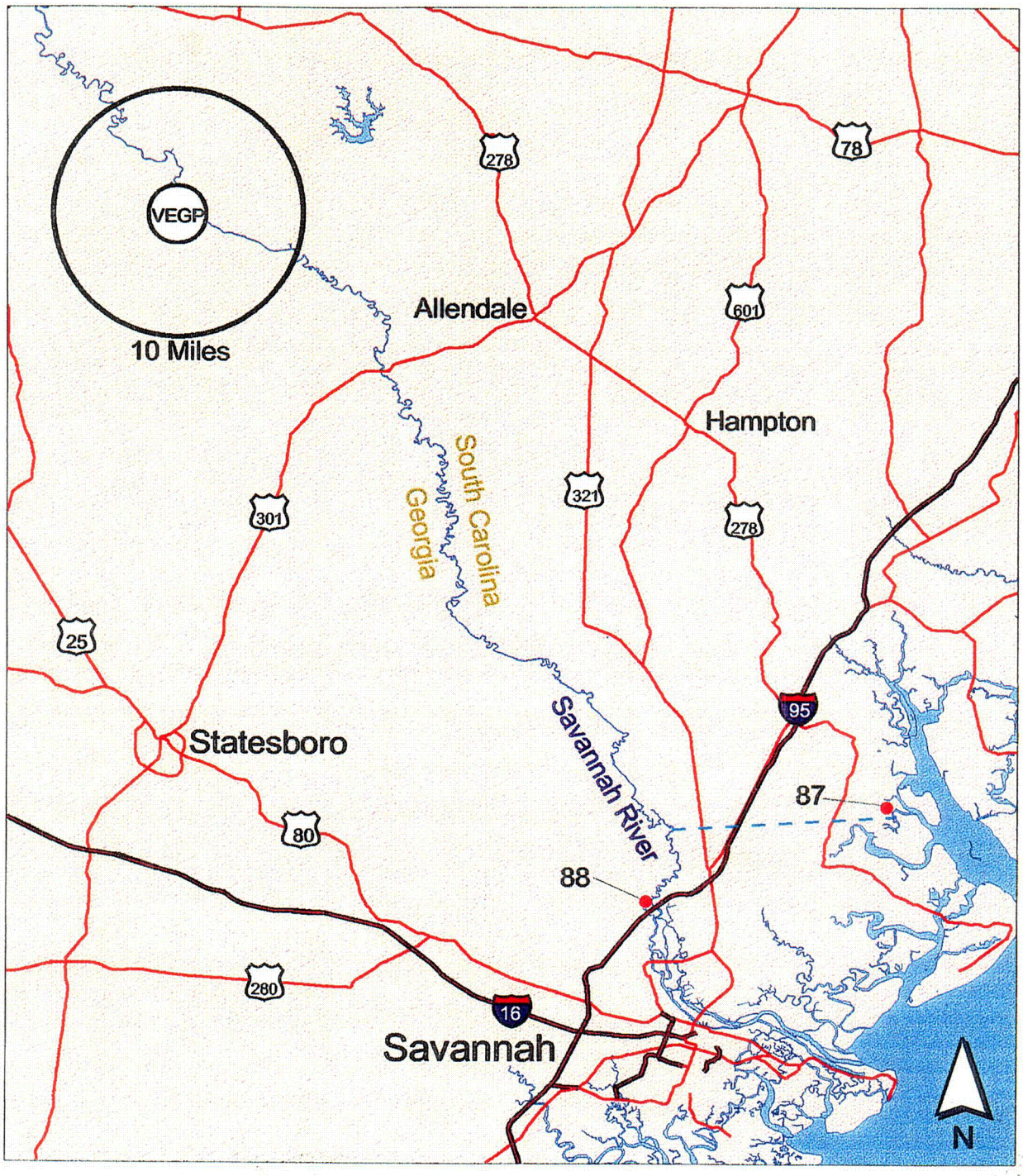


Radiological Environmental Sampling Locations			
	Indicator	Control	Additional
TLD	▲	▲	▲
Other	●	●	●
TLD & Other	△	△	△

REMP Control Stations for the Plant

Figure 2-2

C33



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

REMP Indicator Drinking Water Stations

Figure 2-3

C34

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 2005.

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 361	10	20.5 1.6-39.3 (259/259)	Station 16 Hancock Landing Road 1.4 miles NNW	20.9 1.7-33.3 (51/51)	19.4 1.9-34.2 (52/52)	20.4 1.9-39.0 (50/50)
	Gamma Isotopic 28						
	Cs-134	50	NDM (c)		NDM	NDM	NDM
	Cs-137	60	NDM		NDM	NDM	NDM
Airborne Radioiodine (fCi/m3)	I-131 361	70	NDM		NDM	NDM	NDM
Direct Radiation (mR/91 days)	Gamma Dose 157	NA (d)	12.5 7.7-17.2 (62/62)	Station 29 Claxton-Lively Road 5.1 miles W	16.3 15.3-16.9 (4/4)	13.0 9.8-16.9 (72/72)	13.2 10.7-16.3 (23/23)

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 46						
	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 46	1	NA		NDM	NA	NDM
Vegetation (pCi/kg-wet)	Gamma Isotopic 36						
	I-131	60	NDM		NDM	NA	NDM
	Cs-134	60	NDM		NDM	NA	NDM
	Cs-137	80	49.5 23.5-75.6 (2/24)	Station 16 Hancock Landing Road 1.4 miles NNW	75.6 (1/12)	NA	NDM

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	3000	800 334-1420 (4/4)	Station 83 RM 150.4 0.8 miles ENE	800 334-1420 (4/4)	712 276-1400 (4/4)	458 306-610 (2/4)

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 36	4	3.75 1.32-11.04 (23/24)	Station 87 Beaufort 76 miles SE	4.53 1.43-11.04 (12/12)	NA	2.48 1.28-3.39 (11/12)
	Gamma Isotopic 36						
	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 12	3000	463 259-677 (8/8)	Station 87 Beaufort 76 miles SE	483 363-600 (4/4)	NA	393 344-442 (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 36	4	2.61 1.66-5.19 (24/24)	Station 87 Beaufort 76 miles SE	2.74 1.92-5.19 (12/12)	NA	2.00 1.01-3.80 (11/12)
	Gamma Isotopic 36						
	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 12	2000	546 435-735 (8/8)	Station 87 Beaufort 76 miles SE	564 435-724 (4/4)	NA	223 (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		Other Stations (g) Mean (b), Range (Fraction)	Control Locations Mean (b), Range (Fraction)
				Name Distance & Direction	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	28.8 (1/1)		NDM	NA	NA
Fish (pCi/kg-wet)	Gamma Isotopic 2						
	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	39.3 (1/1)	Station 81 2.5 miles N	40.2 (1/1)	NA	40.2 (1/1)

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)	1931 1325-2538 (2/2)	Station 83 0.8 miles ENE	1931 1325-2538 (2/2)	NA	1086 556-1616 (2/2)
	Co-60	70(e)	146 (1/2)	Station 83 0.8 miles ENE	146 (1/2)	NA	NDM
	Cs-134	150	NDM		NDM	NA	NDM
	Cs-137	180	263 135-391 (2/2)	Station 83 0.8 miles ENE	263 135-391 (2/2)	NA	89 80-99 (2/2)

TABLE 3-1 (SHEET 8 of 8)

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 2005 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 2005 there were four 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
1st Quarter 2005	TLD Station #1	No direct radiation data.	Unable to collect TLDs because station was underwater due to high river level.	Replaced TLDs when water level receded.
1st Quarter 2005	TLD Station #47	No direct radiation data.	Tree where TLDs were in attached was cut down.	TLDs were replaced with blanks at mid-quarter.
5/3/05-5/10/05	Girard AF/AC Station 35	Non-representative sample of airborne particulates.	Small hole found in air filter.	Replaced filter at beginning of week.
7/27/05-8/2/05	Waynesboro AF/AC Station 36	Non-representative sample of airborne particulates.	Power loss at air station.	Contacted Distribution about power loss.
8/2/05-8/9/05	Waynesboro AF/AC Station 36	Non-representative sample of airborne particulates.	Power loss at air station.	Power restored on 8/10/05 at 12:56pm.
8/2/05-8/9/05	River Road AF/AC Station 12	Non-representative sample of airborne particulates.	Station only ran 55 hours due to storm.	Station operation satisfactory after sample change out.
8/2/05-8/9/05	Hancock Landing AF/AC Station 16	Non-representative sample of airborne particulates.	Station only ran 55 hours due to storm.	Station operation satisfactory after sample change out.
8/9/05-8/16/05	Girard AF/AC Station 35	Non-representative sample of airborne particulates.	Sample time short 85 hours.	Total volume was calculated. Station operation satisfactory after sample change out.
8/9/05-8/16/05	Waynesboro AF/AC Station 36	Non-representative sample of airborne particulates.	Power loss at air station.	Power restored on 8/10/05 at 12:56pm.
1st Semi-Annual Period of 2005	Fish Collection	Unable to obtain fish samples.	High river levels existed up until next sample collection period.	Performed fish sampling when water levels permitted during second semi-annual period.
10/4/05-10/11/05	Hancock Landing AF/AC Station 16	Non-representative sample of airborne particulates.	Filter apparatus not completely attached:	Double check connections to ensure proper installation.
10/25/05-12/31/05	W. C. Dixon Dairy	No milk samples available.	Cows were sold. Owner may purchase more cows in the future.	Will keep in contact with owner to find out when/if milk samples will be available.
11/8/05-11/22/05	Coble Dairy	No milk samples available.	Coble moved cows to new location.	Dairy employees will start providing samples on 12/6/05.
11/22/05-11/29/05	Waynesboro AF/AC Station 36	Non-representative sample of airborne particulates.	Air filter not centered in sample holder.	Double check filter placement during change out.
4th Quarter 2005	TLD Station #14	Non-representative sample of airborne particulates.	TLDs missing at the end of the quarter.	TLDs replaced at the beginning of the next quarter.

4.1 Land Use Census and River Survey

In accordance with ODCM 4.1.2, a land use census was conducted on November 15, 2005 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	None	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	4.6	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	4.4	None
WNW	1.8	None	None	3.3
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 2005.

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 September 20, 2005 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 October 31, 2005 and the South Carolina Department of Health and Environmental Control on September 22, 2005. 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 two 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 2005 annual average weekly gross beta activity was 20.5 fCi/m^3 for the indicator stations. It was 0.1 fCi/m^3 greater than the control station average of 20.4 fCi/m^3 for the year. This difference is not statistically discernible, since it is less than the calculated MDD of 2.7 fCi/m^3.

The 2005 annual average weekly gross beta activity at the Girard community station was 19.4 fCi/m^3 which was 1.0 fCi/m^3 less than the control station average. This difference is not statistically discernible since it is less than the calculated MDD of 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

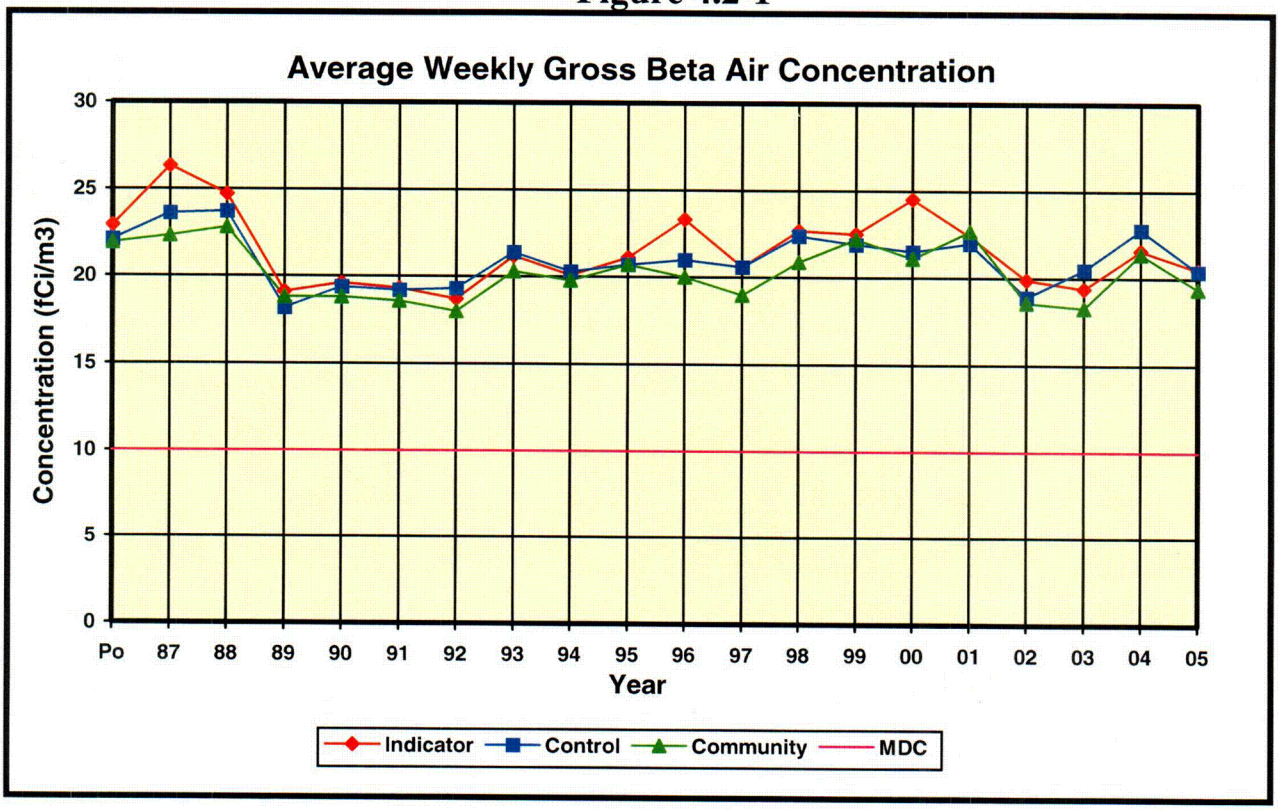


Table 4.2-1
Average Weekly Gross Beta Air Concentration

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

C35

During 2005, 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 2005, Be-7 was not identified in plant gaseous effluents therefore it is not included in the 2005 REMP summary table for the airborne pathway samples. Be-7 has been detected in gaseous effluents eight of the eighteen 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 2005. 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 2005. There were nine air sampling deviations. Six of these involved power losses to the air station; at least two of the six were storm related outages. Two of the nine deviations involved errors in placement of filters/filter holders. One deviation was due to a hole in the air filter. The sample results of six of the nine deviations passed Chauvenet's Criterion and were retained in the air sample database. Three of the deviations resulted in data exclusions from the database.

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 12.5 mR with a range of 7.7 to 17.2 mR. This average was 0.7 mR less than the average quarterly exposure measured at the control stations (13.2 mR). This difference is not statistically discernible since it is less than the MDD of 1.0 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 2005 ranged from 9.8 to 16.9 mR with an average of 12.9 mR which was 0.3 mR less than that for the control stations. However, this difference is not discernible since it is less than the MDD of 1.0 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

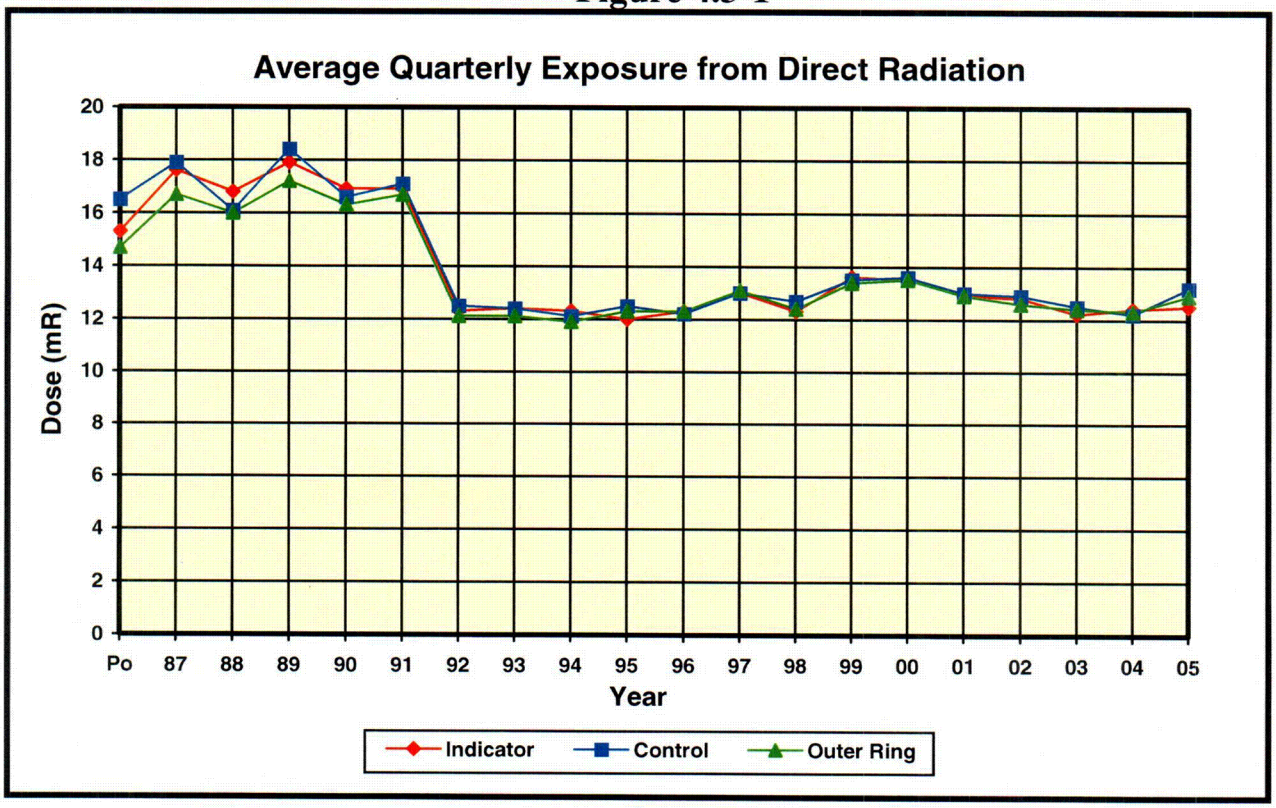


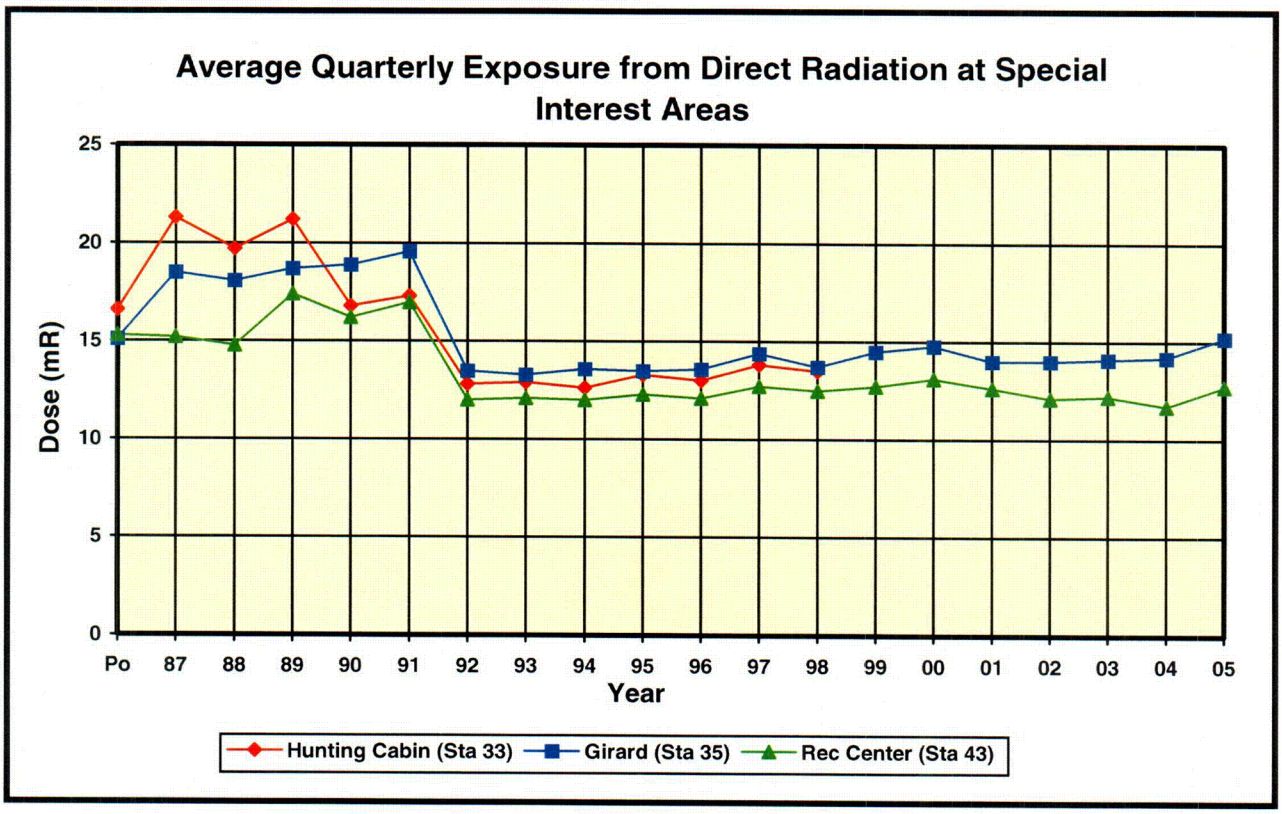
Table 4.3-1
Average Quarterly Exposure from Direct Radiation

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

C36

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



C37

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

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 three deviations from the REMP pertaining to measuring quarterly gamma doses during 2005. These deviations are listed in Table 4-3. All three deviations led to data exclusions from the database. In two of these cases, the TLDs were missing or destroyed therefore no data was available for those stations. In one case, blanks were put in place at mid-quarter and the results failed Chauvenet's Criterion.

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:	V30A, V32B, V45B, V47A
Second Quarter:	V16B, V23A, V31B, V37B
Third Quarter:	None
Fourth Quarter:	None

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.

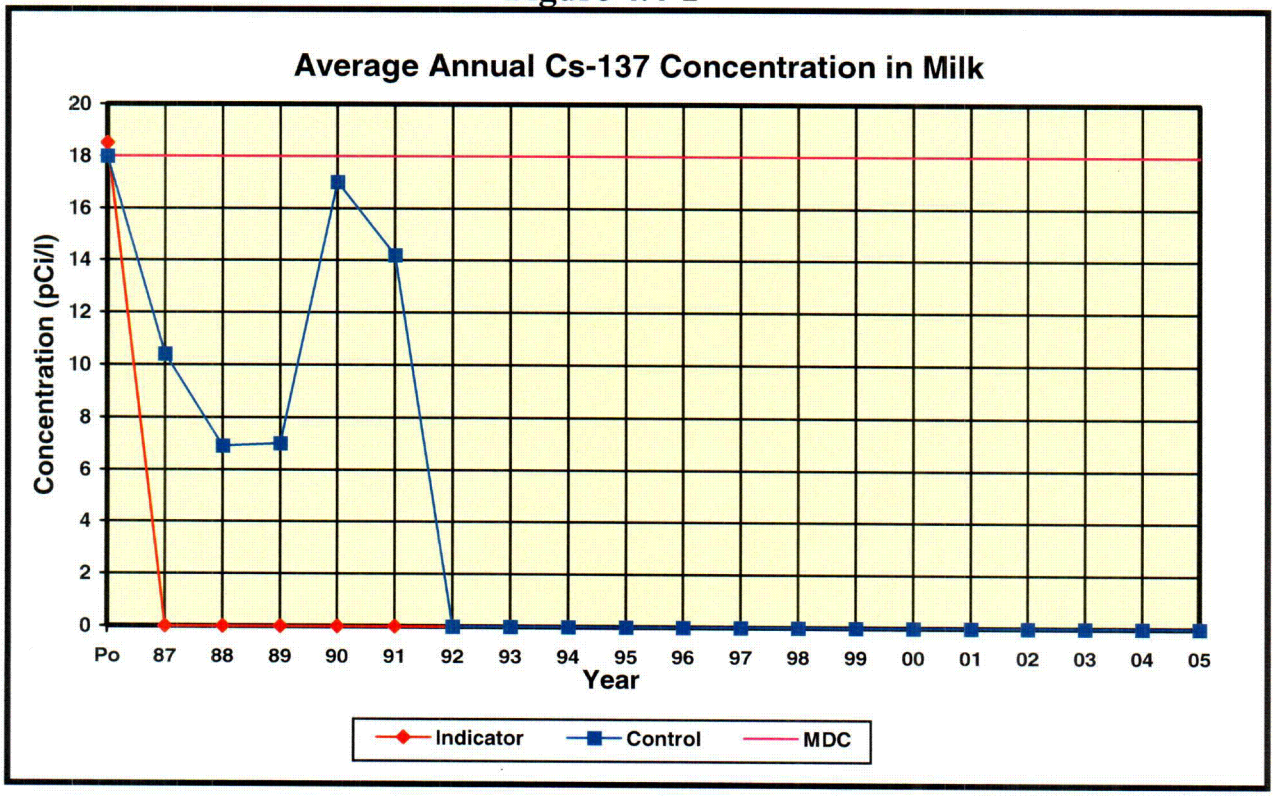
4.4 Milk

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 Boyceland Dairy (Station 99). The Boyceland Dairy discontinued operations in 2003. The last sample was collected on September 3, 2003, and Coble Dairy (Station 100) was added soon after as a replacement location. In the fall of 2005, W. C. Dixon Dairy sold his cows but indicated that he may purchase more cows in 2006. Coble Dairy also had some business changes. The cows were moved in November 2005 from the location on Hwy. 25 to a nearby location on Hwy. 80 north of Waynesboro. No milk samples were available for the two collection periods in November due to milking and processing activities in the new location. A schedule was agreed upon by the Coble employees to provide samples twice a month. Gamma isotopic and I-131 analyses are performed on each milk sample.

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 2005 land use census.

No man-made radionuclide was identified during the gamma isotopic analysis of the milk samples in 2005. 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



C38

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

During 2005, I-131 was not detected in any of the milk samples. Since 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 2005, 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 49.5 pCi/kg-wet. None of the 12 samples collected at the control stations were positive for Cs-137. The levels seen at the indicator stations could potentially be attributed to plant effluents. However, Cs-137 is sometimes 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 2005, 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

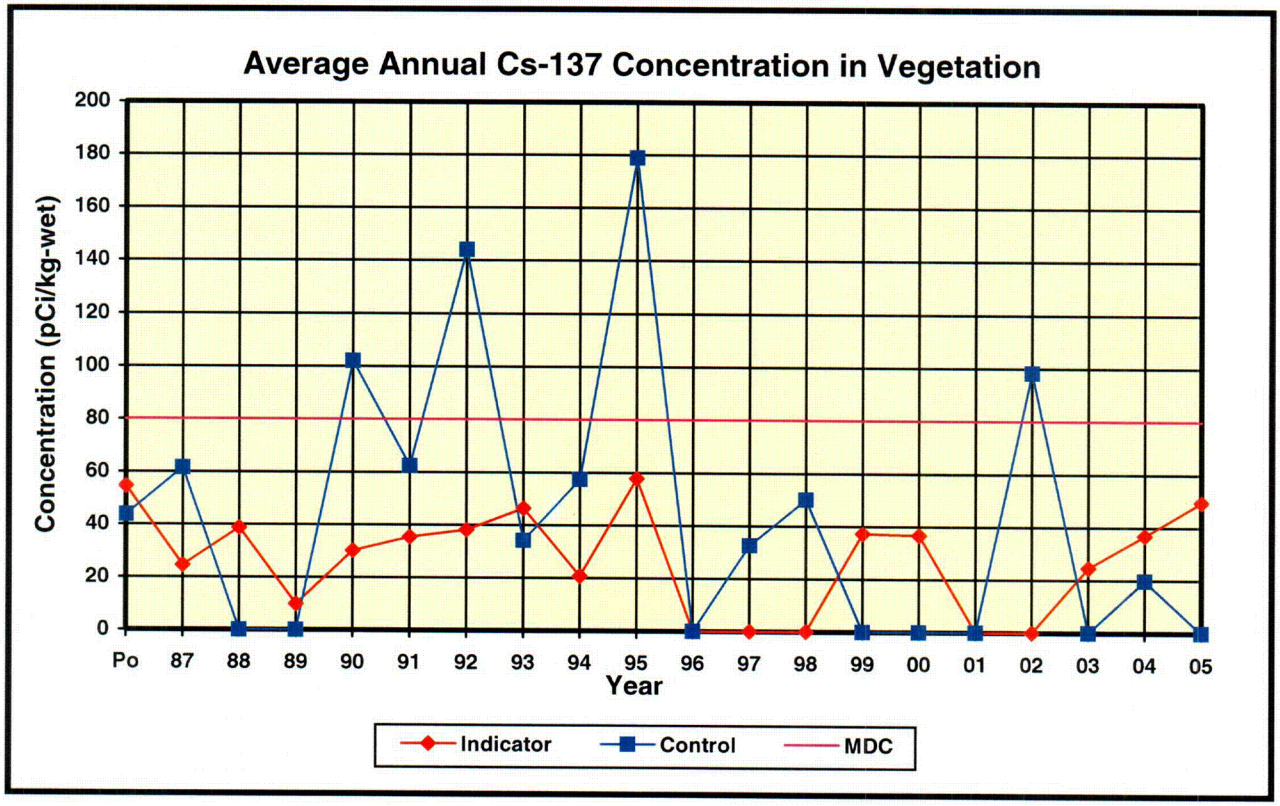


Table 4.5-1
Average Annual Cs-137 Concentration in Vegetation

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

C39

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 2005 river water samples.

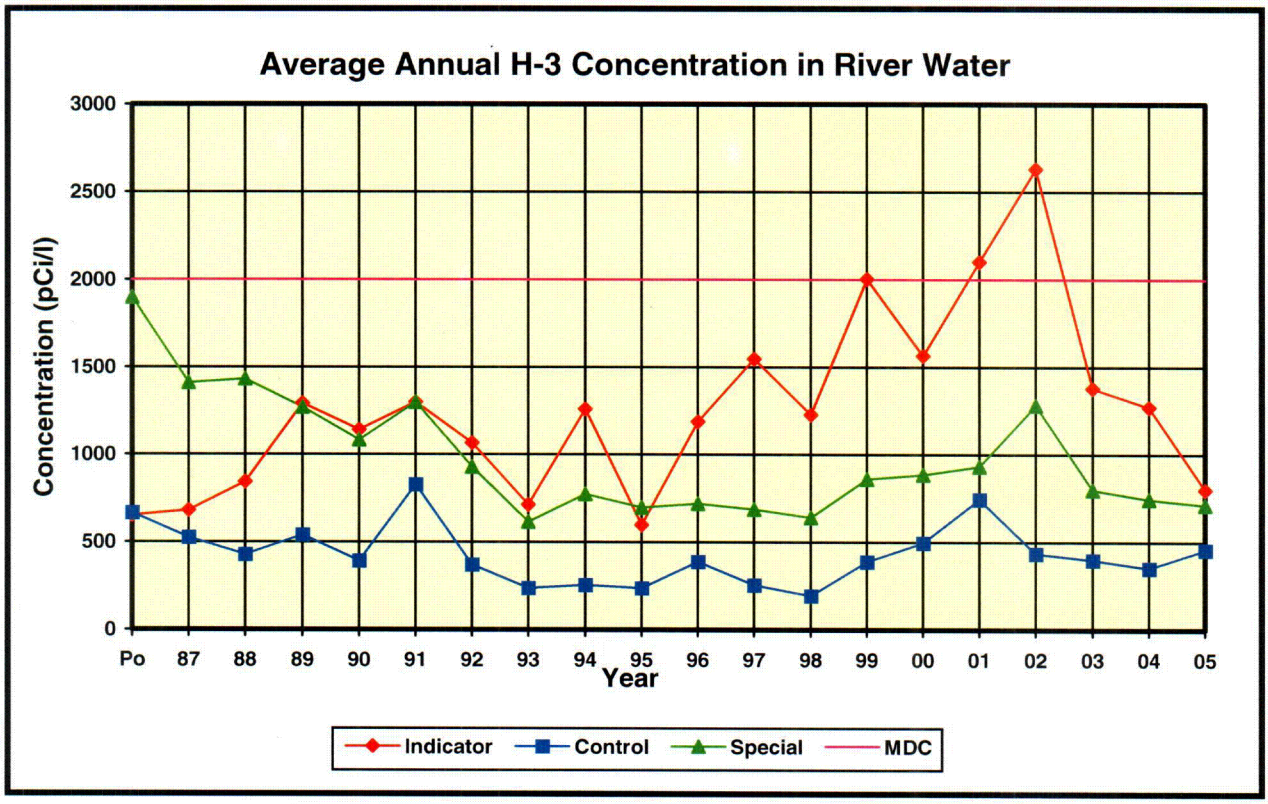
Each quarterly composite is analyzed for tritium. As indicated in Table 3-1, the average concentration found at the indicator station was 800 pCi/l which was 342 pCi/l greater than that found at the control station (458 pCi/l). This difference is not statistically discernible since it is less than the calculated MDD of 1333 pCi/l. 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 276 pCi/l to 1400 pCi/l with an average of 713 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



C40

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

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 two indicator locations (Station 87 - the Beaufort-Jasper County Water Treatment Plant near Beaufort, South Carolina, 112 river miles downriver; and Station 88 - the Cherokee Hill Water Treatment Plant near Port Wentworth, Georgia, 122 river miles downriver). 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 2005, the indicator station average gross beta concentration in the raw drinking water was 3.75 pCi/l which was 1.27 pCi/l greater than the average gross beta concentration at the control station (2.48 pCi/l). This difference is not statistically discernible, since it is less than the calculated MDD of 1.29 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 2005, the indicator station average gross beta concentration in the finished drinking water was 2.61 pCi/l which was 0.61 pCi/l greater than the average gross beta concentration at the control station (2.00 pCi/l). This difference is less than the MDD of 0.79 pCi/l and not statistically discernible. The gross beta concentrations at the indicator stations ranged from 1.66 to 5.19 pCi/l while the concentrations at the control station ranged from 1.01 to 3.80 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

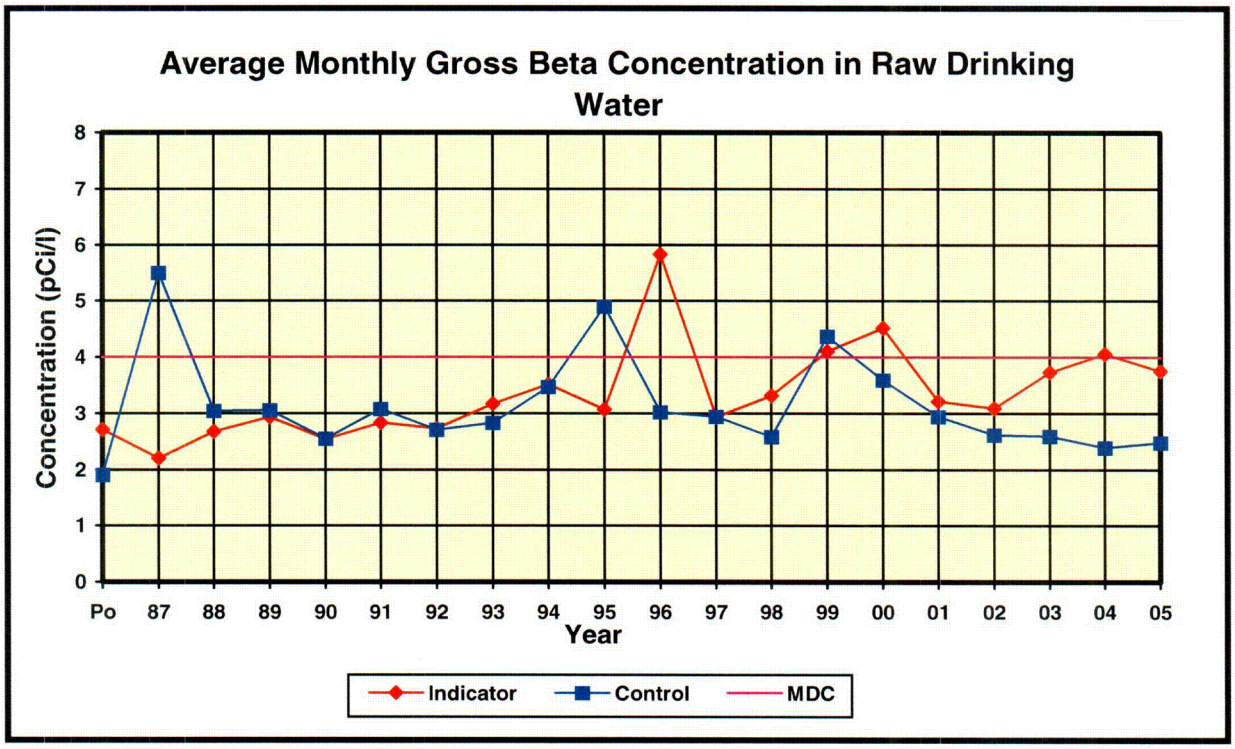


Table 4.7-1
Average Monthly Gross Beta Concentration in Raw Drinking Water

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

C41

Figure 4.7-2

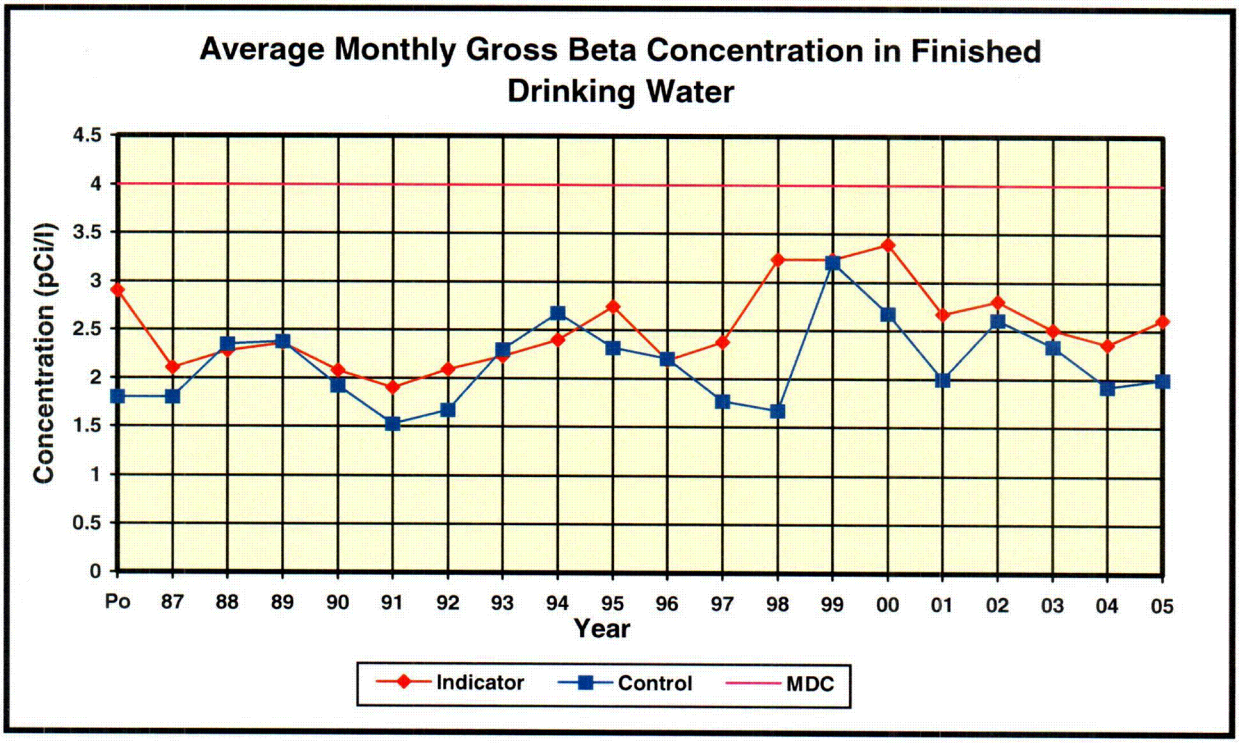


Table 4.7-2
Average Monthly Gross Beta Concentration in Finished Drinking Water

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

C42

As provided in Table 3-1, there were no positive results during 2005 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 2005 raw drinking water indicator stations average tritium was 463 pCi/l which was 70 pCi/l greater than the concentration determined at the control station (393 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 301 pCi/l and therefore is not statistically discernible. For the past 3 years, the average tritium concentration seen at the indicator stations has been less than all prior years (pre-op to present) and was approximately 75% less than the pre-op average tritium concentration seen at the indicator stations (2300 pCi/l). 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 2005 was 546 pCi/l which was 323 pCi/l greater than that found at the control station (223 pCi/l). 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

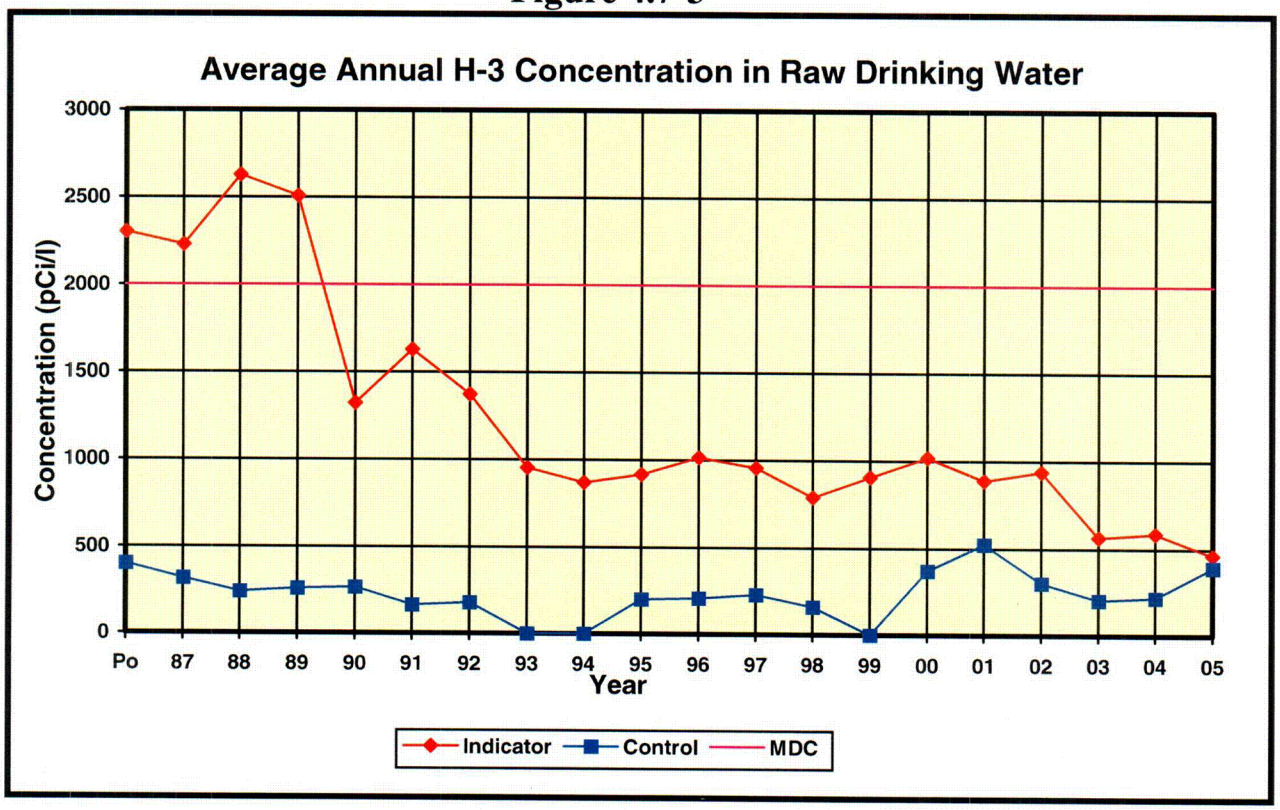


Table 4.7-3
Average Annual H-3 Concentration in Raw Drinking Water

Period	Indicator (pCi/l)	Control (pCi/l)	Difference Between Indicator and 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

C43

Figure 4.7-4

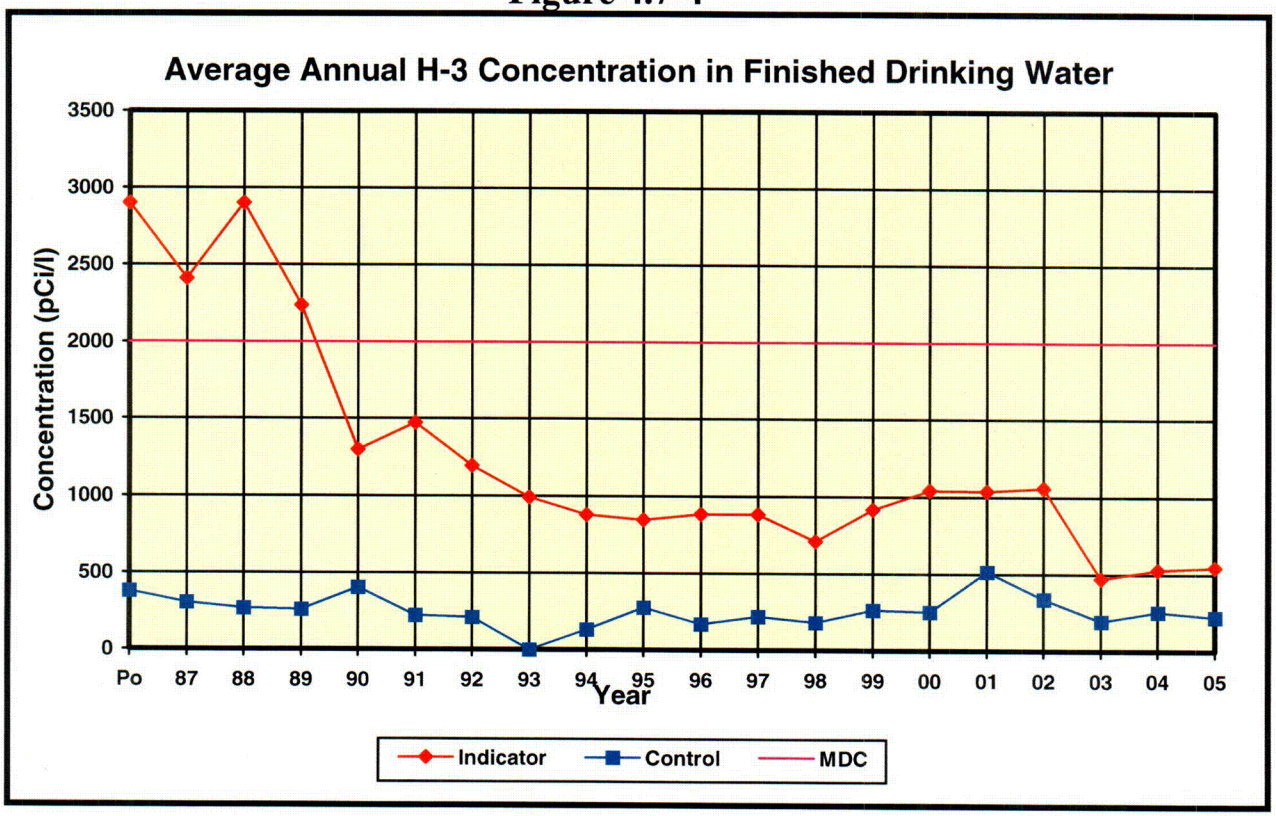


Table 4.7-4
Average Annual H-3 Concentration in Finished Drinking Water

Period	Indicator (pCi/l)	Control (pCi/l)	Difference Between Indicator and 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	0	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

C44

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 sample was collected on April 26, 2005 during the spring spawning season. In all but two 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.

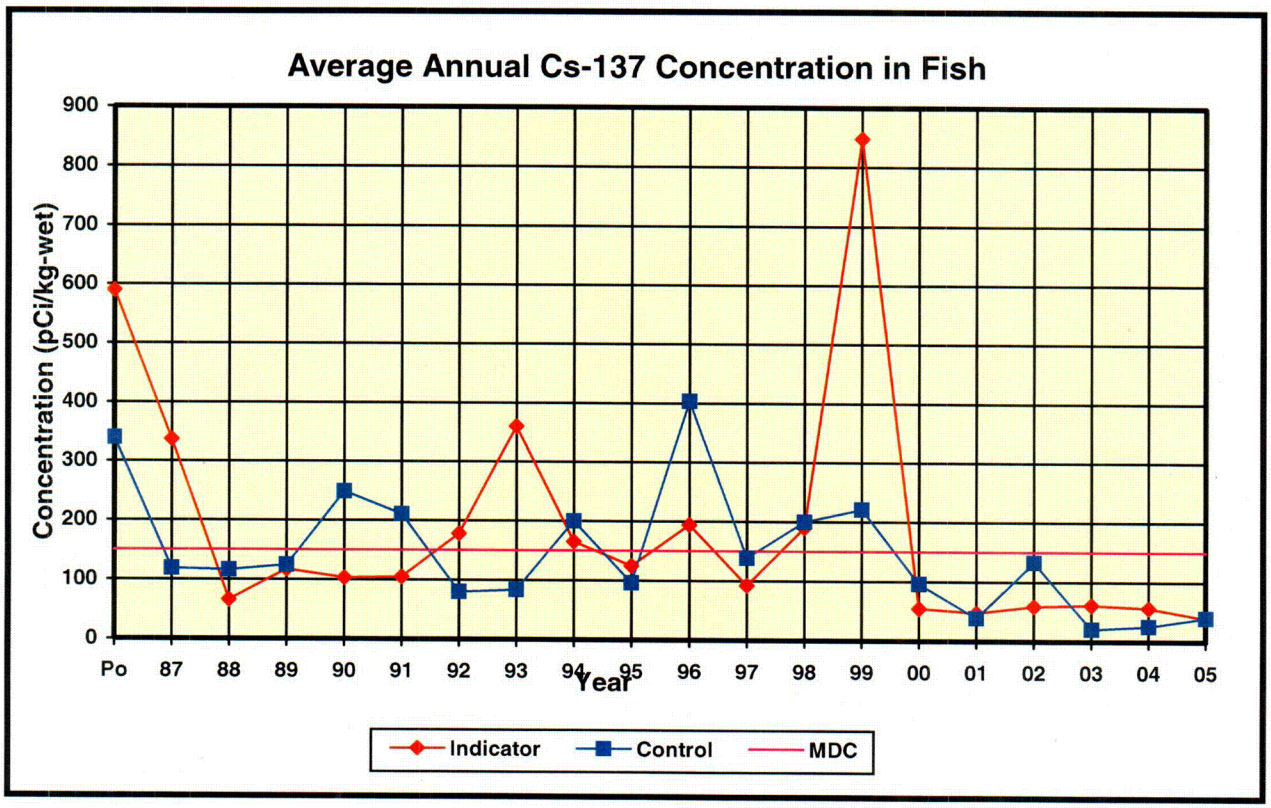
The dates and compositions of the semi-annual catches at the indicator and control stations during 2005 are shown below. During the first semi-annual period, river levels were extremely high and electrofishing was not possible.

Date	Indicator	Control
Could not collect during first semi-annual period due to high river levels	NA	NA
November 4	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 125 samples collected during operation and in all but 5 of the 32 samples collected during preoperation. As provided in Table 3-1, the concentration at the indicator station for the second semi-annual collection was 39.3 pCi/kg-wet which was 0.9 pCi/kg-wet less than that at the control station (40.2 pCi/kg-wet). No statistical analysis can be performed since there is only a single positive value at each station. 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



C45

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

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 July 6 and October 4, 2005 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 2005 samples were Be-7, Co-60, and Cs-137.

Be-7, which is abundant in nature, was not identified in plant liquid effluents during 2005. However, it continues to be trended in river sediment in the REMP report. In 2005, the average level at the indicator station was 1931 pCi/kg-dry and at the control station it was 1086 pCi/kg-dry. The difference between the average at the indicator and the control station (845 pCi/kg-dry) is not statistically discernible since it is less that the MDD of 5612 pCi/kg-dry. 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 2005 was 263 pCi/kg-dry which was 174 pCi/kg-dry greater than that at the control station (89 pCi/kg-dry). The calculated MDD is 889 pCi/kg-dry. Therefore, there is no discernible difference between Cs-137 concentration in sediment at the indicator and control stations. 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 2005, Co-60 was detected in one of two sediment samples at the indicator station. The concentration of the single positive sample was 146 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

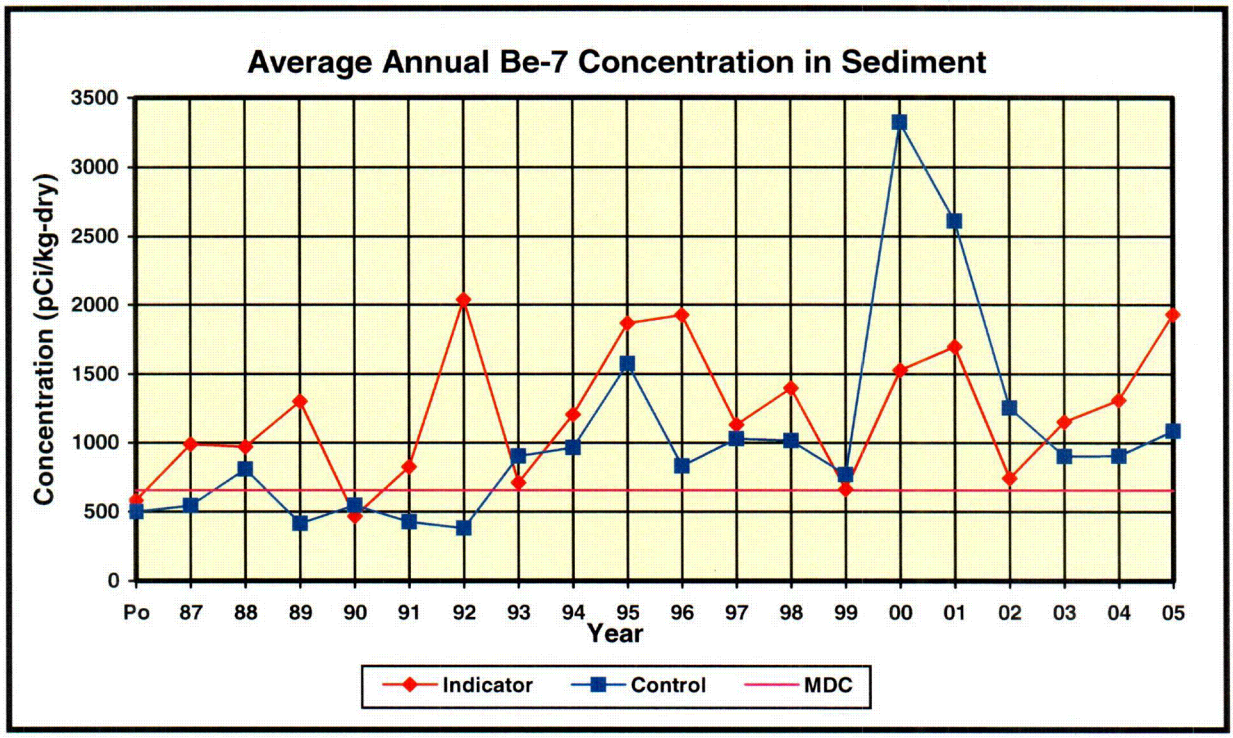


Table 4.9-1
Average Annual Be-7 Concentration in Sediment

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

C46

Figure 4.9-2

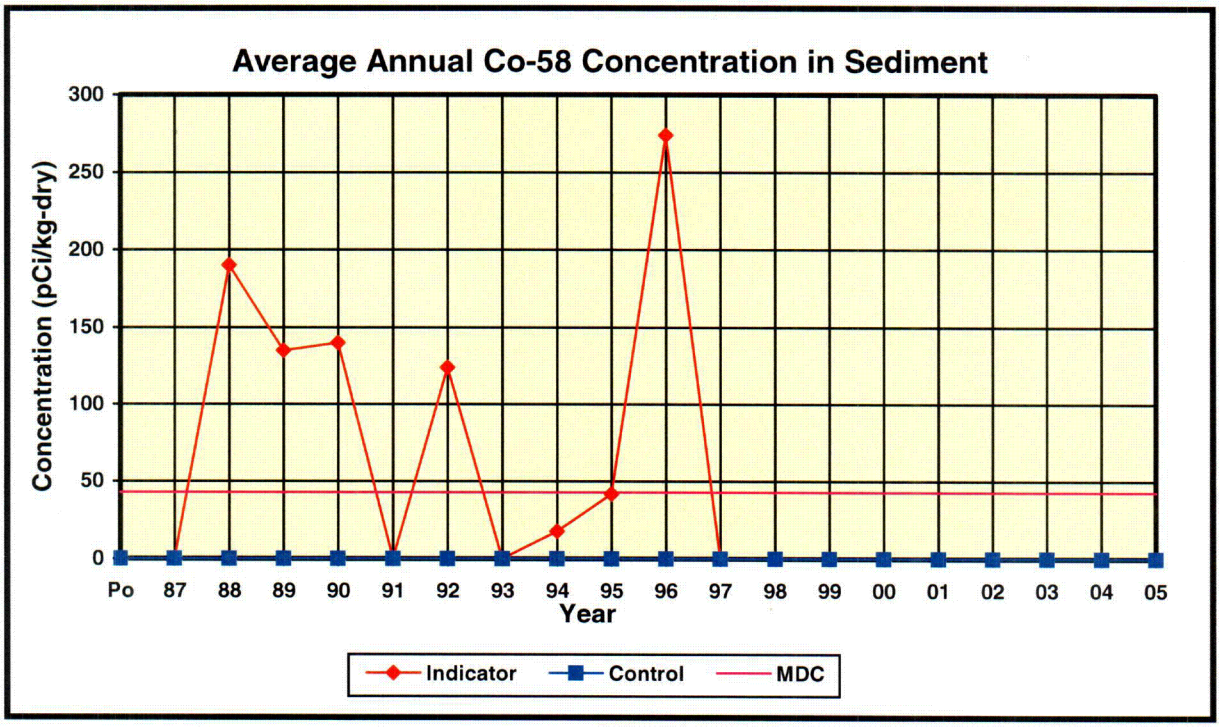


Table 4.9-2
Average Annual Co-58 Concentration in Sediment

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

C47

Figure 4.9-3

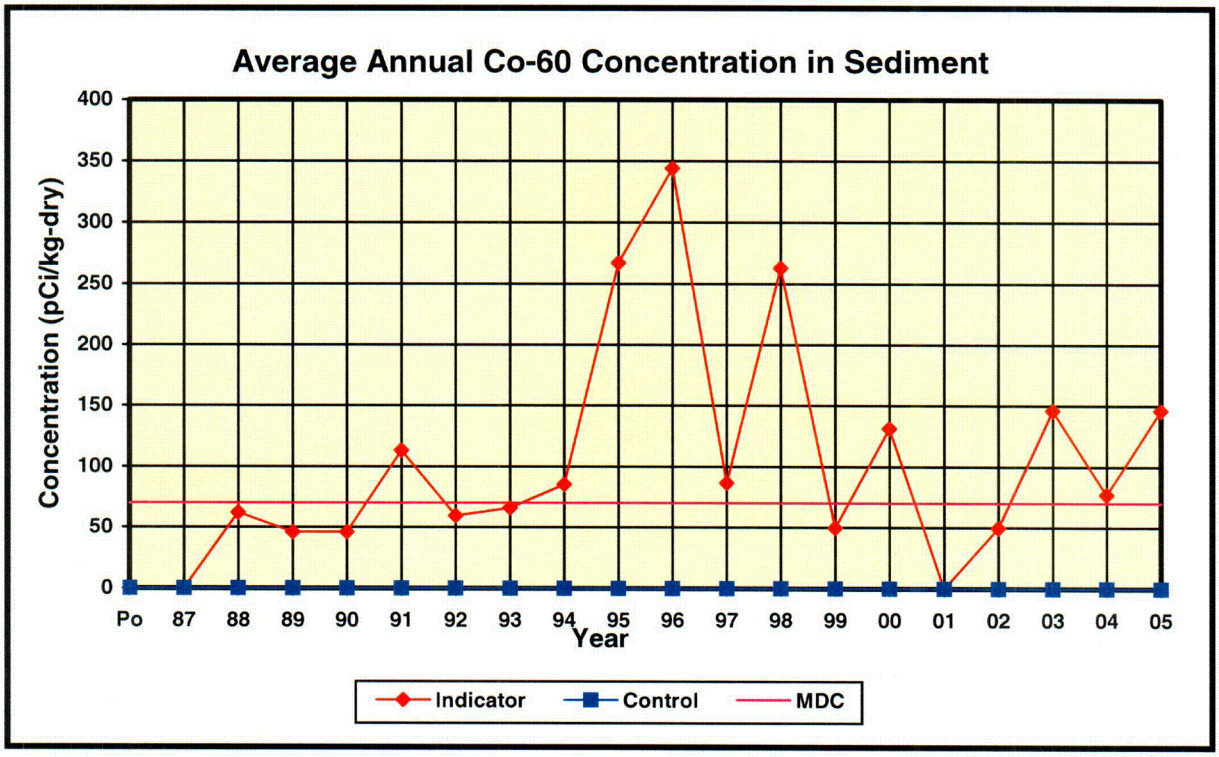


Table 4.9-3
Average Annual Co-60 Concentration in Sediment

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

C48

Figure 4.9-4

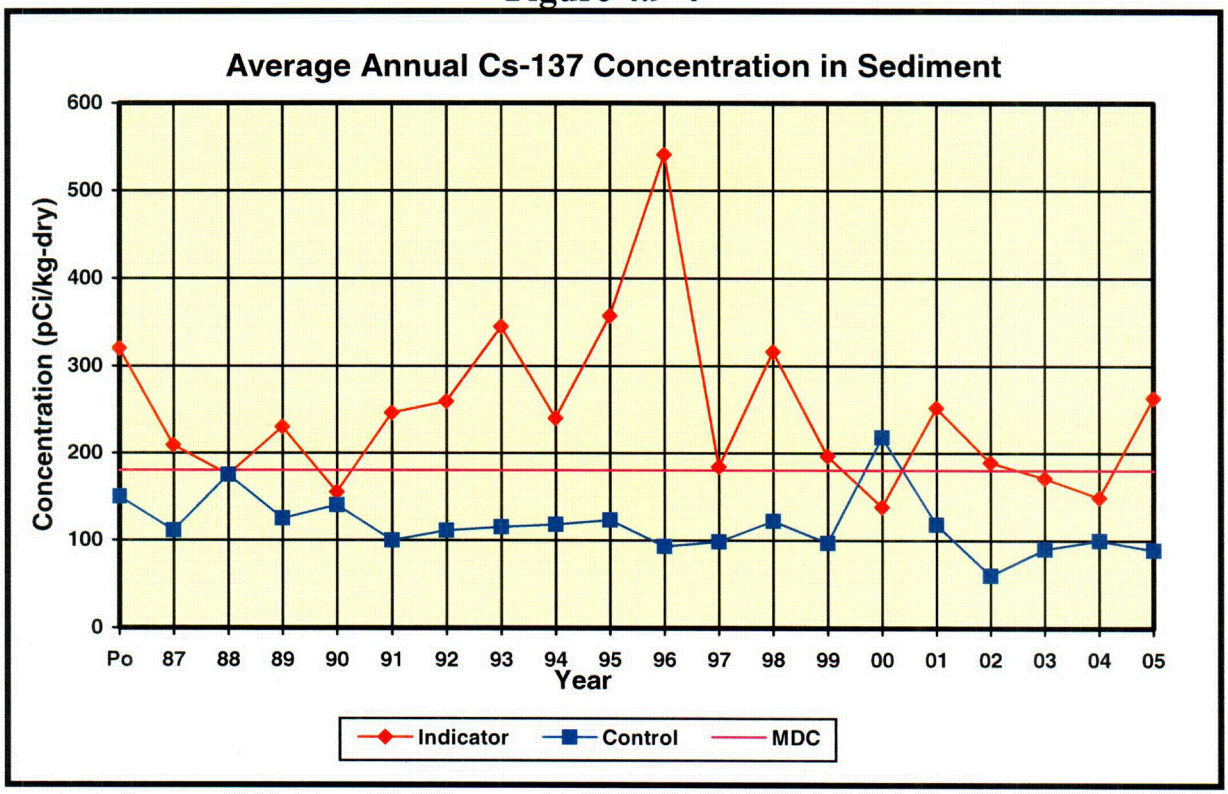


Table 4.9-4
Average Annual Cs-137 Concentration in Sediment

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

C49

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	

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.

In 2005, the laboratory analyzed 9 samples for 46 parameters and completed a gamma analysis investigation of Fe-59 in water. The 2005 analyses included tritium, gross beta, Fe-55, Sr-89/90 and gamma emitting radio-nuclides in different matrices. Two analyses were outside the control limit for precision. The precision deviations were for the determination of gross alpha in water and Sr-90 in an air filter.

The gross alpha in water was analyzed in triplicate with an average value reported. The high range may be attributed to one of the samples not dispersing evenly in the planchet causing alpha absorption. The second quarter alpha sample was in control so no further investigation will be performed. The second quarter air filter sample analyzed for Sr-90 had a high precision value. The low activity in the sample produced small detector counts, thus causing the elevated error. No further investigation will be performed.

The 2004 Fe-59 analysis in water investigation was completed. The efficiencies used in determining the activity were obtained from a calibration curve. The curve was determined to be lower at higher energies due to summing effects from the calibration nuclides. A curve will be produced using a standard containing nuclides without summing gamma energies. The difference in efficiencies of the curves will be applied to the analysis to compensate for the summing losses. This is a known bias for gamma spectroscopy measurements and does not significantly effect radiological environmental monitoring measurements.

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	09/15/05	75.00	71.80	2.90	0.80	5.60	0.77

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	09/15/05	161.80	163.00	5.42	1.82	4.69	-0.16
Co-58	09/15/05	46.30	44.50	4.79	0.49	12.39	0.31
Co-60	09/15/05	113.20	117.00	1.06	1.30	3.80	-0.88
Cr-51	09/15/05	260.80	237.00	6.53	2.63	8.14	1.12
Cs-134	09/15/05	80.00	85.70	3.86	0.95	6.27	-1.14
Cs-137	09/15/05	145.60	137.00	8.07	1.52	6.67	0.89
Fe-59	09/15/05	53.40	42.70	3.91	0.49	11.03	1.82
Mn-54	09/15/05	70.40	64.50	1.22	0.72	5.11	1.65
Zn-65	09/15/05	105.10	86.50	5.51	0.96	7.88	2.24

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	06/09/05	97.60	92.40	12.37	1.03	7.95	0.67
Co-58	06/09/05	NA	NA	NA	NA	NA	NA
Co-60	06/09/05	144.20	145.00	5.62	1.61	5.94	-0.09
Cr-51	06/09/05	286.60	303.00	28.38	3.37	15.87	-0.36
Cs-134	06/09/05	93.10	95.00	6.43	1.06	8.75	-0.24
Cs-137	06/09/05	194.30	189.00	6.24	2.10	5.60	0.49

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	06/09/05	70.30	63.90	8.92	0.71	17.92	0.51
I-131	06/09/05	93.00	86.90	6.93	0.97	10.63	0.61
Mn-54	06/09/05	127.70	125.00	3.73	1.39	6.61	0.31
Zn-65	06/09/05	163.50	155.00	12.09	1.72	10.90	0.48

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	03/17/05	276.00	268.00	4.66	2.98	6.00	0.45
	06/09/05	214.20	214.00	17.96	2.37	8.39	0.01

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	03/17/05	222.00	221.00	9.6	2.46	5.13	0.09
Co-58	03/17/05	115.40	111.00	7.4	1.24	9.21	0.41
Co-60	03/17/05	142.80	139.00	6.4	1.54	7.91	0.34
Cr-51	03/17/05	370.30	322.00	46.1	3.57	14.70	0.89
Cs-134	03/17/05	138.60	134.00	6.1	1.49	5.46	0.61

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	03/17/05	131.40	125.00	7.3	1.39	6.53	0.75
Fe-59	03/17/05	125.60	107.00	9.5	1.19	12.06	1.23
I-131	03/17/05	76.10	65.90	7.1	0.73	11.84	1.13
Mn-54	03/17/05	157.00	154.00	8	1.71	5.63	0.34
Zn-65	03/17/05	219.60	191.00	14.9	2.12	10.82	1.20

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	03/17/05	5388.00	6040.00	132.04	133.33	4.10	-2.96
	06/09/05	9879.10	9100.00	133.48	200.00	2.60	2.62

6.0 CONCLUSIONS

This report confirms the licensee's conformance with the requirements of Chapter 4 of the ODCM during 2005. It provides a summary and discussion of the results of the laboratory analyses for each type of sample.

All of the radiological levels were low and generally trending downward.

In 2005, there were two instances in which the indicator station readings were greater than the control station readings. These are discussed in the following paragraphs.

Cesium-137 was identified in vegetation in two of 24 samples at the indicator station and in none of the 12 samples at the control station. The average of the two positive samples from the indicator station was 49.5 pCi/kg-wet. The potential dose to a member of the public who would receive the highest dose (an adult) due to regular consumption of leafy vegetation containing Cs-137 at the concentration identified at the indicator station would be 0.17 mrem in one year. This dose is less than 2% of the regulatory limit of 15 mrem per year to any organ due to gaseous effluents. As discussed in the vegetation section of the report, low levels of Cs-137 in vegetation samples is attributed primarily to fallout from nuclear weapons testing and from the Chernobyl incident.

Cobalt-60 was identified in river sediment at the indicator station in one of two samples but not at the control station. The activity found at the indicator station was 146 pCi/kg-dry and could be attributed to plant releases. The consequent total body dose to a member of the public expected to receive the highest dose was determined to be approximately 0.0067 mrem in one year or approximately 0.22% of the ODCM limit.

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.