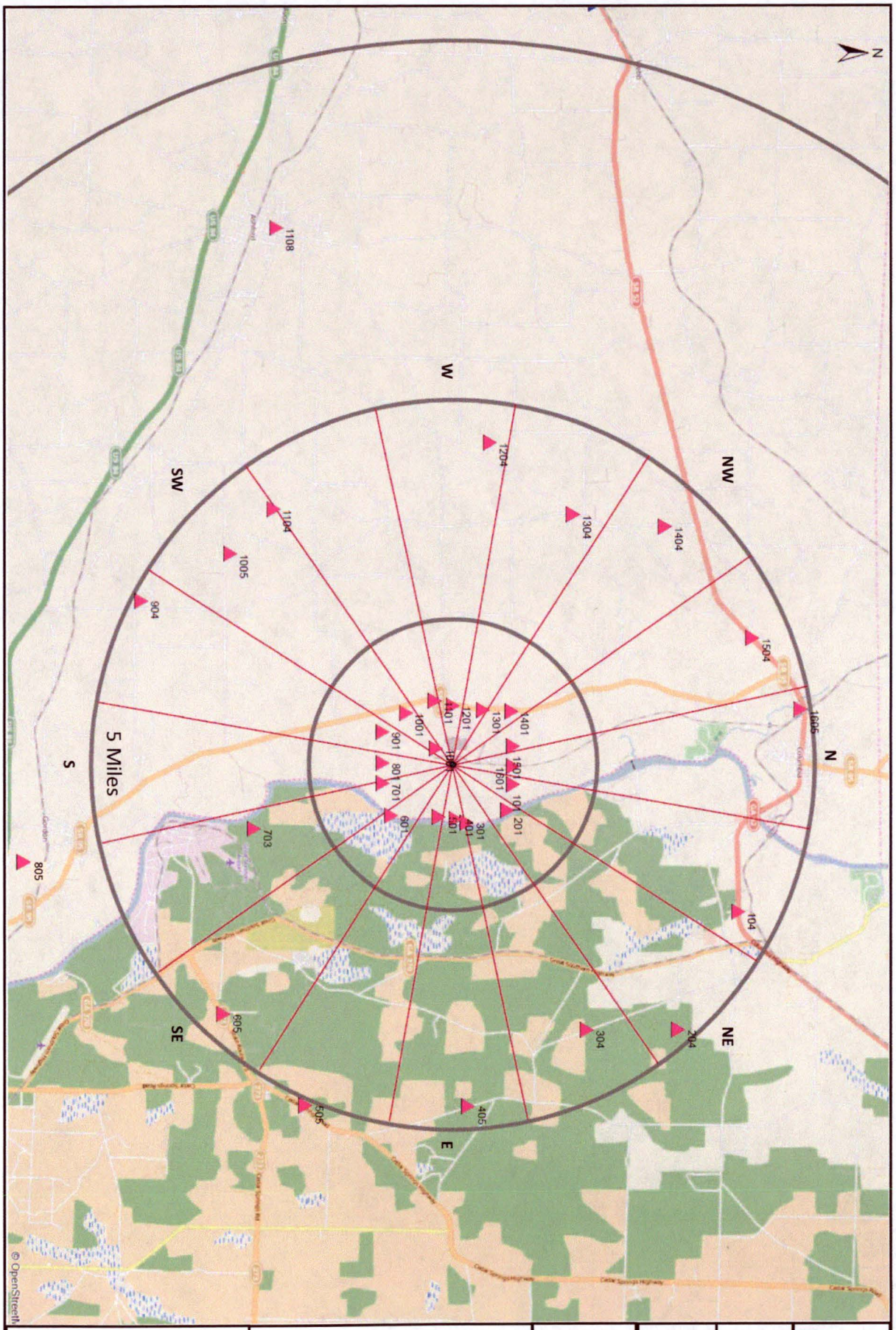
APPENDIX A

Maps



Legend:

Indicator Stations -

Joseph M. Farley Nuclear Plant

2015 Annual Radiological Environmental Report

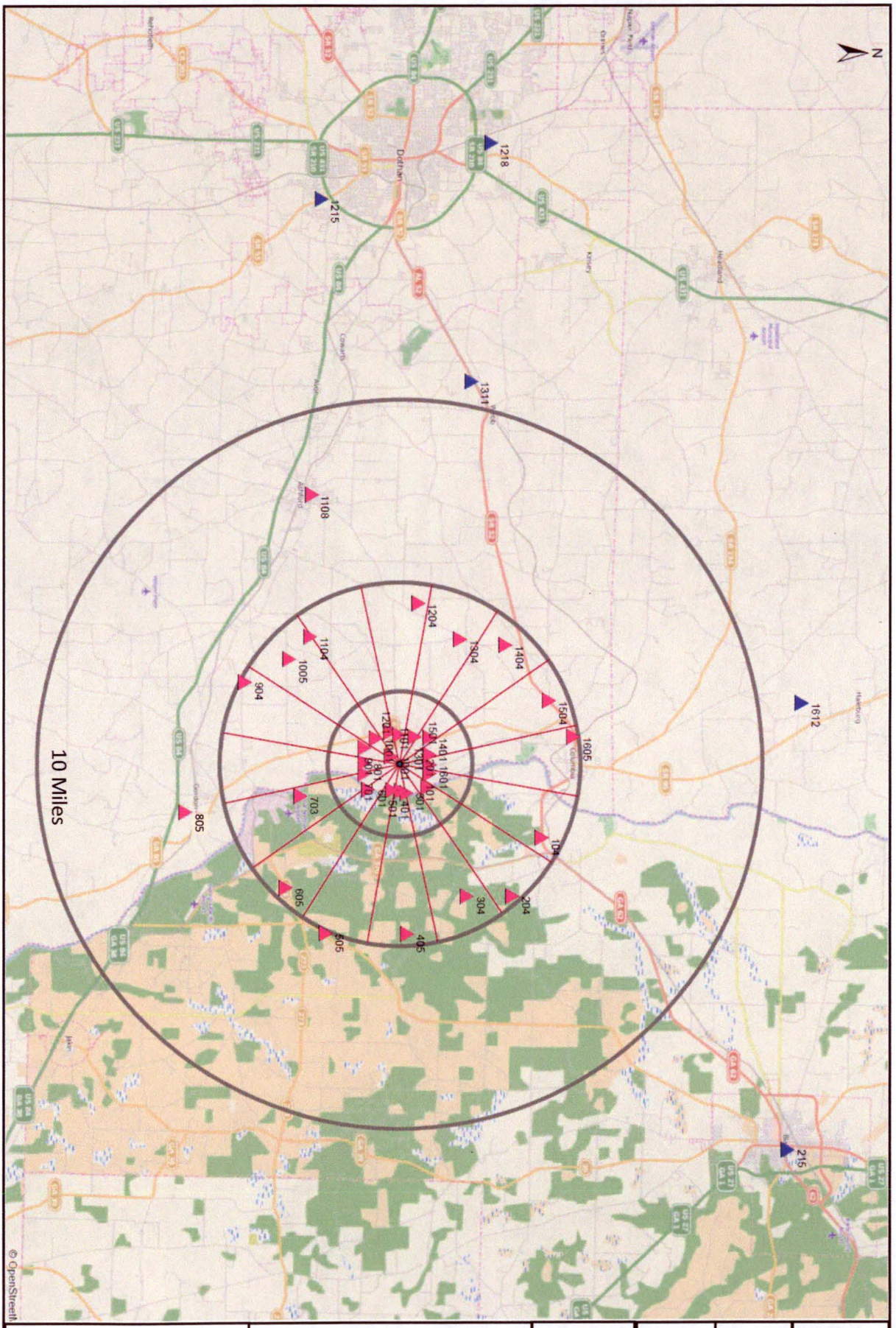
REMP Stations in Plant Vicinity

Drawn by: C. Groce

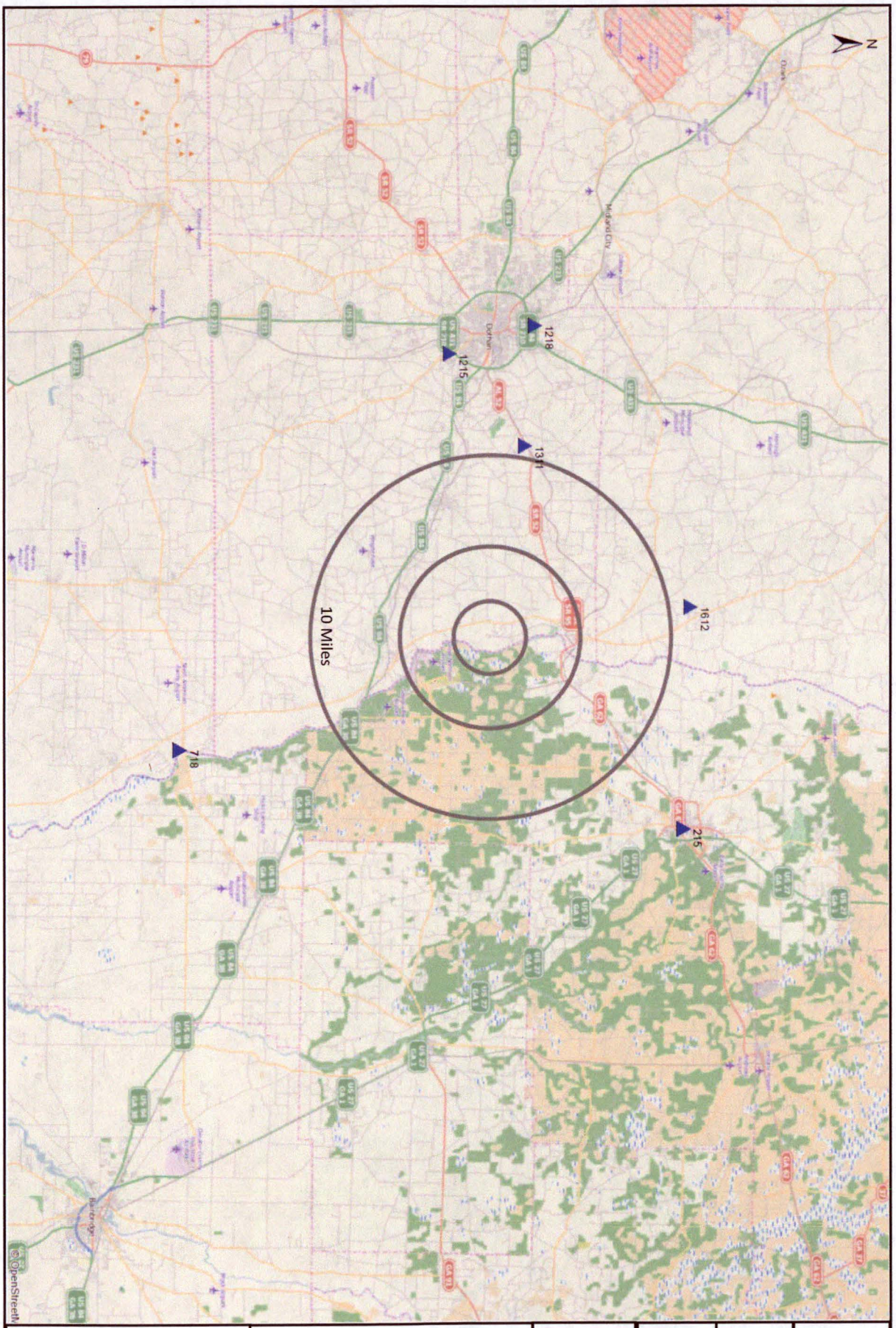
April 30, 2016

Appendix A

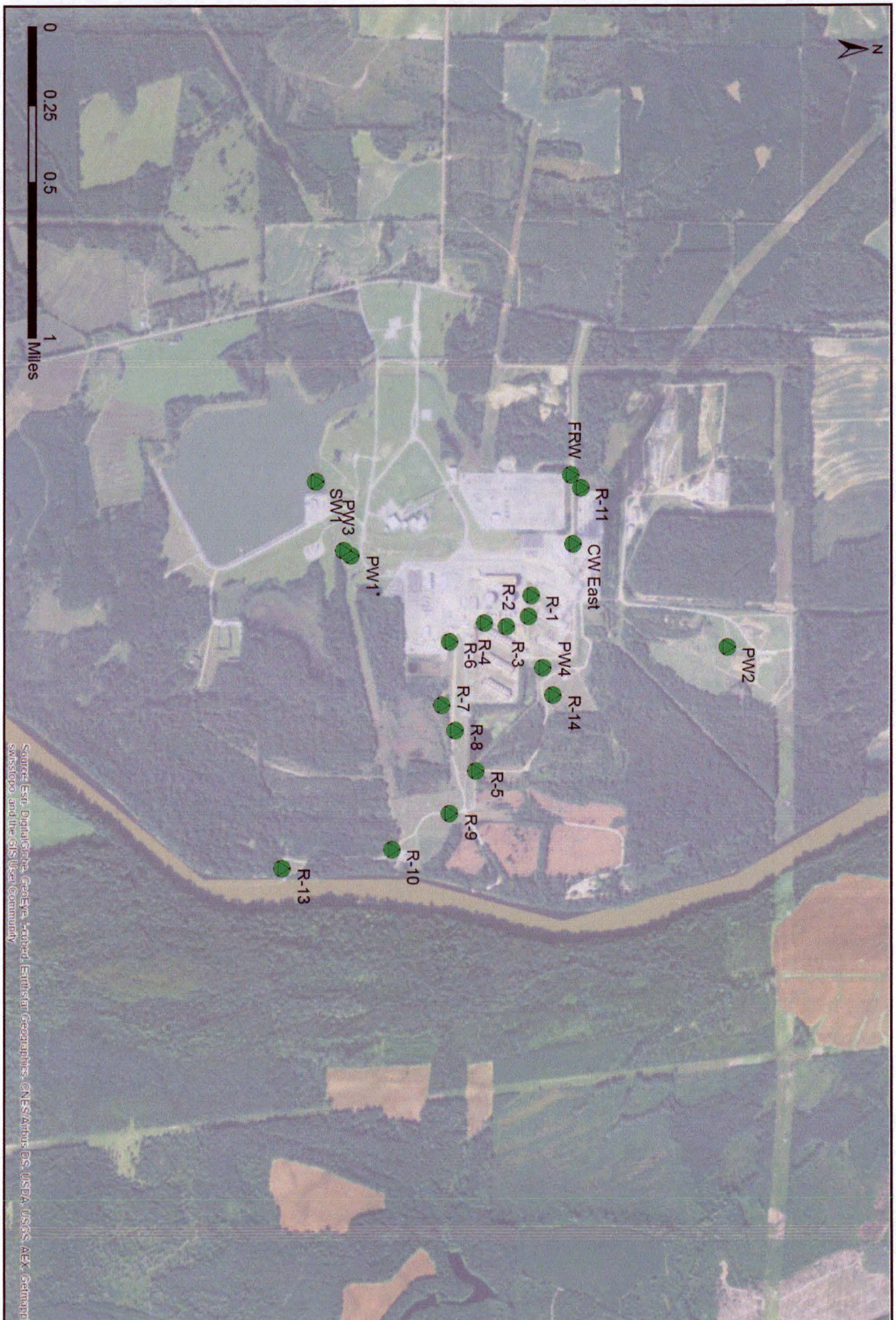
Map A-1



Legend: Indicator Stations - Control Stations -	Joseph M. Farley Nuclear Plant 2015 Annual Radiological Environmental Report REMP Stations within 10 miles		Drawn by:	C. Groce	Appendix A Map A-2
			April 30, 2016		



Legend:	Joseph M. Farley Nuclear Plant		Drawn by: C. Groce	Appendix A
Control Stations - ▲	2015 Annual Radiological Environmental Report			Map A-3
	Extended REMP Stations		April 30, 2016	



Legend:	Joseph M. Farley Nuclear Plant		Drawn by:	C. Groce	Appendix A
Groundwater Wells -	2015 Annual Radiological Environmental Report				Map A-4
*Removed from GWPP	Facility Groundwater Wells		April 30, 2016		

APPENDIX B

Errata

3.8 Groundwater

To ensure compliance with NEI 07-07, Southern Nuclear developed the Nuclear Management Procedure, Radiological Groundwater Protection Program. The procedure contains detailed site-specific monitoring plans, program technical bases, and communications protocol (to ensure that radioactive leaks and spills are addressed and communicated appropriately). In an effort to prevent future leaks of radioactive material to groundwater, SNC plants have established robust buried piping and tanks inspection programs. No changes were made to the Groundwater Protection Program in 2014.

Plant Farley maintains the following wells (Table 3-8), which are sampled at a frequency that satisfies the requirements of NEI 07-07. The analytical results for 2014 were all within regulatory limits specified within this report. Table3-9 contains the results of the Groundwater Protection Program tritium results (in pCi/L).

Table 3-8. Groundwater Protection Program Locations

Well	Aquifer	Monitoring Purpose
R1	Major Shallow aquifer	Dilution line
R2	Major Shallow aquifer	Dilution line
R3	Major Shallow aquifer	Unit 2 RWST
R4	Major Shallow aquifer	Unit 1 RWST
R5	Major Shallow aquifer	Dilution line
R6	Major Shallow aquifer	Dilution line
R7	Major Shallow aquifer	Dilution line
R8	Major Shallow aquifer	Dilution line
R9	Major Shallow aquifer	Dilution line
R10	Major Shallow aquifer	Dilution line
R11	Major Shallow aquifer	Background 1
R13	Major Shallow aquifer	Dilution line
R14	Major Shallow aquifer	Background 2
PW#2	Drinking water	Production Well #2 Supply
PW#3	Drinking water	Production Well #3 Supply
PW#4	Drinking water	Production Well #4 Supply
CW West	Drinking water	Construction Well West Supply
CW East	Drinking water	Construction Well East Supply
FRW	Drinking water	Firing Range Well Supply
SW-1	N/A	Background 3, Service Water Pond

Table 3-9. Groundwater Protection Program Tritium Results (pCi/L)

Well	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
R1	NDM	NDM	NDM	156
R2	NDM	NDM	NDM	166
R3	1570	1990	2030	1860
R4	NDM	NDM	NDM	NDM
R5	NDM	NDM	NDM	NDM
R6	NDM	NDM	NDM	NDM
R7	NDM	NDM	NDM	166
R8	NDM	NDM	NDM	NDM
R9	NDM	NDM	NDM	NDM
R10	NDM	NDM	NDM	178
R11	NDM	NDM	NDM	NDM
R13	NDM	NDM	NDM	NDM
R14	NDM	NDM	NDM	NDM
PW#2	NDM	NDM	NDM	NDM
PW#3	NS – Out of Service	NS – Out of Service	NS – Out of Service	NS – Out of Service
PW#4	NDM	NDM	NDM	NDM
CW West	NS – Out of Service	NDM	NS – Out of Service	NS – Out of Service
CW East	NDM	NDM	NDM	NDM
FRW	NDM	NDM	NDM	NDM
SW-1	NDM	NDM	NDM	NDM

NDM – No Detectable Measurements
NS – Not Sampled

Edwin I. Hatch Nuclear Plant – Units 1 & 2
Joseph M. Farley Nuclear Plant– Units 1 & 2
Vogtle Electric Generating Plant– Units 1 & 2
Annual Radiological Environmental Operating Reports for 2015

Enclosure 3

Vogtle Annual Radiological Environmental Operating Reports for 2015

VOGTLE ELECTRIC GENERATING PLANT

2015 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

SOUTHERN NUCLEAR

A SOUTHERN COMPANY

VOGTLE ELECTRIC GENERATING PLANT

2015 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

TABLE OF CONTENTS

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Appendix A – Maps

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LIST OF ACRONYMS

AREOR	Annual Radiological Environmental Operating Report
ASTM	American Society for Testing and Materials
CL	Confidence Level
EPA	Environmental Protection Agency
GA EPD	State of Georgia Environmental Protection Division
GPC	Georgia Power Company
GPCEL	Georgia Power Company Environmental Laboratory
ICP	Interlaboratory Comparison Program
MDC	Minimum Detectable Concentration
MDD	Minimum Detectable Difference
MWe	MegaWatts Electric
NA	Not Applicable
NDM	No Detectable Measurement(s)
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
ODCM	Offsite Dose Calculation Manual
OSL	Optically Stimulated Luminescence
Po	Preoperation
PWR	Pressurized Water Reactor
REMP	Radiological Environmental Monitoring Program
RL	Reporting Level
RM	River Mile
SNC	Southern Nuclear Operating Company
SRS	Savannah River Site
TLD	Thermoluminescent Dosimeter
TS	Technical Specification
VEGP	Alvin W. Vogtle Electric Generating Plant

1 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 2015 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), areas of higher population (community 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 (SRS). Unit 1, a Westinghouse Electric Corporation Pressurized Water Reactor (PWR), with a licensed core thermal power of 3626 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 3626 MWt, received its operating license on February 9, 1989 and began commercial operation on May 19, 1989. Both units were relicensed on June 3, 2009.

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
- Section 3 provides a summary of the results and an assessment of any radiological impacts to the environment as well as the results from the interlaboratory comparison
- A summary of the land use census and the river survey are included in Section 4
- Conclusions are included in Section 5

2 REMP DESCRIPTION

The following section provides a description of the sampling and laboratory protocols associated with the REMP. Table 2-1 provides a summary of 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 summarizes the collection and analysis frequencies (in accordance with ODCM Section 4.2). Table 2-2 provides specific information regarding the station locations, their proximity to the plant, and exposure pathways. Additionally, the locations of the sampling stations are depicted on Maps A-1 through A-4 of the station locations included in Appendix A of this report.

Georgia Power Company's Environmental Laboratory (GPCEL), located in Smyrna, Georgia collects and analyzes REMP samples.

Table 2-1. Summary Description of Radiological Environmental Monitoring Program

Exposure Pathway and/or	Number of Representative Samples and Sample Locations	Sampling/Collection Frequency	Type/Frequency of Analysis
Direct Radiation	40 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 five miles from the site; and Special interest areas, such as population centers, nearby recreation areas, and control stations	Quarterly	Gamma dose, quarterly
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; A control location near a population center at a distance of about 14 miles	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
Waterborne			
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

Table 2-1. Summary Description of Radiological Environmental Monitoring Program

Exposure Pathway and/or	Number of Representative Samples and Sample Locations	Sampling/Collection Frequency	Type/Frequency of Analysis
Drinking	Two samples at each of the three nearest water treatment plants that could be affected by plant discharges Two samples at a control location	Composite sample of river water near the intake of each water treatment plant over two week period[4] when I-131 analysis is required for each sample; monthly composite otherwise; and grab sample of finished water at each water treatment plant every two weeks or monthly, as appropriate	I-131 analysis on each sample when the dose calculated for the consumption of the water is greater than 1 mrem per year[5]. Composite for gross beta and gamma isotopic analysis[2] on raw water, monthly. Gross beta, gamma isotopic and I-131 analyses on grab sample of finished water, monthly. Composite for tritium analysis on raw and finished water, quarterly
Groundwater	See Table 3-8 and Map A-4 for well locations	See Table 3-8 and Map A-4 for well locations. Quarterly sample; pump used to sample GW wells; grab sample from yard drains and ponds	Tritium, gamma isotopic, and field parameters (pH, temperature, conductivity, dissolved oxygen, oxidation/reduction potential, and turbidity) of each sample quarterly; Hard to detect radionuclides as necessary based on results of tritium and gamma
Shoreline Sediment	• One sample from downriver area with existing or potential recreational value • One sample from upriver area with existing or potential recreational value	Semiannually	Gamma isotopic analysis[2], semiannually
Ingestion			
Milk	Two samples from milking animals[6] at control locations at a distance of about 10 miles or more	Bimonthly	Gamma isotopic analysis[2,7], bimonthly

Table 2-1. Summary Description of Radiological Environmental Monitoring Program

Exposure Pathway and/or	Number of Representative Samples and Sample Locations	Sampling/Collection Frequency	Type/Frequency of Analysis
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 spring spawning season	Gamma isotopic analysis[2] on edible portions, semiannually Gamma isotopic analysis[2] on edible portions, annually.
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

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. Radiological Environmental Sampling Locations

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

Table 2-2. Radiological Environmental Sampling Locations

Station Number	Station Type	Descriptive Location	Direction[1]	Distance (miles)[1]	Radiation Sample Type
22	Other	River Bank	ESE	5.2	Direct
23	Other	River Road	SE	4.6	Direct
24	Other	Chance Road	SSE	4.9	Direct
25	Other	Chance Road near Highway 23	S	5.2	Direct
26	Other	Highway 23 and Ebenezer Church Road	SSW	4.6	Direct
27	Other	Highway 23 opposite Boll Weevil Road	SW	4.7	Direct
28	Other	Thomas Road	WSW	5.0	Direct
29	Other	Claxton-Lively Road	W	5.1	Direct
30	Other	Nathaniel Howard Road	WNW	5.0	Direct
31	Other	River Road at Allen's Chapel Fork	NW	5.0	Direct
32	Other	River Bank	NNW	4.7	Direct
35	Other	Girard	SSE	6.6	Airborne, Direct
36	Control	GPC Waynesboro Op. HQ	WSW	13.9	Airborne, Direct
37	Control	Substation, Waynesboro, GA	WSW	16.7	Direct, Vegetation
43	Other	Employee's Rec. Center	SW	2.2	Direct
47	Control	Oak Grove Church	SE	10.4	Direct
48	Control	McBean Cemetery	NW	10.2	Direct
51	Control	SGA School, Sardis, GA	S	11.0	Direct
52	Control	Oglethorpe Substation; Alexander, GA	SW	10.7	Direct
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]

Table 2-2. Radiological Environmental Sampling Locations

Station Number	Station Type	Descriptive Location	Direction[1]	Distance (miles)[1]	Radiation Sample Type
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]
89	Indicator	Purrysburg Water Treatment Plant; Purrysburg, SC	SSE	76	Drinking Water[7]
98	Control	W.C. Dixon Dairy	SE	9.8	Milk[8]
101	Indicator	Girard Dairy	S	5.5	Milk[8]
102	Control	Seven Oaks Dairy/Milky Way Dairy	W	7.5/16.0	Milk[8]

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 DELETED THIS SAMPLE LOCATION IN 2014 (LDCR 2014004)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]The intake for the Purrysburg Water Treatment Plant is located on the same canal as the Beaufort-Jasper Water Treatment Plant. The Purrysburg intake is closer to the Savannah River at the beginning of the canal.

[8]Girard Dairy is considered an indicator station since it is the closest dairy to the plant (~5.5 miles). Dixon Dairy went out of business in June 2009 and Seven Oaks Dairy (~7.5 miles) was added as a replacement and is considered a control station even though a control station is typically 10 miles or greater. Milky Way Dairy as identified and added to the ODCM in 2015 to replace Seven Oaks since it is at 16.0 miles from the plant.

3 RESULTS SUMMARY

Included in this section are statistical evaluations of the laboratory results, comparison of the results by media, and a summary of the anomalies and deviations. Overall, 1,195 analyses were performed across nine exposure pathways. Tables and figures are provided throughout this section to provide an enhanced presentation of the information.

In recent history, man-made nuclides have been released into the environment and have resulted in wide spread distribution of radionuclides across the globe. For example, 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 pre-operation, and through early operation. Some long lived radionuclides, such as Cs-137, continue to be detected and a portion of these detections are believed to be attributed to the nuclear weapons tests.

Additionally, data associated with certain radiological effects created by off-site events have been removed from the historical evaluation, this includes: the nuclear atmospheric weapon test in the fall of 1980; the Chernobyl incident in the spring of 1986; and abnormal releases from the Savannah River Site (SRS) during 1987 and 1991.

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. Historically, the radionuclide Be-7, which occurs abundantly in nature, is often detected in REMP samples, and occasionally detected in the plant's liquid and gaseous effluents. When it is detected in effluents and REMP samples, it is also included in the REMP results. In 2015, Be-7 was not detected in any plant effluents and therefore is not included in this report. The Be-7 detected in select REMP samples likely represents naturally occurring and/or background conditions.

As part of the data evaluation process, SNC considered the impact of the non-plant associated nuclides along with a statistical evaluation of the REMP data. The statistical evaluations included within this report include the Minimum Detectable Concentration (MDC), the Minimum Detectable Difference (MDD), and Chauvenet's Criterion as described below.

Minimum Detectable Concentration

The minimum detectable concentration is defined as an estimate of the true concentration of an analyte required to give a specified high probability that the measured response will be greater than the critical value.

Minimum Detectable Difference

The Minimum Detectable Difference (MDD) compares the lowest significant difference (between the means) of a control station, versus an indicator station or a community station, that can be determined statistically at the 99% Confidence Level (CL). A difference in mean values which was less than the MDD was considered to be statistically indiscernible.

Chauvenet's Criterion

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.

The 2015 results were compared with past results, including those obtained during pre-operation. As appropriate, results were compared with their MDC (listed in Table 3-1) and RL which is listed in Table 3-2. The required MDCs were achieved during laboratory sample analysis. No data points were excluded for violating Chauvenet's criterion.

Table 3-1. Radiological Environmental Monitoring Program Annual Summary

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 (f) Mean (b), Range (Fraction)	Control Locations Mean (b), Range (Fraction)
				Name Distance and Direction	Mean (b), Range (Fraction)		
Airborne Particulates (fCi/m3)	Gross Beta 350	10	21.5 2.9-38.6 (247/248)	Hancock Landing Road NNW 1.4 mi.	22.3 3.8-36.2 (51/51)	20.8 1-40.4 (51/51)	20.8 3.5-34.2 (51/51)
	Gamma Isotopic 28						
	I-131	70	NDM(c)		NDM	NDM	NDM
	Cs-134	50	NDM		NDM	NDM	NDM
	Cs-137	60	NDM		NDM	NDM	NDM
Airborne Radioiodine (fCi/m3)	I-131 350	70	NDM		NDM	NDM	NDM
Direct Radiation (mR/91 days)	Gamma Dose 159		12.5 7.3-19 (64/64)	SRS, Road A.13.1 ENE 4.8 mi.	16.9 15.4-18.8 (4/4)	12.6 7.7-18.8 (71/71)	12.3 9.8-16.2 (24/24)
Milk (pCi/l)	Gamma Isotopic 46						
	I-131	1	NDM		NDM		NDM
	Cs-134	15	NDM		NDM		NDM
	Cs-137	18	1.4 0.8-1.8 (11/24)	Girard Dairy S 5.5 mi	1.4 0.8-1.8 (11/24)		1 1-1.1 (2/22)
	Ba-140	60	NDM		NDM		NDM
	La-140	15	NDM		NDM		NDM

Table 3-1. Radiological Environmental Monitoring Program Annual Summary

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 (f) Mean (b), Range (Fraction)	Control Locations Mean (b), Range (Fraction)
				Name Distance and Direction	Mean (b), Range (Fraction)		
Vegetation (pCi/kg-wet)	Gamma Isotopic 30						
	I-131	60	NDM				NDM
	Cs-134	60	NDM				NDM
	Cs-137	80	NDM				NDM
River Water (pCi/l)	Gamma Isotopic 33						
	Be-7	124(d)	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		
	Ba-140	60	NDM		NDM		
	La-140	15	NDM		NDM		
	Tritium 12	2000	1087 389-2000 (4/4)	Savannah River (RM 150.4) ENE 0.8 mi	1087 389-2000 (4/4)	478 363-654 (4/4)	104 53.8-191 (4/4)

Table 3-1. Radiological Environmental Monitoring Program Annual Summary

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 (f) Mean (b), Range (Fraction)	Control Locations Mean (b), Range (Fraction)
				Name Distance and Direction	Mean (b), Range (Fraction)		
Water Near Intakes to Water Treatment Plants (pCi/l)	Gross Beta 43	4	3.0 1.1-5.5 (31/31)	Beaufort-Jasper County Water Treatment Plant SE 76 mi.	3.63 2.4-5.5 (12/12)		3.14 1.3-7.5 (12/12)
	Gamma Isotopic 43						
	Be-7	124(d)	NDM		NDM		NDM
	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	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 15	2000	374 71-792 (11/11)	Purrysburg Water Treatment Plant, Purrysburg, SC, SSE, 76 miles	392 173-556 (4/4)		103 54-167 (4/4)

Table 3-1. Radiological Environmental Monitoring Program Annual Summary

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 (f) Mean (b), Range (Fraction)	Control Locations Mean (b), Range (Fraction)
				Name Distance and Direction	Mean (b), Range (Fraction)		
Finished Water at Water Treatment Plants (pCi/l)	Gross Beta 43	4	3.0 1.1-5.5 (31/36)	Augusta Water Treatment Plant NNW 29 mi.	3.3 2.5-4.1 (7/7)		3.1 1.2-7.5 (12/12)
	Gamma Isotopic 43						
	Be-7	124(d)	NDM		NDM		NDM
	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	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 15	2000	375 71-792 (11/11)	Purrysburg Water Treatment Plant; Purrysburg, SC SSE 76 mi.	392 173-556 (4/4)		102 54-167 (4/4)
Anadromous Fish (pCi/kg-wet)	Gamma Isotopic 3						
	Be-7	655(d)			NA		NA

Table 3-1. Radiological Environmental Monitoring Program Annual Summary

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 (f) Mean (b), Range (Fraction)	Control Locations Mean (b), Range (Fraction)
				Name Distance and Direction	Mean (b), Range (Fraction)		
	Mn-54	130			NA		NA
	Fe-59	260			NA		NA
	Co-58	130			NA		NA
	Co-60	130			NA		NA
	Zn-65	260			NA		NA
	Cs-134	130			NA		NA
	Cs-137	150		Savannah River, N, 2.5 Miles	127 15-238 (2/3)		127 15-238 (2/3)
Fish (pCi/kg-wet)	Gamma Isotopic 6						
	Be-7	655(d)	NDM				NDM
	Mn-54	130	NDM				NDM
	Fe-59	260	NDM				NDM
	Co-58	130	NDM				NDM
	Co-60	130	NDM				NDM
	Zn-65	260	NDM				NDM
	Cs-134	130	NDM				NDM
	Cs-137	150	36.6 23.5-49.5 (3/3)	Savannah River, N, 2.5 Miles	126.8 15.4-238.1 (2/3)		126.8 15.4-238.1 (2/3)
Sediment (pCi/kg-dry)	Gamma Isotopic 4						

Table 3-1. Radiological Environmental Monitoring Program Annual Summary

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 (f) Mean (b), Range (Fraction)	Control Locations Mean (b), Range (Fraction)
				Name Distance and Direction	Mean (b), Range (Fraction)		
	Co-60	70(e)	21 21-21 (1/2)	Savannah River (RM 150.4) ENE 0.8 mi.	21 21-21 (1/2)		NDM
	Cs-134	150	NDM				NDM
	Cs-137	180	96.1 56.4-135.8 (2/2)	Savannah River (RM 150.4), ENE, 0.8 miles	99.7 91.9-107.5 (2/2)		99.7 91.9-107.5 (2/2)

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.

(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) (NDM).

(d) The Georgia Power Company Environmental Laboratory has determined that this value may be routinely attained under normal conditions. No value is provided in ODCM Table 4-3.

(e) 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.

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

Not Applicable (sample not required)

Table 3-2. 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	20000[a]				
Mn-54	1000		30,000		
Fe-59	400		10,000		
Co-58	1000		30,000		
Co-60	300		10,000		
Zn-65	300		20000		
Zr-95	400				
Nb-95	700				
I-131	2[b]	900		3	100
Cs-134	30	10,000	1000	60	1000
Cs-137	50	20000	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.

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 sampling (as described in Table 2-1) are summarized in Table 3-3 along with their causes and resolution.

Table 3-3. Anomalies and Deviations from Radiological Environmental Monitoring Program

Collection Period	Affected Samples	Anolmaly (A)* or Deviation (D)**	Cause	Resolution
03/10/15-04/21/15 TE 914801 TE 919619	Air I, Air Part. Stations 16 (Hancock)	(D) No samples obtained	Late power bill to Planter's EMC led to disruption of power at station.	Power restored when bill was paid and switched to electronic billing (was previously paper billing).
First Quarter	OSLD Badge Badge V26 Community Station	(D) No sample obtained	OSLD badge damaged by fire; could not be read.	Replaced badge in same location.
7/13/15-7/15/15 CR 10103203	Air I, Air Part. Station 10 (MET)	(A) Sample volume less than typical	Power disruption to air sampler near met tower.	Data was concluded to be unaffected by low volume.
09/15/15	Air I, Air Part. Stations 16 (Hancock)	(D) No sample obtained	Loss of power. Planter's EMC performed work but did not close breaker to restore power to pole.	Power was restored to this station by the end of the sampling period.
09/15/15-09/29/15	Milk Milky Way Dairy	(D) No samples obtained	The dairy was not milking on these dates.	No milk samples were obtained for these sampling periods.
2015 CR 10079727	Fish (Anadromous)	(D) No sample obtained	River was too high to be able to access this fish habitat so no sample was obtained	Other fish samples were collected. Anadromous fish will be collected in 2016.

* An anomaly is considered a non-standard sample that still meets sampling criteria outlined in SNC and Georgia Power Labs procedures.
** A deviation is a sample result that is not recorded due to not meeting scheduling and/or procedural requirements as outlined by SNC and Georgia Power Labs

3.1 Airborne Particulates

As specified in Table 2-1, airborne particulate filters and charcoal canisters are collected weekly at five 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 seven miles from the plant, and at a control station (Station 36) approximately 14 miles from the plant. At sampling locations containing a filter and cartridge series, 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.

3.1.1 Gross Beta

As provided in Table 3-1, the 2015 annual average weekly gross beta activity was 21.5 fCi/m3 for the indicator stations. It was 0.7 fCi/m3 more than the control station average of 20.8 fCi/m3 for the year. This difference is not statistically discernible, since it is less than the calculated MDD of 6.8 fCi/m3.

The 2015 annual average weekly gross beta activity at the Girard community station was 20.8 fCi/m3 which was equal to the control station average. This is not statistically discernible since it is less than the calculated MDD of 7.9 fCi/m3.

Average Air Gross Beta historical data (Table 3-4) is graphed to show trends associated with a prevalent exposure pathway (Figure 3-1). 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.

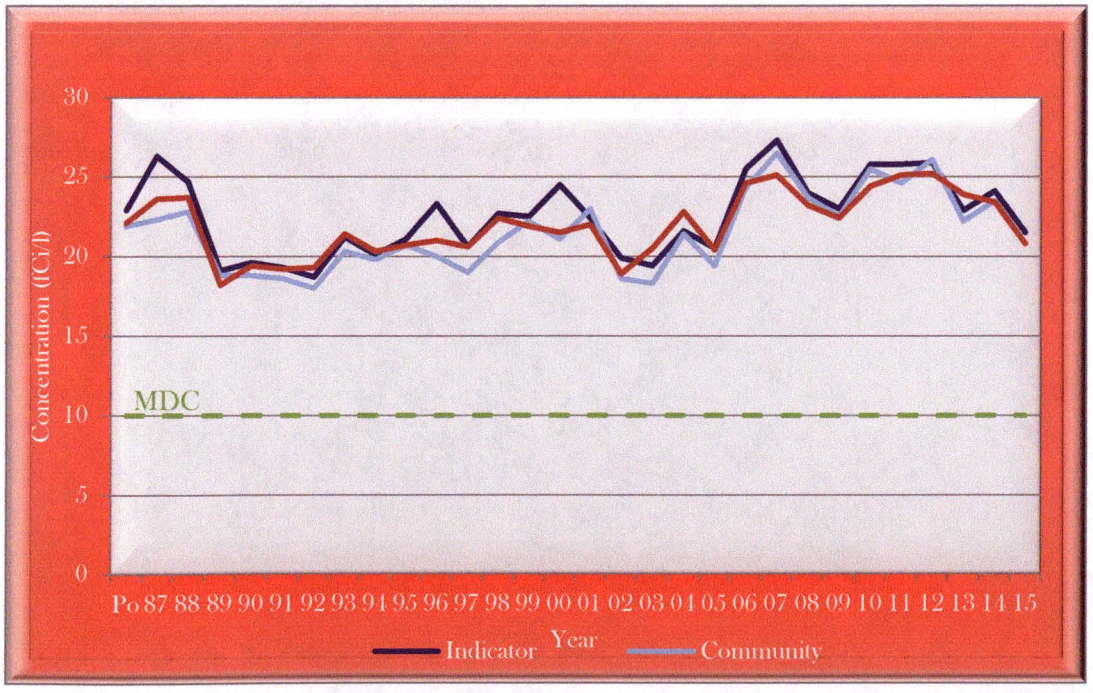
Table 3-4. Average Weekly Gross Beta Air Concentration

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

Table 3-4. Average Weekly Gross Beta Air Concentration

Period	Indicator (fCi/m3)	Control (fCi/m3)	Community (fCi/m3)
1998	22.7	22.4	20.9
1999	22.5	21.9	22.2
2000	24.5	21.5	21.1
2001	22.4	22.0	22.7
2002	19.9	18.9	18.6
2003	19.4	20.5	18.3
2004	21.6	22.8	21.4
2005	20.5	20.4	19.4
2006	25.5	24.6	24.3
2007	27.3	25.1	26.5
2008	24.0	23.2	23.7
2009	23.0	22.4	22.5
2010	25.8	24.4	25.5
2011	25.8	25.1	24.6
2012	25.9	25.2	26.1
2013	22.9	23.9	22.2
2014	24.1	23.4	23.5
2015	21.5	20.8	20.8

Figure 3-1. Average Weekly Gross Beta Air Concentration



3.1.2 Gamma Particulates

During 2015, no man-made radionuclides were detected from the gamma isotopic analysis of the quarterly composites of the air particulate filters.

Historically, gamma isotopes have been detected as a result of offsite events. During pre-operation, Cs-134, Cs-137 and I-131 were occasionally detected. In 1987, Cs-137 was found in one indicator composite at a concentration of 1.7 fCi/m3. Additionally, I-131 was also detected after the Fukushima incident in 2011, the highest I-131 result in 2011 was 93.8 fCi/m3, which is approximately 10% of the RL.

3.2 Direct Radiation

In 2015, direct (external) radiation was measured with Optically Stimulated Luminescent (OSL) dosimeters by placing two OSL badges at each station. The gamma dose at each station is reported as the average reading of the two badges. The badges are analyzed on a quarterly basis. An inspection is performed near mid-quarter for offsite badges to assure that the badges are on-station and to replace any missing or damaged badges.

Two direct radiation stations are established in each of the 16 compass sectors, to form two concentric rings. The inner ring (Stations 1 through 16) is located near the plant perimeter as shown in Map A-1 in Appendix A and the outer ring (Stations 17 through 32) is located at a distance of approximately five miles from the plant as shown in Map A-2 in Appendix A. 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 six control stations (Stations 36, 37, 47, 48, 51 and 52) are located at distances greater than 10 miles from the plant as shown in Map A-3 in Appendix A. Monitored special interest areas include Station 35 at the town of Girard and Station 43 at the employee recreational area. The mean and range values presented in the "Other" column in Table 3-1 includes the outer ring stations (stations 17 through 32) as well as stations 35 and 43.

As provided in Table 3-1, the 2015 average quarterly exposure at the indicator stations (inner ring) was 12.5 mR with a range of 7.3 to 19.0 mR. The indicator station average was 0.20 mR more than the control station average (12.3 mR). This difference is not statistically discernible since it is less than the MDD of 1.3 mR. Over the operational history, the annual average quarterly exposures shows a variation of no more than 0.7 mR between the indicator and control stations.

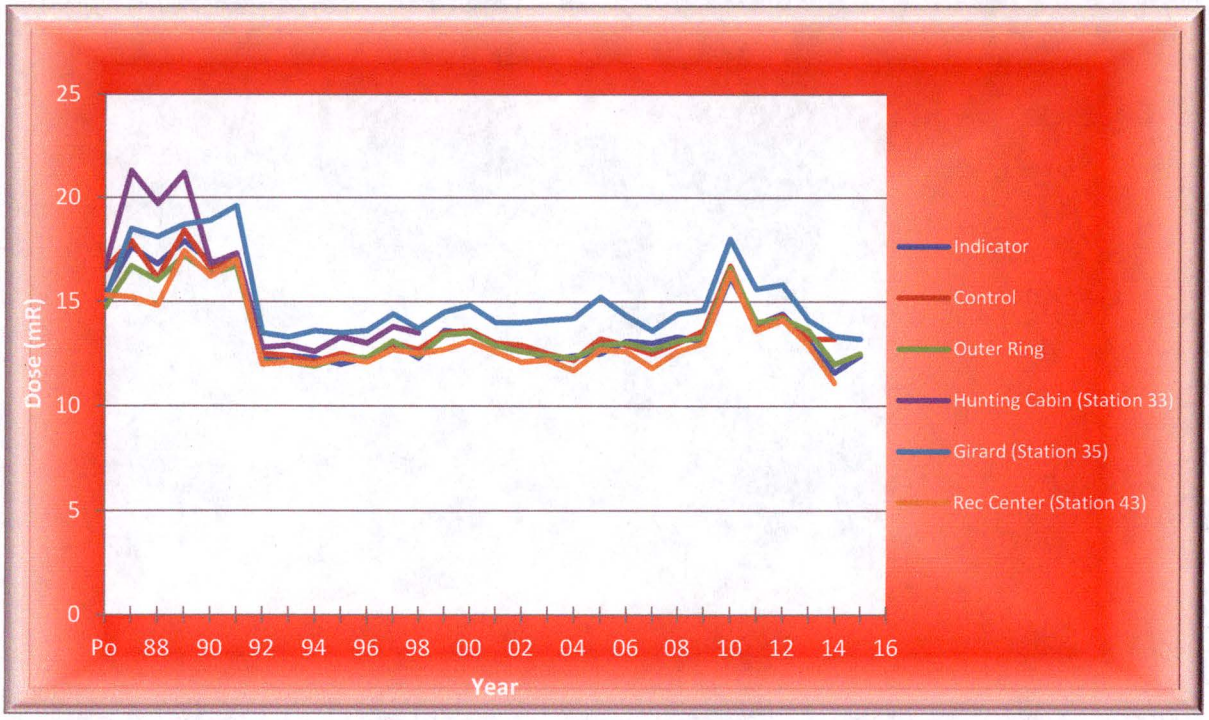
The quarterly exposures acquired at the community/other (outer ring) stations during 2015 ranged from 7.7 to 18.8 mR with an average of 12.6 mR which was 0.3 mR more than that for the control stations. However, this difference is not discernible since it is less than the MDD of 1.1 mR. For the entire period of operation, the annual average quarterly exposures at the outer ring stations vary by no more than 1.2 mR from those at the control stations.

Average Direct Radiation historical data (Table 3-5) is graphed to show trends associated with a prevalent exposure pathway (Figure 3-2). 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.

Table 3-5. Average Quarterly Exposure from Direct Radiation

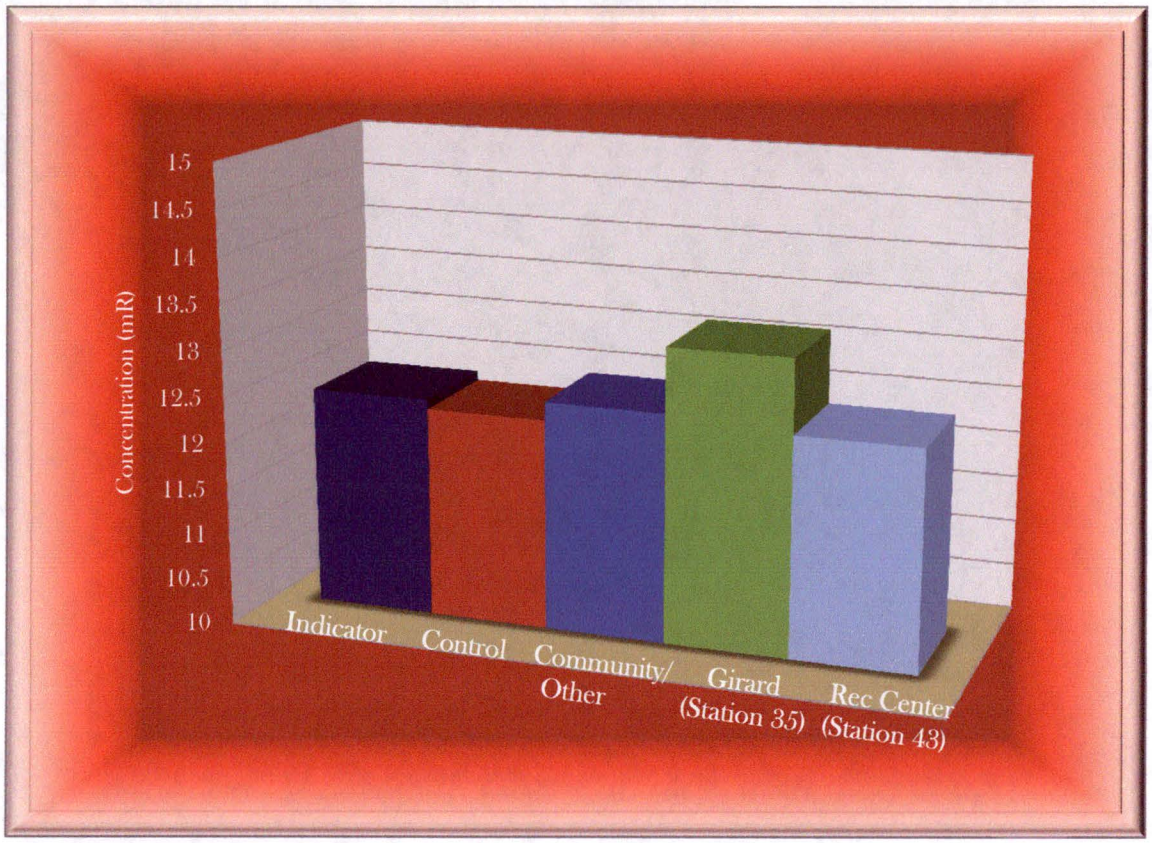
Period	Indicator (mR)	Control (mR)	Outer Ring (mR)
Pre-op	15.3	16.5	14.7
1987	17.6	17.9	16.7
1988	16.8	16.1	16.0
1989	17.9	18.4	17.2
1990	16.9	16.6	16.3
1991	16.9	17.1	16.7
1992	12.3	12.5	12.1
1993	12.4	12.4	12.1
1994	12.3	12.1	11.9
1995	12.0	12.5	12.3
1996	12.3	12.2	12.3
1997	13.0	13.0	13.1
1998	12.3	12.7	12.4
1999	13.6	13.5	13.4
2000	13.5	13.6	13.5
2001	12.9	13.0	12.9
2002	12.8	12.9	12.6
2003	12.2	12.5	12.4
2004	12.4	12.2	12.3
2005	12.5	13.2	12.9
2006	13.1	12.9	13.0
2007	13.0	12.5	12.7
2008	13.3	13.0	13.1
2009	13.1	13.6	13.3
2010	16.2	16.7	16.6
2011	13.9	13.9	14.0
2012	14.4	14.3	14.2
2013	13.1	13.2	13.6
2014	11.6	12.3	12.0
2015	12.5	12.3	12.6

Figure 3-2. Average Quarterly Exposure from Direct Radiation



The increase shown in 2010 reflects issues with the aging Panasonic TLD reader. The close agreement between the station groups supports the position that the plant is not contributing significantly to direct radiation in the environment. Figure 3-3 provides a more detailed view of the 2015 values. The values for the special interest areas detailed below indicate that Plant Vogtle did not significantly contribute to direct radiation at those areas.

Figure 3-3. 2015 Average Exposure from Direct Radiation



3.3 Biological Media

Cs-137 was the only radionuclide detected in two of the three biological media. As indicated in Figure 3-4, the Cs-137 activity levels are below the respective MDCs and well below that of the respective RLs for each sample media for both the indicator and control stations.

3.3.1 Milk

In accordance with Tables 2-1 and 2-2, milk samples are collected bimonthly from two locations, the Girard Dairy (Station 101) which is considered an indicator station because it is approximately 5.5 miles from Vogtle (ideally a milk indicator station is less than 5 miles from the plant), and the Seven Oaks Dairy (Station 102) at 7.5 miles from Vogtle is the control location (ideally control locations are greater than 10 miles from the plant). SNC identified Milky Way Dairy as a replacement control location. The ODCM was revised in 2015 to include

the Milky Way Dairy for sampling instead of Seven Oaks. No milk animal was found within five miles of Plant Vogtle during the 2015 land use census.

Gamma isotopic (including I-131 and Cs-137) analyses were performed on each collected milk sample and there were no detectable results for gamma isotopes, with the exception of a Cs-137, which was detected in 11 indicator samples (1.4 average) and two control samples (1.0 average. The difference is less than the MDD (0.48), therefore there is no statistical difference. Figure 3-4 provides the 2015 Cs-137 concentration in milk.

3.3.2 Vegetation

In accordance with Tables 2-1 and 2-2, vegetation samples are collected monthly for gamma isotopic analyses at two indicator locations near the site boundary (Stations 7 and 15) and at one control station located about 17 miles WSW from the plant (Station 37). Cs-137 was not detected in any of the sampled collected in 2015. The man-made radionuclide Cs-137 is periodically identified in vegetation samples, and is generally attributed to offsite sources (such as weapons testing, Chernobyl, and Fukushima).

While Cs-137 and I-131 were periodically found and Co-60 was discovered once in vegetation samples during pre-operation, the historical trends and the relationship between the indicator and control stations demonstrate that plant operations are having no adverse impact to the environment. The sample results have consistently been well below the MDC and the RL for Cs-137 (80 and 2000 pCi/kg-wet, respectively).

During 2015, no gamma isotopes were detected in any Vogtle REMP vegetation samples.

3.3.3 Fish

Fish samples were collected in accordance with the ODCM (as indicated in Table 2-1). For the semiannual collections, the control location (Station 81) extends from approximately two to seven miles upriver of the plant intake structure, and the indicator location (Station 85) extends from about 1.4 to seven miles downriver of the plant discharge structure.

3.3.3.1 Anadromous Species

For anadromous species, all fish sampled are considered indicator stations. Anadromous fish were sampled twice during 2015, on June 3 and October 28. No radionuclides were detected in the 2015 analyses, with the exception of Cs-137 (average of 126.7 pcl/L), which does occur occasionally, and is consistent with historical data.

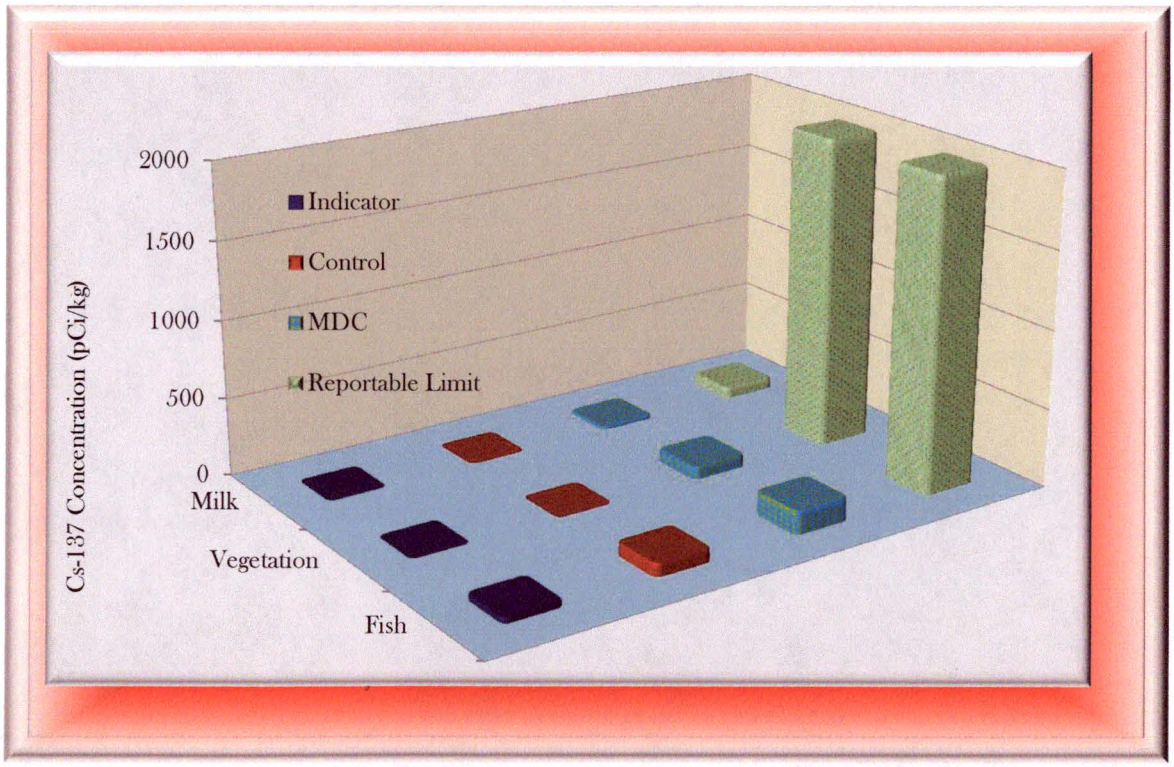
3.3.3.2 Commercially or Recreationally Important Species

For this year, as provided in Table 3-1, Cs-137 was found in the semiannual collections of commercially or recreationally important species of fish (indicator and control). The indicator station averaged a Cs-137 concentration of 36.6 pCi/kg-wet, and 126.8 pCi/kg-wet was the average Cs-137 detected at the control station. The MDD was not evaluated because the average at the indicator was lower than the control. No discernible difference between the indicator and control stations has occurred for any year of operation or during pre-operation. No other gamma nuclides were discovered in 2015.

3.3.4 Biological Media Summary

There were no statistical differences, trends, or anomalies associated with the 2015 biological media samples when compared to historical data. Figure 3-4 below, details the 2015 Cs-137 concentration compared to the Reportable Limits.

Figure 3-4. 2015 Biological Media Average Cs-137 Concentrations



3.4 Drinking Water

Samples are collected at an upstream control location and at three downstream indicator locations (shown on Map A-3) and further described in Table 2-2.

Water samples are taken near the intake of each water treatment plant (raw drinking water) using automatic composite samplers, which are collected monthly. Additionally, monthly grab samples of the processed water effluent from the treatment plants (finished drinking water) are collected. Monthly aliquots from the raw and processed drinking water are analyzed for gross beta and gamma isotopic activity. The monthly aliquots are also combined to form quarterly composites, which are analyzed for tritium.

For 2015, the indicator station average gross beta concentration in the raw drinking water was 2.77 pCi/l which was 0.37 pCi/l less than the average gross beta concentration at the control station (3.14 pCi/l). Historically, there has been close agreement between the gross beta values at the indicator stations and the control station which supports that there is no significant gross beta contribution from the plant effluents. The required MDC for gross beta in water is 4.0 pCi/l. There is no RL for gross beta in water.

For 2015, the indicator station average gross beta concentration in the finished drinking water was 2.61 pCi/l which was 0.58 pCi/l less than the average gross beta concentration at the control station (3.19 pCi/l). The MDD was not calculated because the concentration at the control station was higher than the indicator station. Figure 3-5 show the relationship between the average indicator station and average control station for 2015 and the comparison to the MDC.

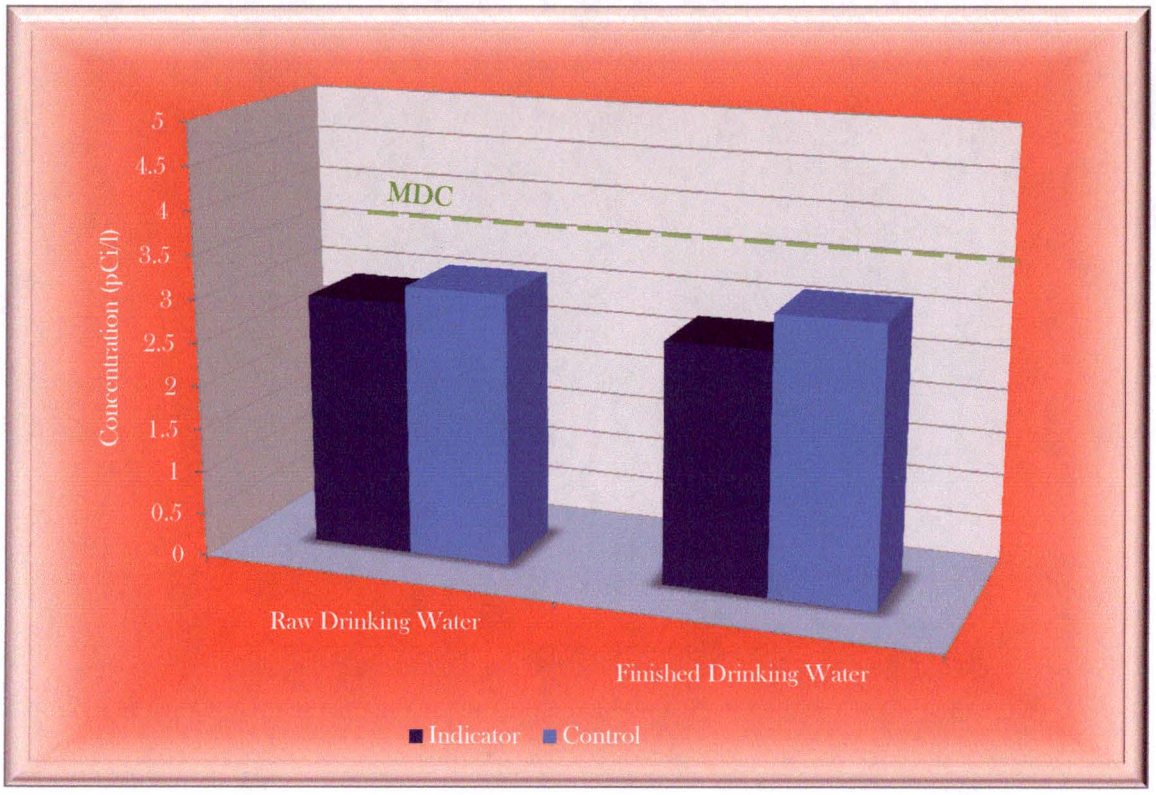
As provided in Table 3-1, there were no positive results during 2015 from the gamma isotopic analysis of the raw and finished drinking water samples. The 2015 raw drinking water indicator stations average tritium concentration was 375 pCi/l which was 272 pCi/l greater than the average concentration found at the control station (102 pCi/l). However, this difference is not discernible since it is less than the MDD of 318 pCi/L.

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.

The finished drinking water average tritium concentration at the indicator stations during 2015 was 290 pCi/l which was 188 pCi/l greater than the average concentration found at the control

station (102 pCi/l). The MDD was calculated as 227 pCi/l between the indicator and control stations, indicating no statistically discernible difference.

Figure 3-5. 2015 Average Gross Beta Concentration in Raw and Finished Drinking Water



3.5 River Water

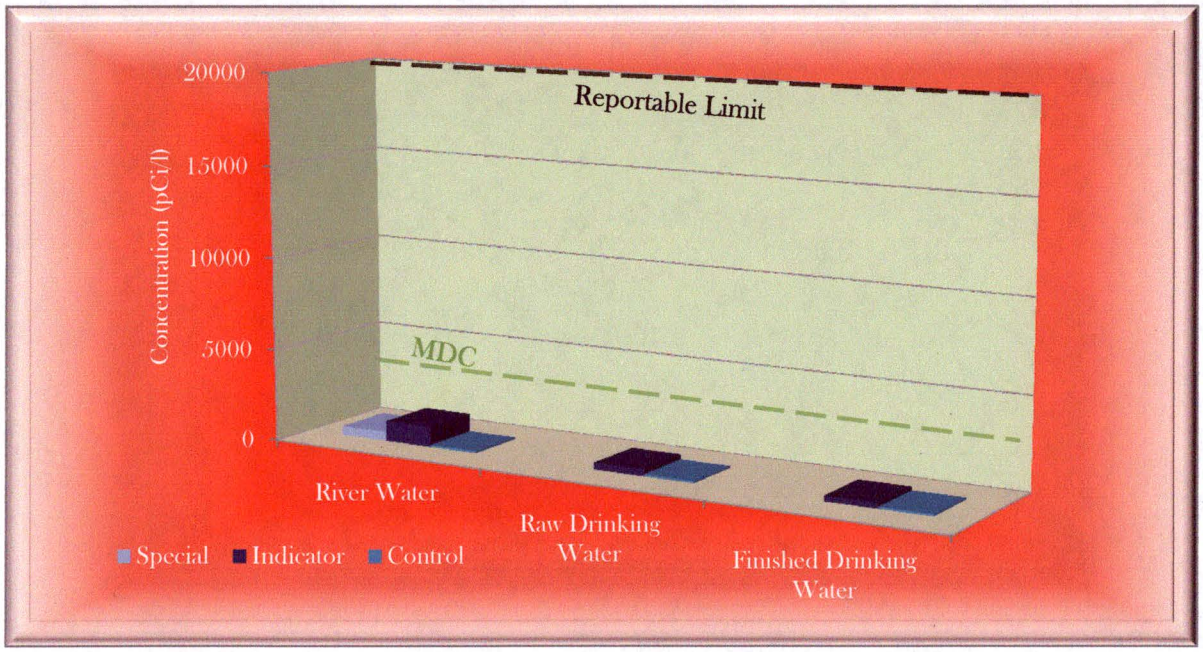
Composite river water samples are collected monthly at an upstream control location and at two downstream indicator locations (shown on Map A-3). The details of the sampling protocols are outlined in Tables 2-1 and Table 2-2. A gamma isotopic analysis is conducted on each monthly sample and the monthly aliquots are combined to form quarterly composite samples, which are analyzed for tritium.

As provided in Table 3-1, there were no positive results during 2015 from the gamma isotopic analysis of the river water samples. Also indicated in Table 3-1, the average tritium concentration found at the indicator station was 1087 pCi/l which was 983 pCi/l greater than the average at the control station (104 pCi/l). The River Water tritium MDD was calculated to be 779 pCi/l, which would indicate a value that is statistically discernible. Since the value is only

slightly above the MDD and still below the MDC and the RL, no adverse environmental impact is indicated. The MDC for tritium in river water used to supply drinking water is 2000 pCi/l and the RL for tritium in drinking water is 20000 pCi/l.

At the "Other" river water sampling station (Station 84), the results ranged from 363 pCi/l to 654 pCi/l with an average of 478 pCi/l. The difference between the Station 84 and the control station was 374 pCi/l. The MDD was calculated to be 175 pCi/l, which would indicate a value that is statistically discernible. Since the value is only slightly above the MDD and below the MDC and the RL, no adverse environmental impact exists. Historically, the relationship between the indicator/control stations and Station 84 has remained consistent. Figure 3-6 below details the 2015 average tritium concentrations across the three water mediums.

Figure 3-6. 2015 Average Tritium Concentrations in River, Raw Drinking, and Finished Drinking Water



3.6 Sediment

Sediment was collected along the shoreline of the Savannah River in the spring and fall 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 detected in 2015 samples were Be-7 and Cs-137. Even though Be-7 was detected in sediment, it will not be discussed within this report, because it was not detected in any plant effluents and likely represents naturally occurring and/or background conditions.

For Cs-137, the average concentration at the indicator station during 2015 was 96.1 pCi/kg-dry which was 3.6 pCi/kg-dry less than that at the control station (99.7 pCi/kg-dry). The concentration of Cs-137 found at the indicator and control stations could be attributed to plant effluents or to other facilities that release radioactive effluents in the vicinity of the plant.

Co-60 was detected at a low level (21 pCi/kg) in a sediment sample collected in April, 2015, from station 83 (at River Mile 150.4, approximately 0.8 miles downstream of the plant discharge) and will be monitored in the future. A review of plant effluents indicates that Co-60 is regularly released at very low levels. Co-60 is currently measured in both water and fish samples; however, if this isotope is consistently observed in subsequent sediment samples, it will be added to the Vogtle ODCM for future inclusion on the REMP. There are no reporting levels for sediment results.

3.7 Interlaboratory Comparison Program

In accordance with ODCM 4.1.3, GPCEL participates in an Interlaboratory Comparison Program (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 ICP includes the required determinations (sample medium/radionuclide combinations) included in the REMP.

The ICP was conducted by Eckert & Ziegler Analytics, Inc. (EZA) of Atlanta, Georgia. EZA 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. EZA supplies the crosscheck samples to GPCEL which performs routine laboratory analyses. Each of the specified analyses is performed three times.

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. 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 on Table 3-6 below:

Table 3-6. Interlaboratory Comparison Limits

Nuclide	Concentration *	Total Sample Activity (pCi)	Percent Coefficient of Variation
Cr-51	<300	NA	25
	NA	>1000	25
	>300	<1000	15
Fe-59	<80	NA	25
	>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 GPCEL's participation in the ICP is provided in Table 3-7 for:

- gross beta and gamma isotopic analyses of an air filter
- gamma isotopic analyses of milk samples
- gross beta, tritium and gamma isotopic analyses of water samples

The 2015 analyses included tritium, gross beta and gamma emitting radio-nuclides in different matrices. The attached results for all analyses were within acceptable limits for accuracy (less than 15% coefficient of variation and less than 3.0 normalized deviations, except for Cr-51 and Fe-59, which are outlined in Table 3-6).

Table 3-7. Interlaboratory Comparison Summary

Analysis or Radionuclide	Date Prepared	Reported Average	Known Value	Standard Deviation EL	Uncertainty Analytics (3S)	Percent Coef of Variation	Normalized Deviation
I-131 ANALYSIS OF AN AIR CARTRIDGE (pCi/cartridge)							
I-131	9/10/2015	85.4	82.0	1.37	1.37	5.79	0.69
GAMMA ISOTOPIC ANALYSIS OF AN AIR FILTER (pCi/filter)							
Ce-141	9/10/2015	92.7	85.5	4.36	1.43	7.5	1.03
Co-58	9/10/2015	114	106	5.28	1.76	5.6	0.9
Co-60	9/10/2015	139	132	5.38	2.21	5	0.37
Cr-51	9/10/2015	226	216	16.66	3.61	9.6	0.45
Cs-134	9/10/2015	85.3	84.9	3.37	1.42	5.4	0.08
Cs-137	9/10/2015	111	102	5	1.71	6.5	1.2
Fe-59	9/10/2015	96.7	90.5	5.5	1.51	6.2	0.91
Mn-54	9/10/2015	133	116	5.82	1.94	6	2.09
Zn-65	9/10/2015	164	142	8.46	2.37	7.3	1.85
GROSS BETA ANALYSIS OF AN AIR FILTER (PCI/FILTER)							
Gross Beta	9/10/2015	103	96.3	3.66	1.61	5.9	1.44
GAMMA ISOTOPIC ANALYSIS OF A MILK SAMPLE (PCI/LITER)							
Co-58	6/11/2015	77.7	68.4	5.92	1.14	10.92	1.1
Co-60	6/11/2015	203	193	8.29	1.06	4.52	1.12
Cr-51	6/11/2015	295	276	33.19	4.61	12.3	0.53
Cs-134	6/11/2015	184	163	6.93	2.72	5.02	2.28
Cs-137	6/11/2015	144	125	7.77	2.09	7.38	1.75
Fe-59	6/11/2015	163	151	10.07	2.53	6.94	1.03
I-131	6/11/2015	105	95.9	6.91	1.6	8	1.04
Mn-54	6/11/2015	115	101	6.9	1.68	7.31	1.62
Zn-65	6/11/2015	282	248	15.62	4.15	7.3	1.64

Table 3-7. Interlaboratory Comparison Summary

Analysis or Radionuclide	Date Prepared	Reported Average	Known Value	Standard Deviation EL	Uncertainty Analytics (3S)	Percent Coef of Variation	Normalized Deviation
GROSS BETA ANALYSIS OF WATER SAMPLE (PCI/LITER)							
Gross Beta	3/19/2015	319	281	10.5	4.69	4.56	2.59
	6/11/2015	290	248	10.2	4.15	4.68	3.1
GAMMA ISOTOPIC ANALYSIS OF WATER SAMPLES (PCI/LITER)							
Ce-141	3/19/2015	135.7	139.2	8.44	2.32	7.97	-0.3
Co-58	3/19/2015	183	180	9.32	3	6.76	0.24
Co-60	3/19/2015	325.3	328	12.73	5.48	5.61	-0.15
Cr-51	3/19/2015	399.1	366	38.04	6.11	17.12	0.48
Cs-134	3/19/2015	131.1	126	5.81	2.1	9.49	0.41
Cs-137	3/19/2015	175	167	9	2.78	7.49	0.6
Fe-59	3/19/2015	203	195	11.63	3.25	7.01	0.56
I-131	3/19/2015	100.5	96.7	7.16	1.61	9.24	0.41
Mn-54	3/19/2015	170	159	8.97	2.65	7.78	0.8
Zn-65	3/19/2015	328	299	17.26	4.99	7.61	1.15
TRITIUM ANALYSIS OF WATER SAMPLES (PCI/LITER)							
H-3	3/19/2015	12104	12600	140	210	3.14	-1.31
	6/11/2015	12700	13000	148	217	2.11	-0.95

3.8 Groundwater

To ensure compliance with NEI 07-07 (Industry Ground Water Protection Initiative – Final Guidance Document), Southern Nuclear developed the Nuclear Management Procedure, Radiological Groundwater Protection Program. The procedure contains detailed site-specific monitoring plans, program technical bases, and communications protocol (to ensure that radioactive leaks and spills are addressed and communicated appropriately). In an effort to prevent future leaks of radioactive material to groundwater, SNC plants have established robust buried piping and tanks inspection programs. No changes were made to the Groundwater Protection Program in 2015.

Plant Vogtle maintains the following wells (Table 3-8), which are sampled at a frequency that satisfies the requirements of NEI 07-07. The analytical results for 2015 were all within regulatory limits specified within this report. Table 3-9 contains the results of the Groundwater Protection Program tritium results (in pCi/L).

Table 3-8. Groundwater Protection Program Locations

Well	Aquifer	Monitoring Purpose
LT-1B	Water Table	NSCW related tank
LT-7A	Water Table	NSCW related tank
LT-12	Water Table	NSCW related tank
LT-13	Water Table	NSCW related tank
802A	Water Table	Southeastern potential leakage
803A*	Water Table	Up gradient to rad waste building
805A**	Water Table	Down gradient from rad waste building and NSCW related facilities
806B	Water Table	Dilution line
808	Water Table	Up gradient; along Pen Branch Fault
R1	Water Table	NSCW related tank; western potential leakage
R2	Water Table	Southern potential leakage
R3	Water Table	Eastern potential leakage
R4	Water Table	Dilution line
R5	Water Table	Dilution line
R6	Water Table	Dilution line
R7	Water Table	Dilution line
R8	Water Table within Sav. River sediments	Dilution line
1013*	Water Table	Low level rad waste storage
1014	Tertiary	Up gradient
1015	Water Table	Vertically up gradient

Table 3-8. Groundwater Protection Program Locations

Well	Aquifer	Monitoring Purpose
1003*	Tertiary	Up gradient
1004*	Water Table	Vertically up gradient
27**	Tertiary	Down gradient tertiary
29**	Tertiary	Down gradient tertiary
MU-1	Tertiary/Cretaceous	Facility water supply
River	N/A	Surface water

NSCW – Nuclear service cooling water
* Well abandoned due to construction activities with Vogtle Units 3&4
** Well no longer sampled due to structural issues

Table 3-9. Groundwater Protection Program Tritium Results (pCi/L)

Well	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
LT-1B	323	261	504	430
LT-7A	532	621	594	737
LT-12	799	797	919	1050
LT-13	517	407	611	368
802A	329	451	310	652
806B	119	307	291	373
808	126	171	345	391
R1	367	519	220	190
R2	156	357	117	145
R3	244	331	193	201
R4	303	325	87.9	26.8
R5	518	287	83.8	157
R6	123	246	319	333
R7	NDM	112	NDM	168
R8	58.3	NDM	82.3	250
1014	NDM	NDM	NDM	59.7
1015	265	473	171	198
MU-1	267	NS	NS	NS
River	116	108	50.2	135

NDM – No Detectable Measurement

4 SURVEY SUMMARIES

4.1 Land Use Census

In accordance with ODCM 4.1.2, a land use census was conducted on November 10, 2015 to verify the locations of the nearest radiological receptor within five miles. The census results, shown in Table 4-1, indicated no changes from 2014; therefore, no changes to the ODCM are required.

Table 4-1. Land Use Census Results

Sector	Residence	Milk Animal*	Beef Cattle	Garden**
Distance in Miles to the Nearest Location in Each Sector				
N	1.4	None	None	None
NNE	None	None	None	None
NE	None	None	None	None
ENE	None	None	None	None
E	None	None	None	None
ESE	4.2	None	None	None
SE	4.3	None	4.9	None
SSE	4.7	None	4.7	None
S	4.4	None	None	None
SSW	4.7	None	None	None
SW	3.1	None	4.4	None
WSW	2.6	None	2.7	None
W	3.4	None	4.4	None
WNW	1.9	None	None	None
NW	1.5	None	1.8	None
NNW	1.5	None	None	None

*A milk animal is a cow or goat producing milk for human consumption.
**A garden of greater than 500 square feet producing broad leaf vegetation.
Note: Land within SRS was excluded from the census.

4.2 Savannah River Survey

A survey of the Savannah River downstream of the plant for approximately 100 miles (approximately river miles 44.7 to 151.2) was conducted on September 22, 2015 to identify any new withdrawal of water from the river for drinking, irrigation, or construction purposes. No

new usage was visually identified. These results were verified with the South Carolina Department of Health and Environmental Control (SC DEHEC) on September 29, 2015, and the Georgia Department of Natural Resources on September 29, 2015. Each of these agencies confirmed that no water withdrawal permits for drinking, irrigation, or construction purposes had been issued for this stretch of the Savannah River. It should be noted that Vogtle Units 3 and 4 received a surface water withdrawal permit in December of 2015.

5 CONCLUSIONS

This report confirms SNCs conformance with the requirements of Chapter 4 of the ODCM and the objectives were to:

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

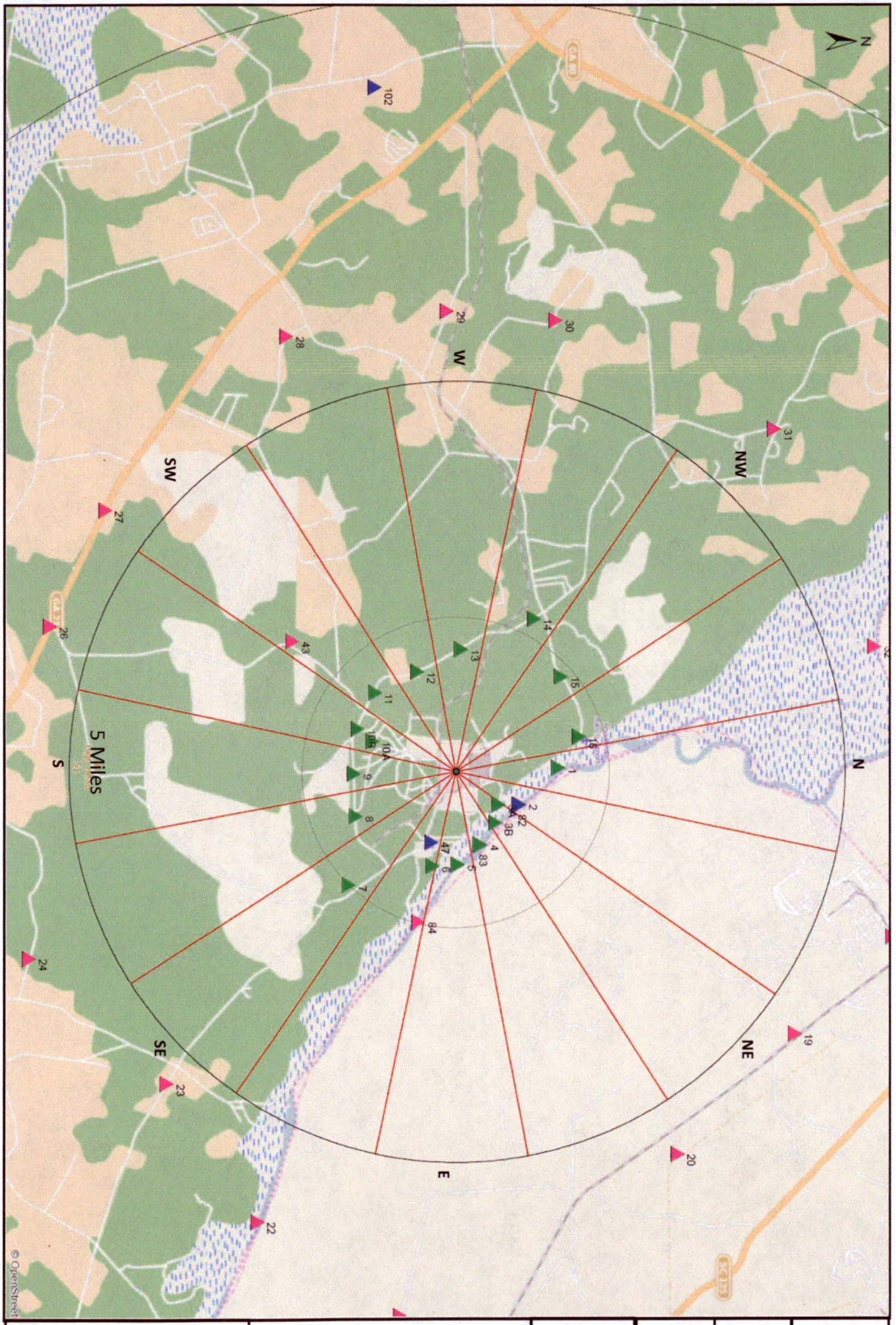
2) Assess the radiological impact (if any) to the environment due to the operation of the VEGP.

Based on the 2015 activities associated with the REMP, SNC offers the following conclusions:

- Samples were collected and there were no deviations or anomalies that negatively affected the quality of the REMP
- Land use census and river survey did not reveal any changes
- Analytical results were below reporting levels
- These values are consistent with historical results, indicating no adverse radiological environmental impacts associated with the operation of VEGP

APPENDIX A

Maps



Legend:

Indicator Stations -

Control Stations -

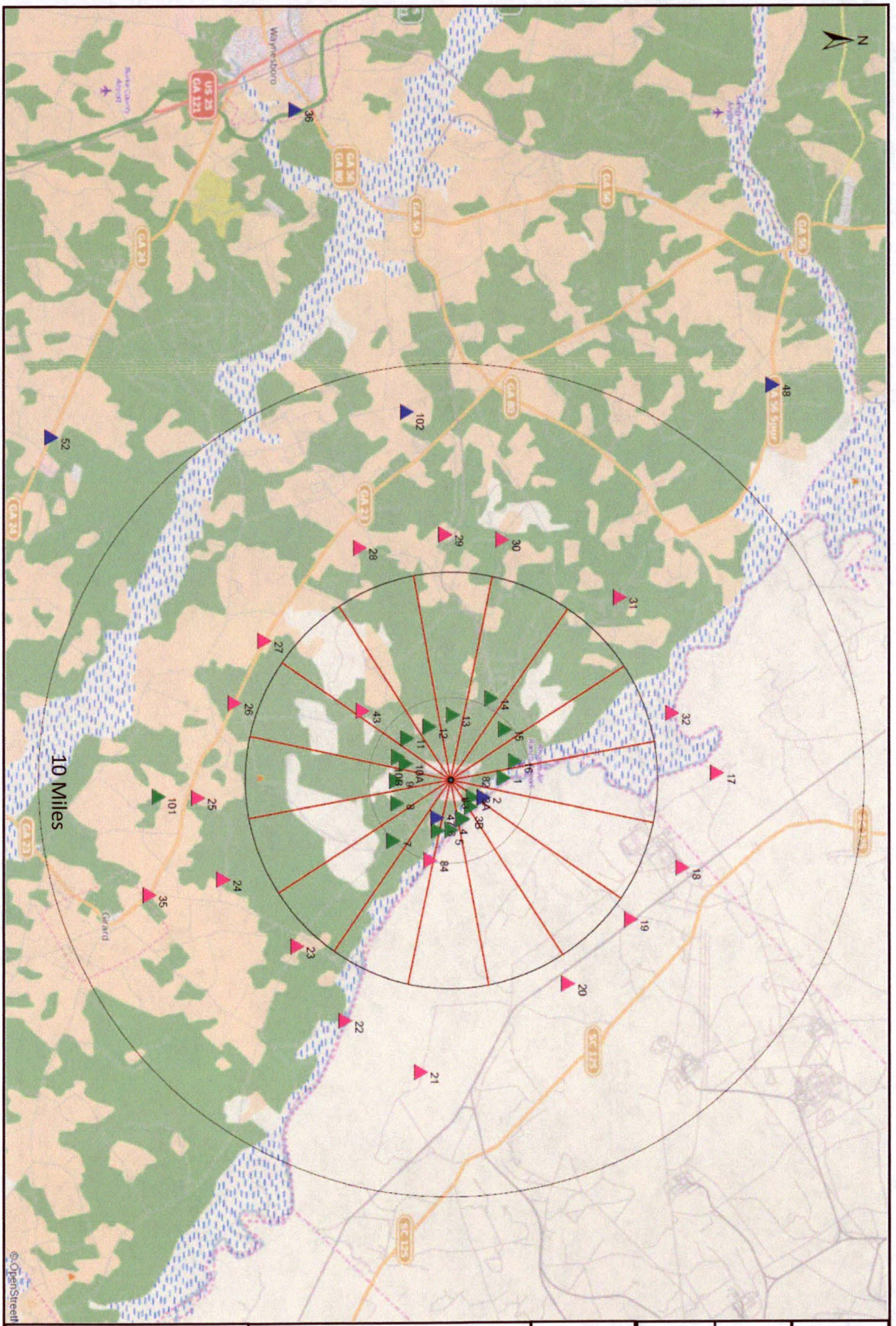
Other Stations -

Vogtle Electric Generating Plant

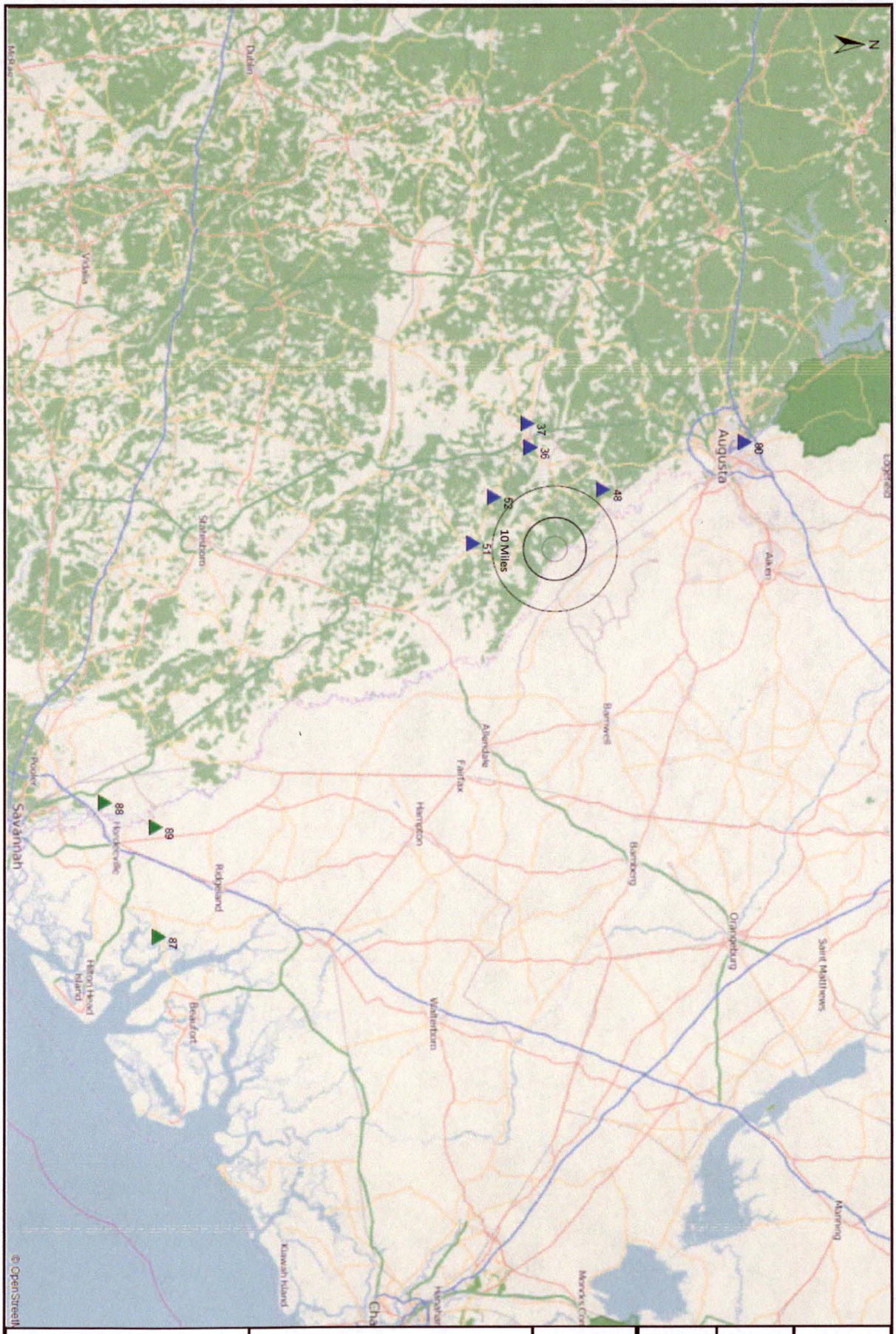
2015 Annual Radiological Environmental Report

REMP Stations in Plant Vicinity

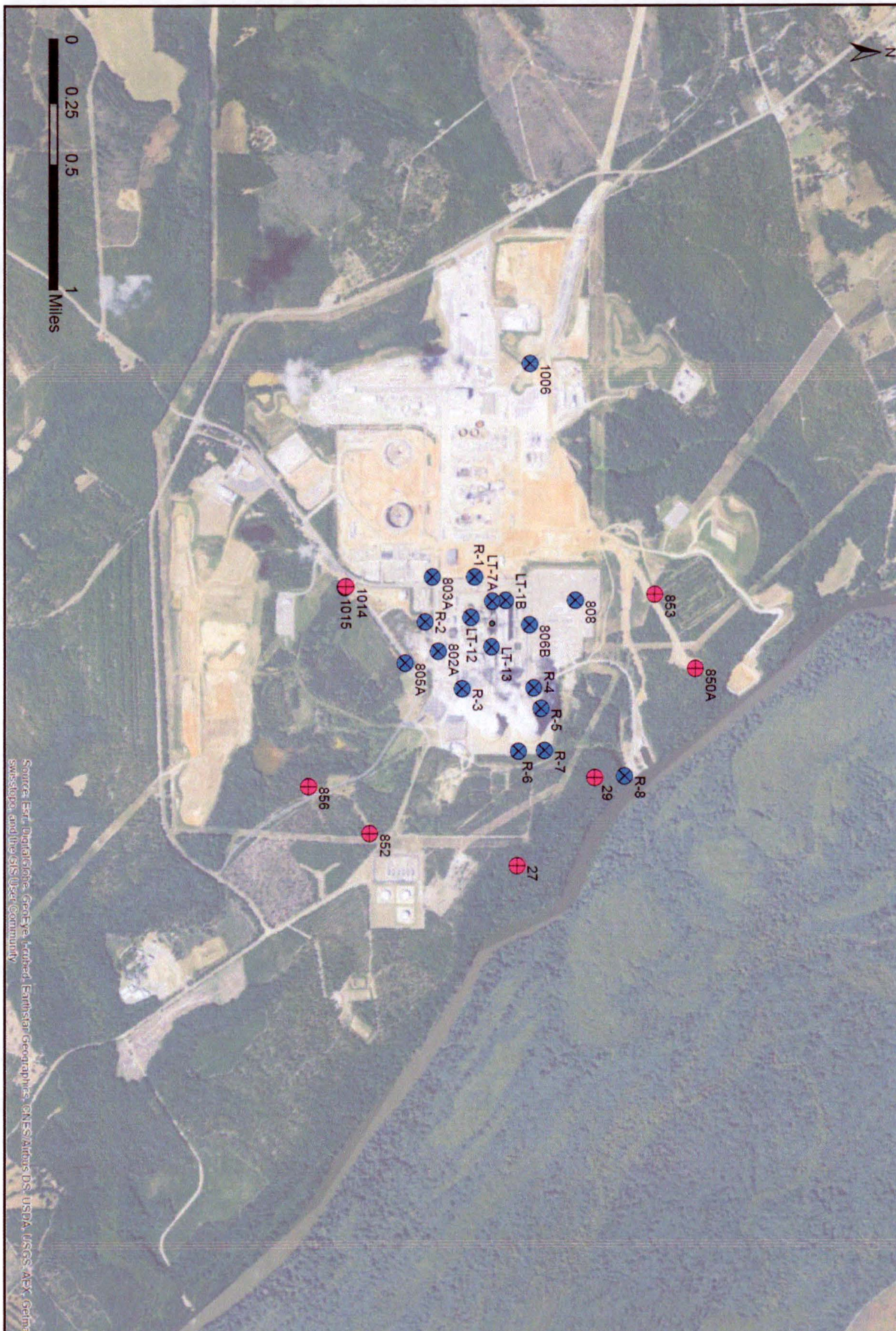
Drawn by:	C. Groce	Appendix A
April 30, 2016		Map A-1



Legend:	Vogtle Electric Generating Plant		Drawn by: C. Groce	Appendix A
Indicator Stations -	2015 Annual Radiological Environmental Report			Map A-2
Control Stations -	REMP Stations within 10 miles		April 30, 2016	
Other Stations -				



Legend:	Vogtle Electric Generating Plant		Drawn by: C. Groce	Appendix A
Indicator Stations - ▲	2015 Annual Radiological Environmental Report			Map A-3
Control Stations - ▲	Extended REMP Stations		April 30, 2016	
Other Stations - ▲				



Legend:	Vogtle Electric Generating Plant		Drawn by:	C. Groce	Appendix A
Surficial Aquifer - ⊗ (blue)	2015 Annual Radiological Environmental Report				Map A-4
Tertiary Aquifer - ⊗ (red)	Facility Groundwater Wells		April 30, 2016		

APPENDIX B

Errata

3.8 Groundwater

To ensure compliance with NEI 07-07 (Industry Ground Water Protection Initiative – Final Guidance Document), Southern Nuclear developed the Nuclear Management Procedure, Radiological Groundwater Protection Program. The procedure contains detailed site-specific monitoring plans, program technical bases, and communications protocol (to ensure that radioactive leaks and spills are addressed and communicated appropriately). In an effort to prevent future leaks of radioactive material to groundwater, SNC plants have established robust buried piping and tanks inspection programs. No changes were made to the Groundwater Protection Program in 2014.

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Table 3-8. Groundwater Protection Program Locations

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River	N/A	Surface water

NSCW – Nuclear service cooling water
* Well abandoned due to construction activities with Vogtle Units 3&4
** Well no longer sampled due to structural issues

Table 3-9. Groundwater Protection Program Tritium Results (pCi/L)

Well	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
LT-1B	496	505	336	642
LT-7A	806	770	765	1020
LT-12	688	842	710	859
LT-13	429	342	540	673
802A	370	307	429	512
806B	308	447	377	583
808	271	224	213	NDM
R1	286	323	373	386
R2	210	282	163	489
R3	283	402	261	224
R4	232	367	215	NDM
R5	238	285	259	424
R6	289	398	292	NDM
R7	NDM	NDM	NDM	NDM
R8	NS – Flooded	NS – No Access	NDM	NDM
1014	NDM	NDM	NDM	NDM
1015	358	262	346	175
MU-1	NDM	NDM	NDM	NS – Out of Service
River	ND - Flooded	255	135	180

NDM – No Detectable Measurement