U.S. DEPARTMENT OF ENERGY

Savannah River Citizens Advisory Board

Environmental Sampling and Monitoring

July 22, 2013

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Environmental Quality Management Division
Office of Infrastructure and Environmental Stewardship
Department of Energy – Savannah River Operations Office

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ACRONYMS AND DEFINITIONS

ATSDR	Agency for Toxic Substances and Disease Registry
CDC	Center for Disease Control
DOE-SR	Department of Energy – Savannah River Operations Office
EPA	Environmental Protection Agency
GDNR	Georgia Department of Natural Resources
MEI	Maximally Exposed Individual
mrem	Millirem
PHA	Public Health Assessment
SCDHEC	South Carolina Department of Health and Environmental Control
SRS	Savannah River Site
SRNS	Savannah River Nuclear Solutions, LLC
TLD	Thermoluminescent Dosimeter
ug/g	Microgram/gram

PURPOSE

To fulfill a Facilities Disposition and Site Remediation Committee Work Plan Commitment

To provide a general overview of an environmental monitoring:

- **Pollutant Pathways**
- **Sample Determinations**
- **Reporting**
- **Impacts**

WHAT IS ENVIRONMENTAL MONITORING?

- **Effluent Monitoring**
  - The collection of samples or data from the point a facility discharges liquid or releases gases to the environment

- **Environmental Surveillance**
  - The collection of samples of air, water, soil, vegetables, fruits, meat, milk, biota, and other media—or of data—from the environment

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WHY IS ENVIRONMENTAL MONITORING CONDUCTED?

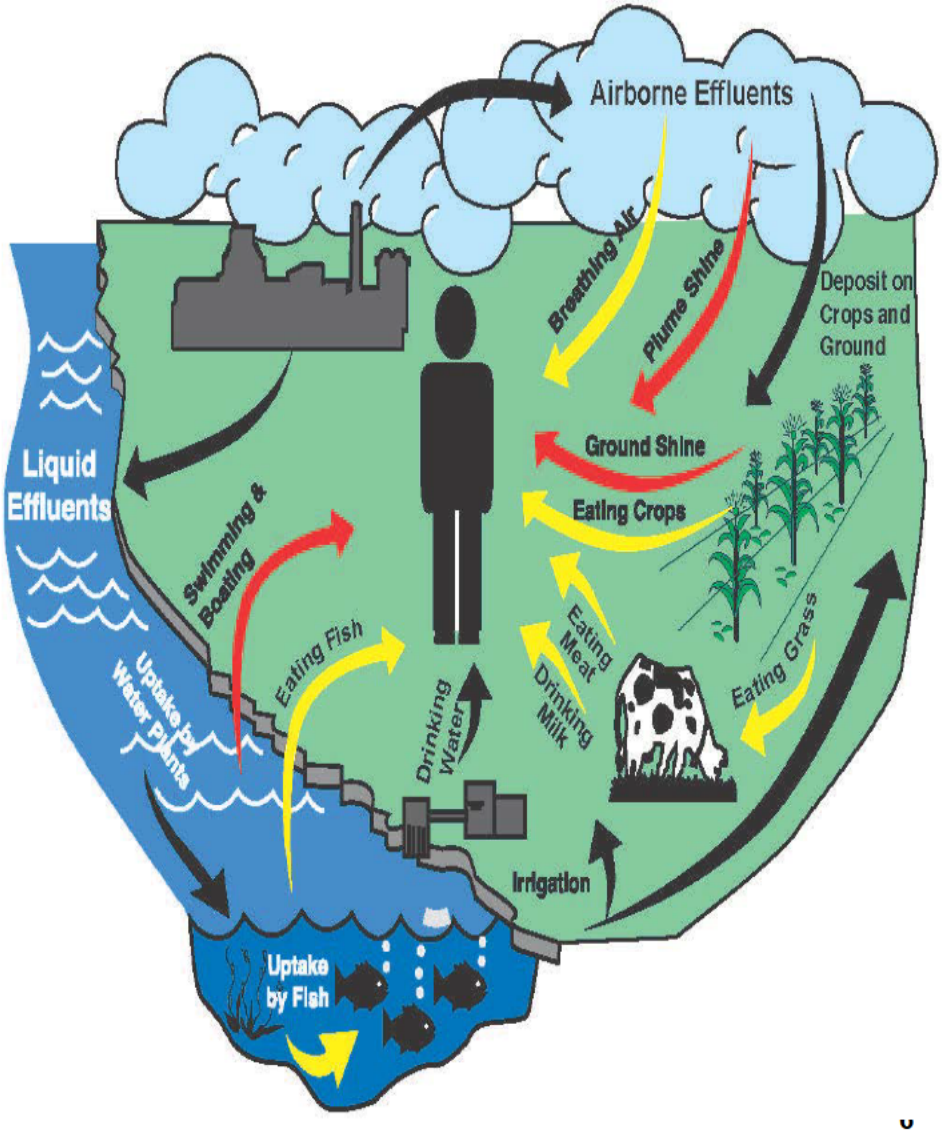
- Characterize and quantify contaminants released from a facility
- Assess the effects, if any, to the public and on the environment
- To comply with applicable regulatory standards established by:
  - EPA
  - SCDHEC
  - DOE

HOW IS THE ENVIRONMENTAL MONITORING CONDUCTED DETERMINED?

- Determining where, when and how media are sampled or monitored is based on contaminant characteristics, mobility and pathway(s).

- Contaminants are incidentally released to the environment through atmospheric and/or liquid pathways from facility operations. The principal pathways by which people are exposed to releases of radioactivity are:

Inhalation	Skin absorption
Ingestion	External exposure



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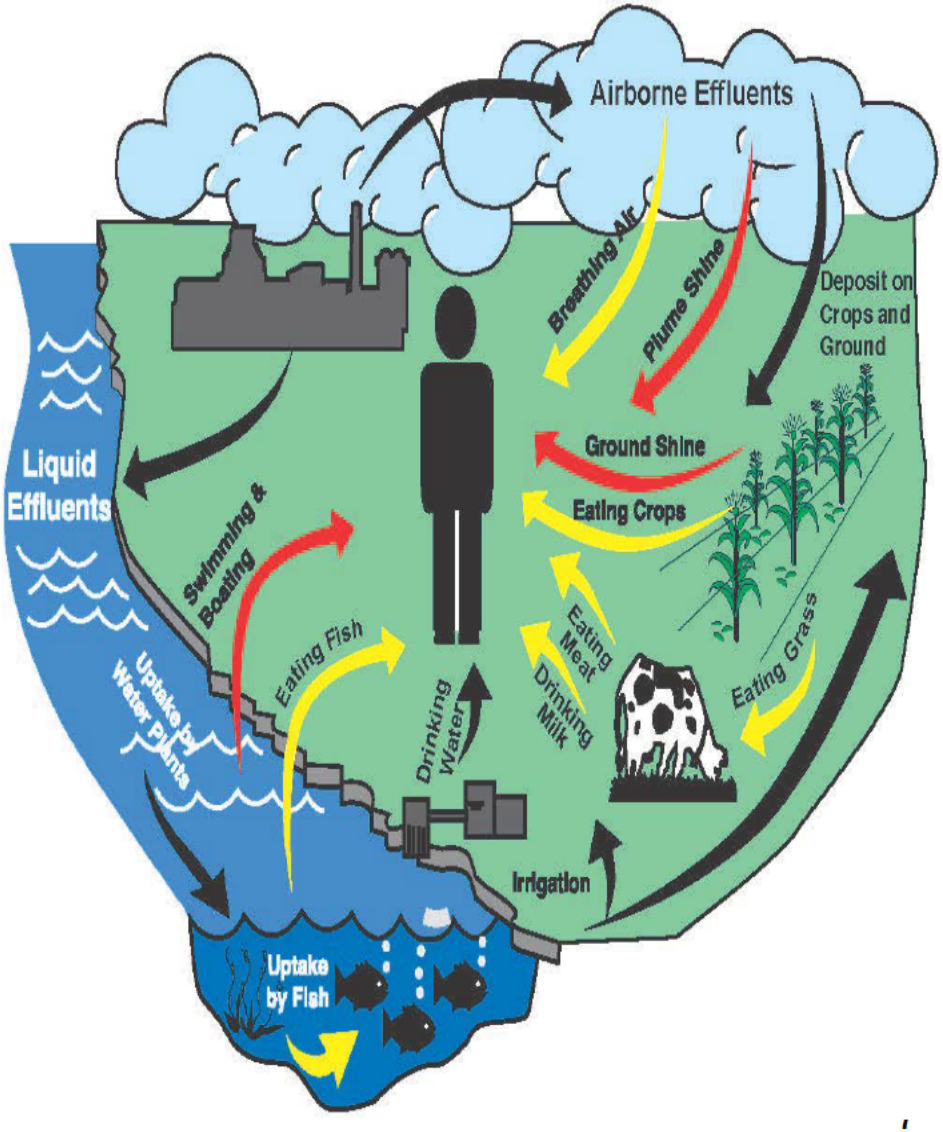
HOW IS THE ENVIRONMENTAL MONITORING CONDUCTED DETERMINED?

- Doses to the public are calculated and referred to as the Maximally Exposed Individual (MEI) dose. What is a maximally exposed individual – a member of the public who hypothetically has a potential to receive the largest radiation dose from a facility's operations.

- At SRS, the MEI hypothetically would have lived at the site boundary and consumed milk, meat, and vegetables produced at that location; consumed water and fish from the Savannah River; and spent time on or near the river every day.



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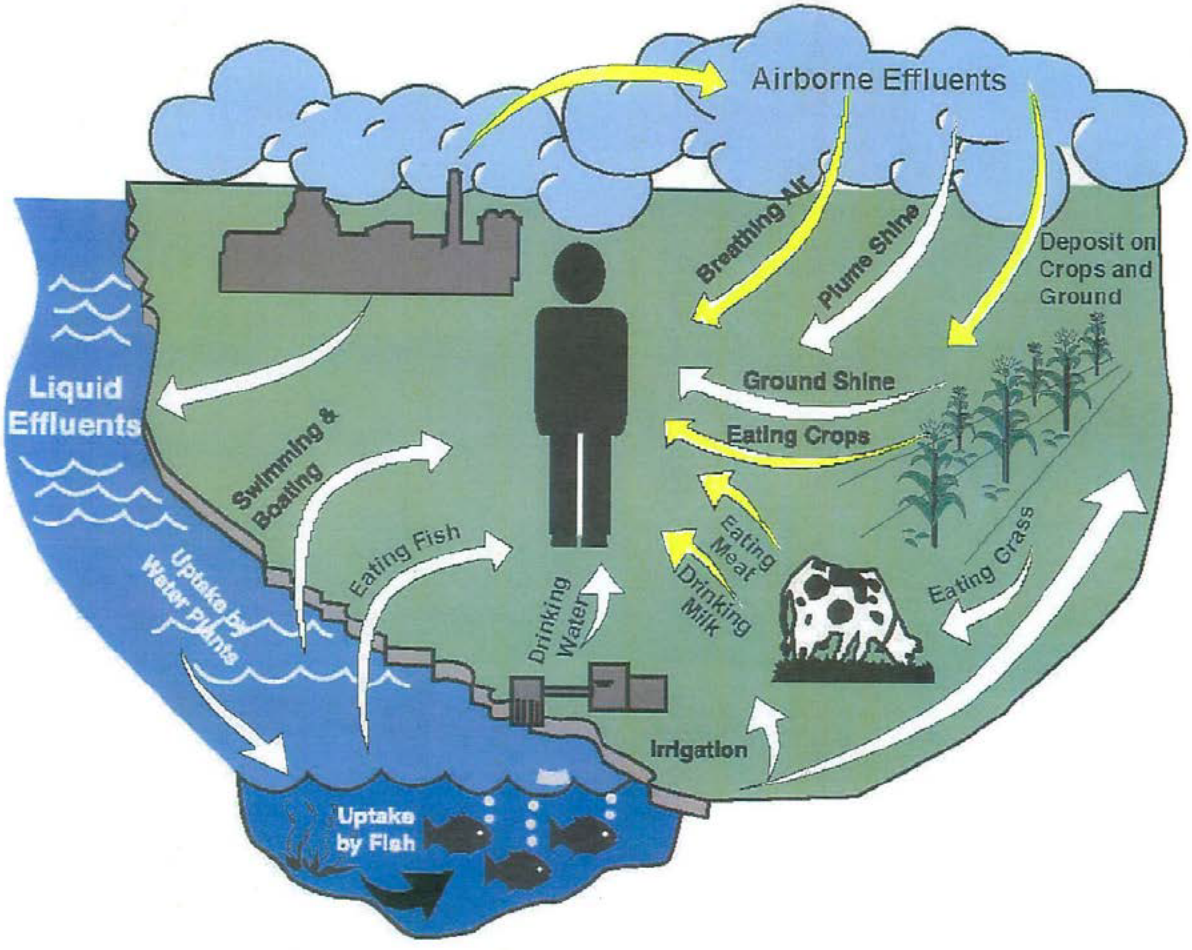
CONTAMINANT AIR PATHWAY



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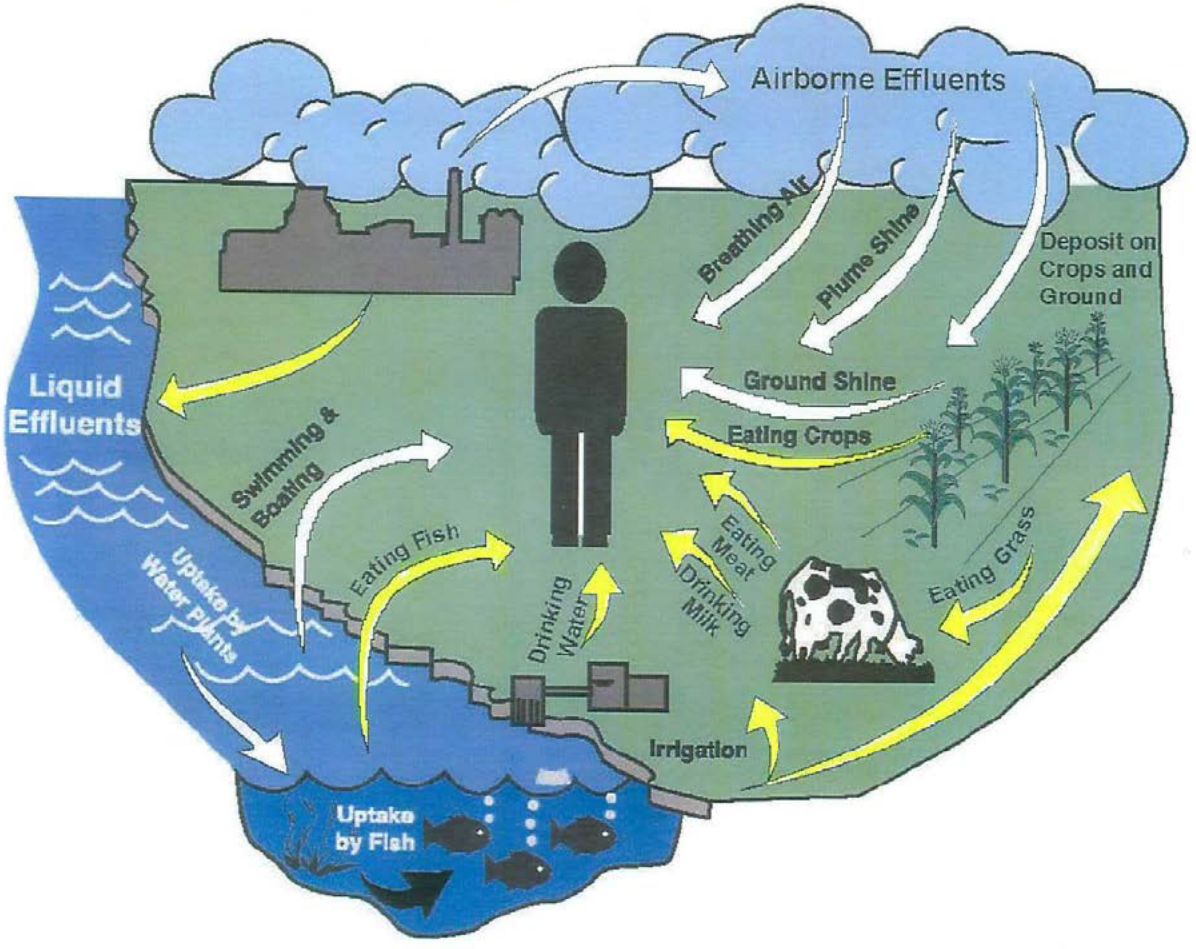
CONTAMINANT LIQUID PATHWAY



WHO CONDUCTS ENVIRONMENTAL MONITORING ACTIVITIES IN THE CSRA AND SAVANNAH RIVER?

- Georgia Department of Natural Resources
- Savannah River Nuclear Solutions
- Vogtle Electric Generating Plant
- City of Savannah Industrial and Domestic Water Treatment Plant
- South Carolina Department of Health and Environmental Control
- Energy Solutions (Barnwell, SC)
- Beaufort-Jasper Water and Sewer Authority

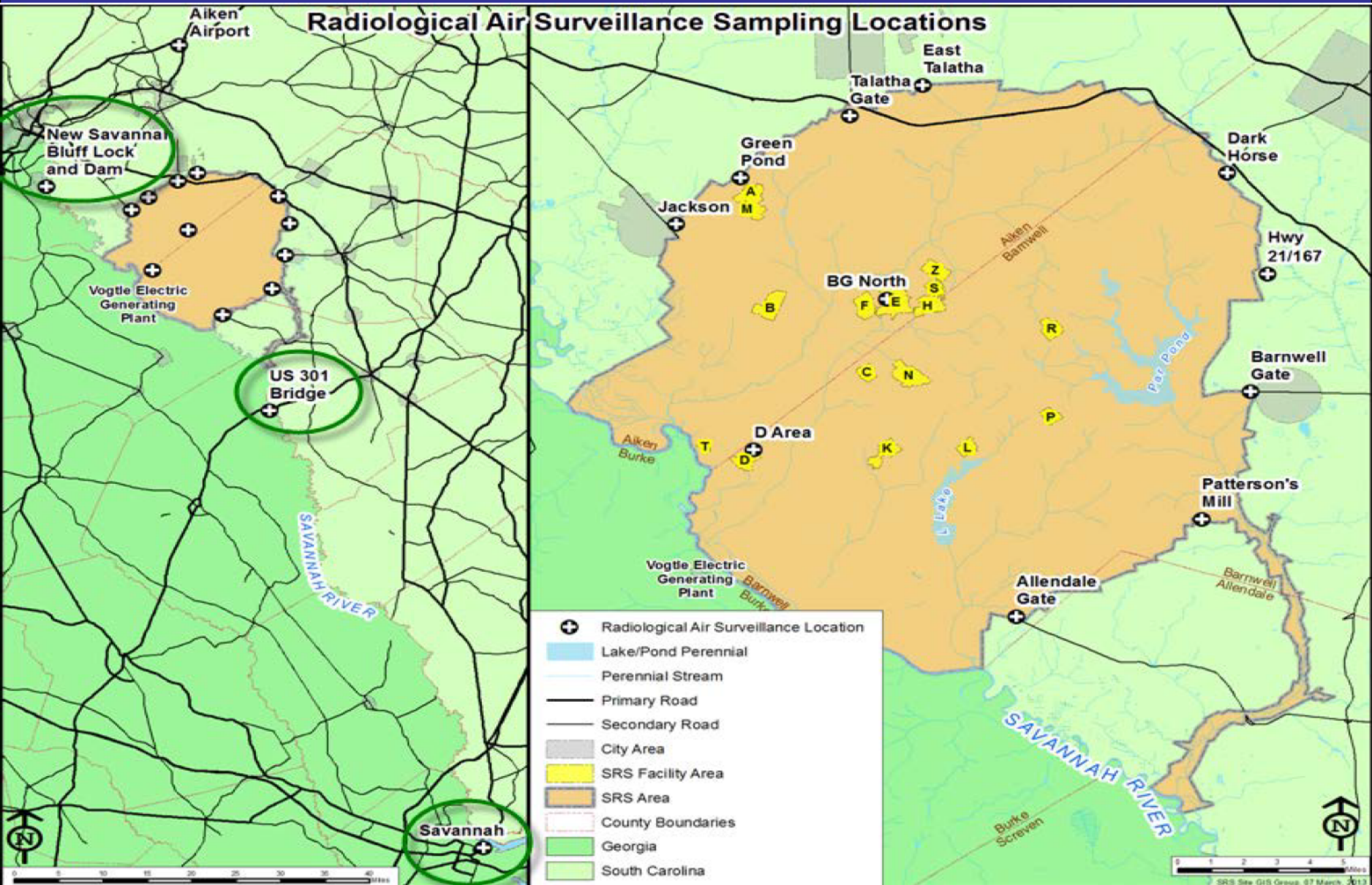
SAMPLE COLLECTION & MONITORING LOCATIONS BY STATE – SCDHEC, VOGTLE AND SRS COMPOSITE

ENVIRONMENTAL MEDIA	GA	SC	TOTAL
RADIOLOGICAL AIR SURVEILLANCE	10	20	30
RADIOLOGICAL SURFACE WATER SURVEILLANCE	21	29	50
FISH (RADIOLOGICAL AND NON-RADIOLOGICAL)	13	10	23
GAME ANIMALS	1	8	9
VEGETATION (Edible)			Various
VEGETATION (Non-edible)	3	35	38
MILK	8	9	17
SOIL (RADIOLOGICAL)	3	48	51
SEDIMENT (RADIOLOGICAL)	2	54	56
DRINKING WATER (RADIOLOGICAL)	4	26	30
SURFACE WATER (NON-RADIOLOGICAL)	0	24	24
GROUNDWATER	36	1175	1211
SEDIMENT (NON-RADIOLOGICAL)	0	38	38
SAVANNAH RIVER SWAMP	0	53	53
TOTAL	97	1529	1626

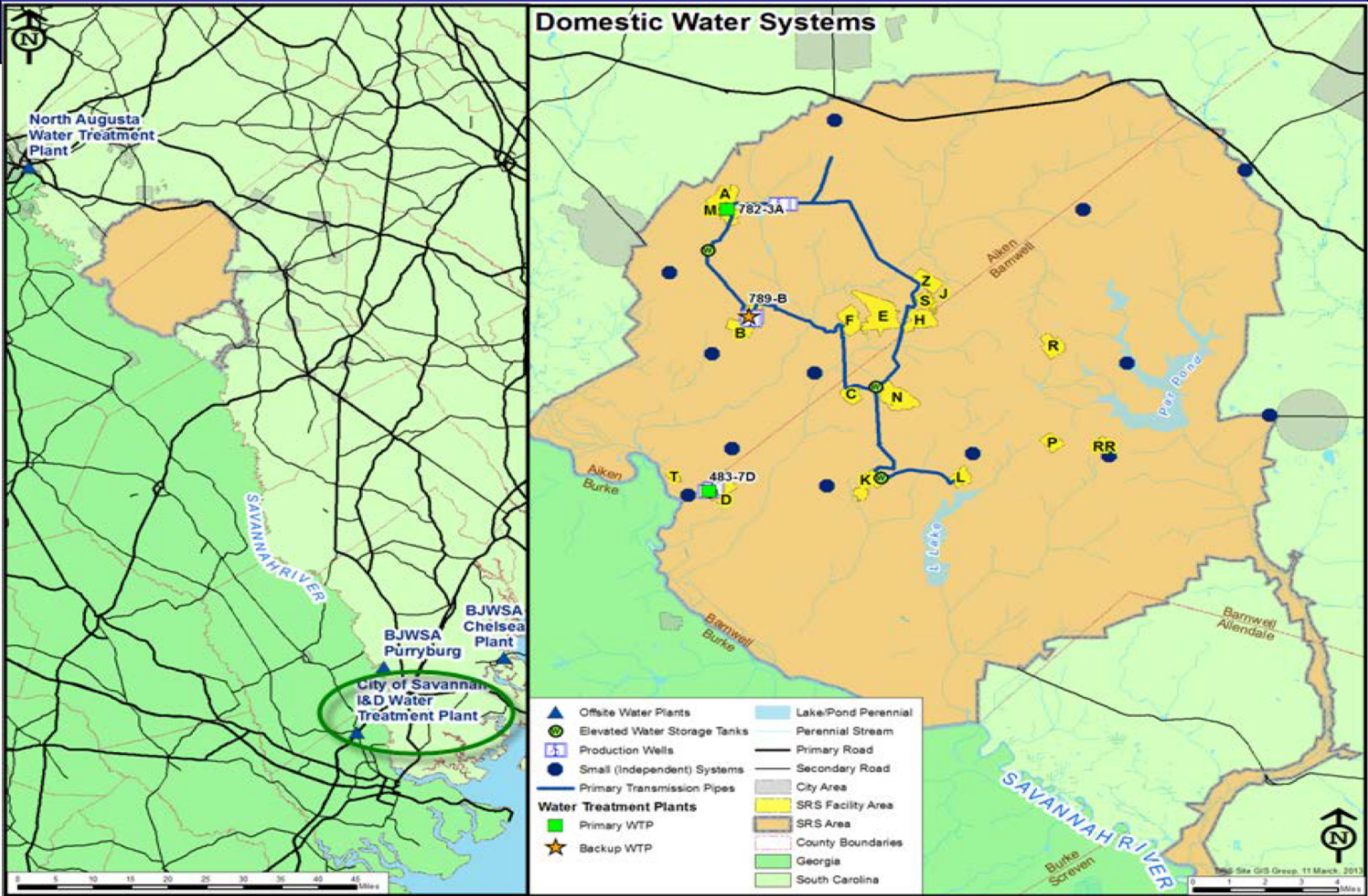
SRS SAMPLE COLLECTION & MONITORING LOCATIONS BY STATE

ENVIRONMENTAL MEDIA	GA	SC	TOTAL
All Radiological Air Surveillance	3	12	15
All Radiological Surface Water Surveillance	5	22	27
FISH	4	5	9
GAME ANIMALS	1	1	2
VEGETATION (edible)	3	5	8
VEGETATION (non-edible)	3	15	18
MILK	4	4	8
SOIL (RAD)	3	19	22
SEDIMENT	0	27	27
DRINKING WATER (RAD)	1	3	4
GROUNDWATER	10	1100	1110
SAVANNAH RIVER SWAMP	0	53	53

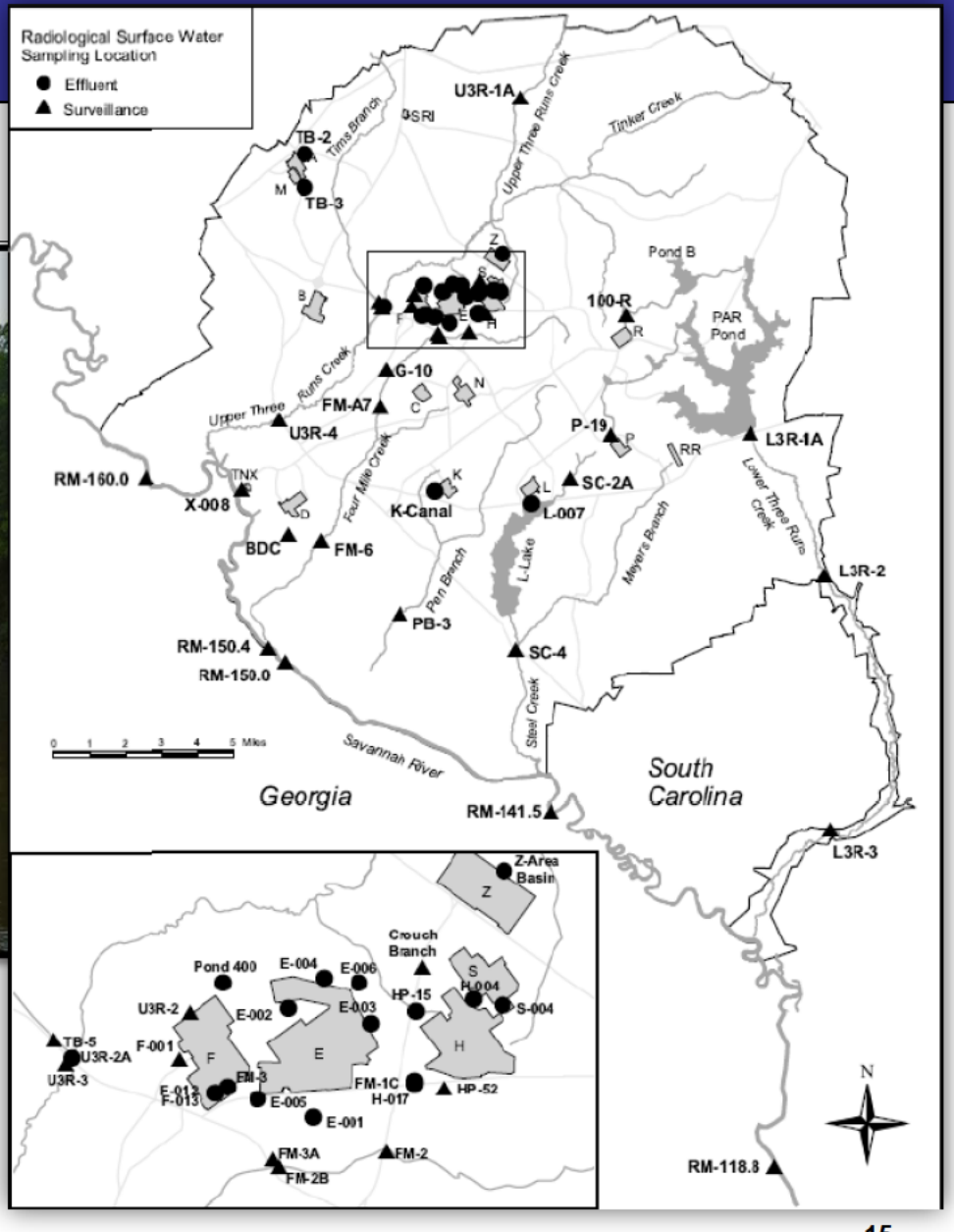
RADIOLOGICAL AIR SURVEILLANCE LOCATIONS



DRINKING WATER SURVEILLANCE LOCATIONS



SURFACE WATER



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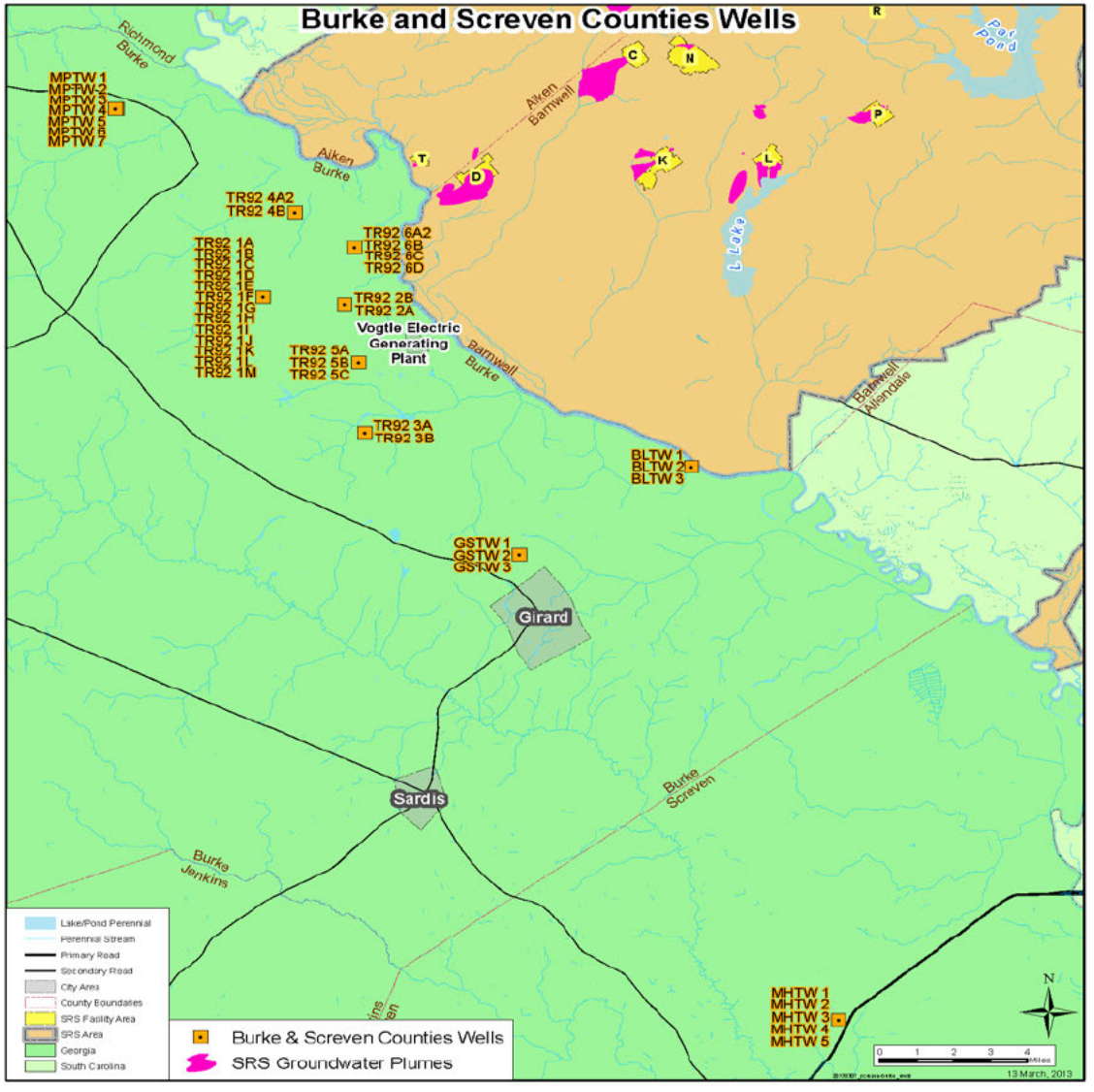
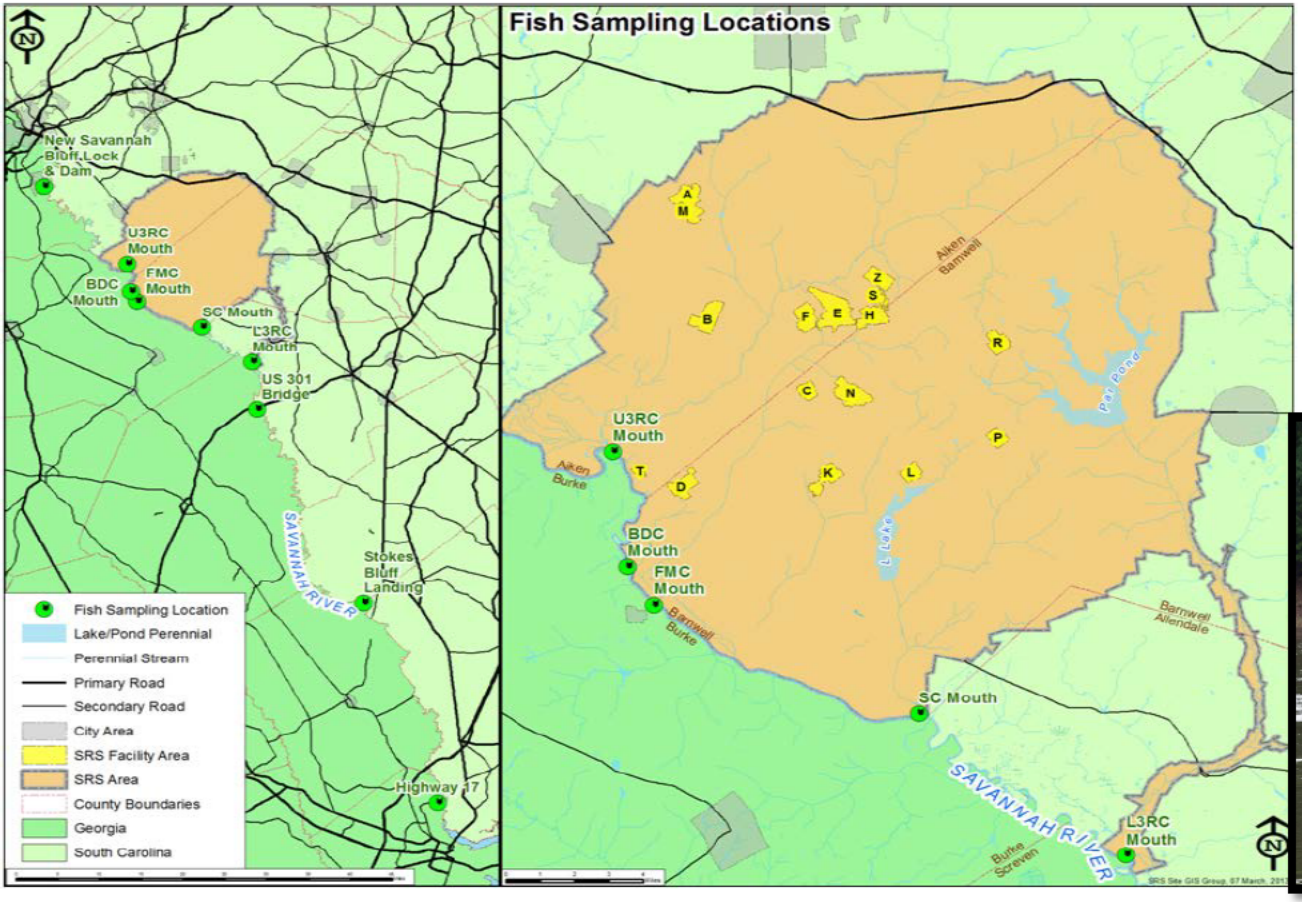
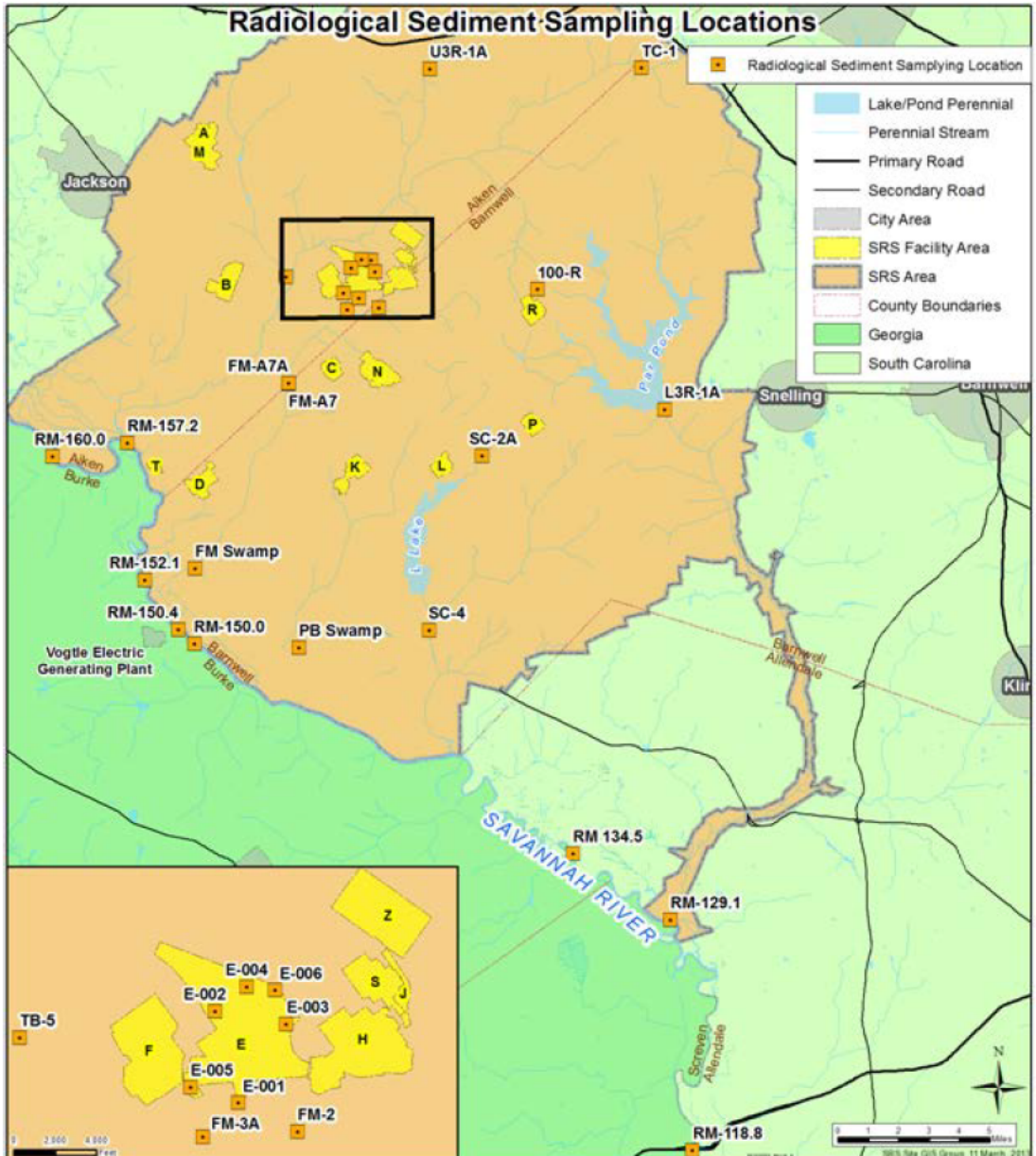
GROUNDWATER



FISH SAMPLING



SEDIMENT SAMPLING



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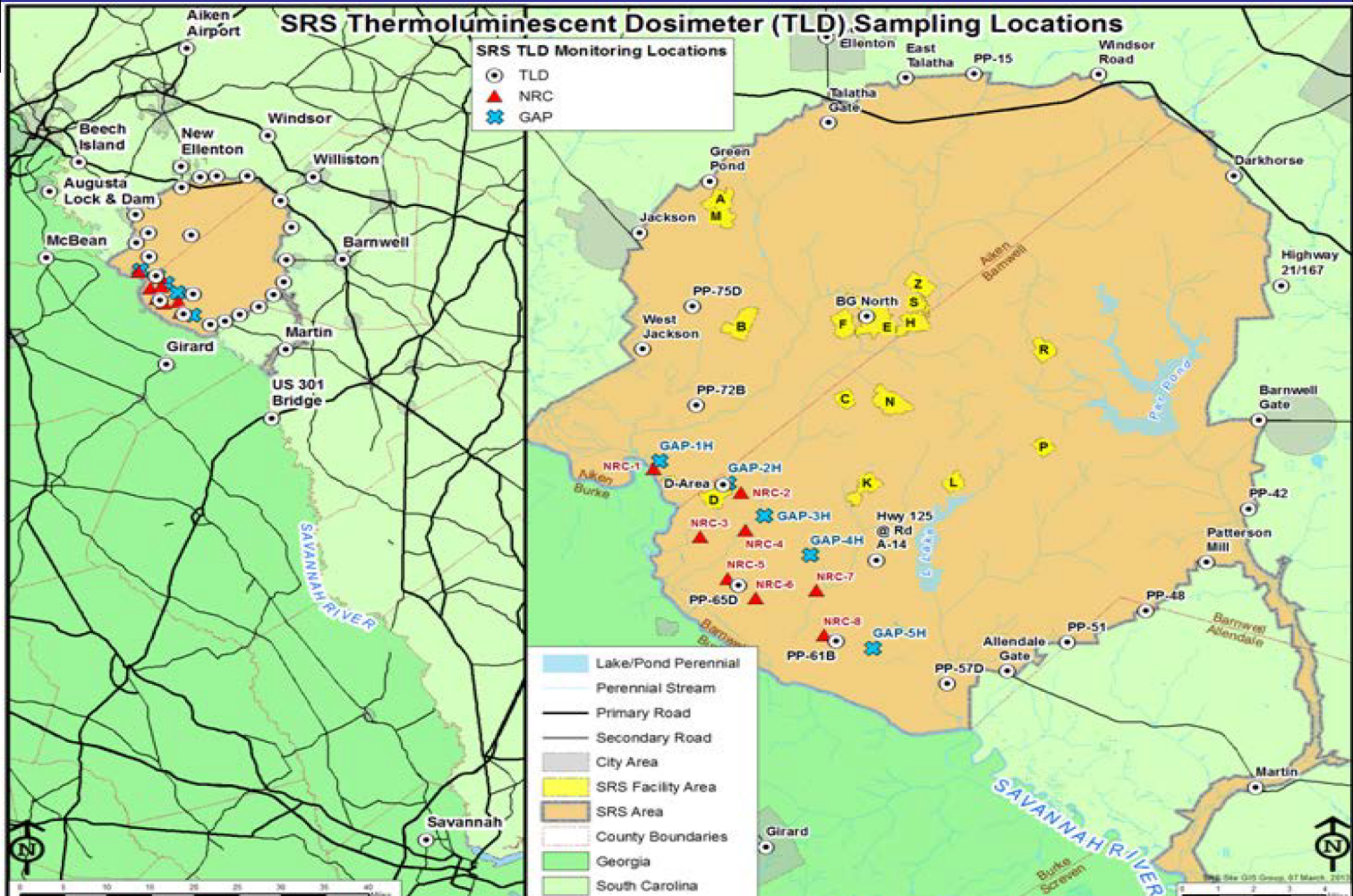
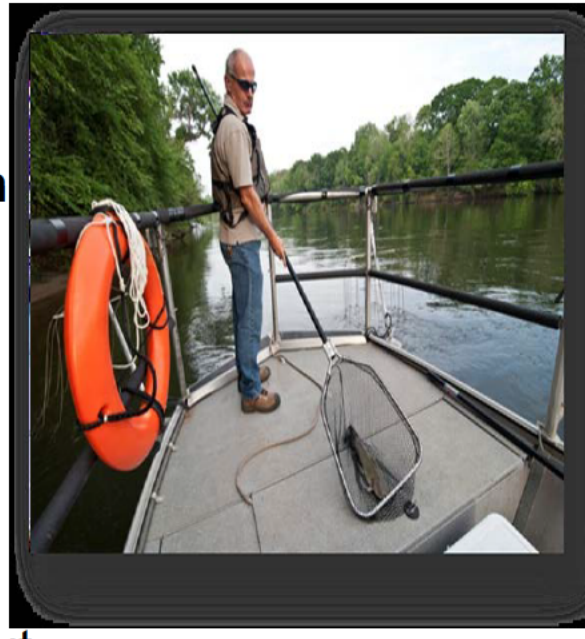
TLD MONITORING



SRS NON-RADIOLOGICAL SURVEILLANCE WATER QUALITY

- **Water Quality parameters were analyzed on all stream, river surveillance, and fish samples**
  - SRS discharges did not impact the water quality in streams or the Savannah River



- **Fish are collected and analyzed from the Savannah River to determine concentrations of non-radiological contaminants**
  - Fish analyses in 2011 indicated mercury levels for fish in the Savannah River ranging from below detectable levels to 1.30 ug/g in bass; lower than levels observed in 2010
  - Primary source of mercury deposition from global fallout
  - Industrial facilities upstream of SRS are considerable contributors

WHERE CAN I FIND THE ENVIRONMENTAL INFORMATION ?

- **Environmental information is available to the public on EPA, NRC, GDNR, SCDHEC, and DOE websites**

- **The Agency for Toxic Substances and Disease Registry (ATSDR) has published two of three Public Health Assessments (PHA)**

  - Groundwater and Surface Water (2007)
  - Biota (2012)
  - Air (Ongoing)

- **The Center for Disease Control published the SRS Dose Reconstruction Project report in 2005.**

SRS ANNUAL SITE ENVIRONMENTAL REPORT AND SUMMARY

- The SRS Annual Site Environmental Report (ASER) and Summary provide describes SRS operations and monitoring activities, data and results.
- ASER and Summary are posted on the World Wide Web by October 1 each year.
- Current and historical copies

  http://www.srs.gov/general/pubs/ERsum/index.html

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SUMMARY

- **Monitoring is conducted to measure contaminants and assess impacts, if any to the public and on the environment and meet regulatory requirements.**

- **Monitoring methods, frequencies, locations and analyses depend on a number of factors:**
  - What the contaminant and its characteristics are?
  - How the contaminant moves in the environment?
  - How people are exposed?

- **Comprehensive environmental monitoring programs are conducted in both states, Georgia and South Carolina by various agencies and organizations.**

- **Monitoring and sampling program results are available to the public.**

- **Independent assessments conducted by ATSDR and CDC are available on the World Wide Web.**

CONCLUSIONS SPECIFIC TO IMPACTS FROM SRS OPERATIONS

- **SRS conducts a comprehensive environmental monitoring program in both states, Georgia and South Carolina.**
- **The radiological doses from SRS operations have been 0.21 mrem or lower during the past ten years.**
  - The DOE Public Dose Standard is 100 mrem/year.
  - Individuals receive natural and consumer doses of 311 mrem/year.
  - The average total dose from all sources is 620 mrem/year.
- **The SRS environmental monitoring program is reviewed annually to ensure adequate monitoring is conducted to quantify the impacts, if any, of SRS operations on the public and the environment.**

SRS ENVIRONMENTAL MONITORING PROGRAM CONTACTS

DOE-SR

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SRNS

Amy Meyer, Manager

Sample Data Management

Environmental Compliance and Area Projects

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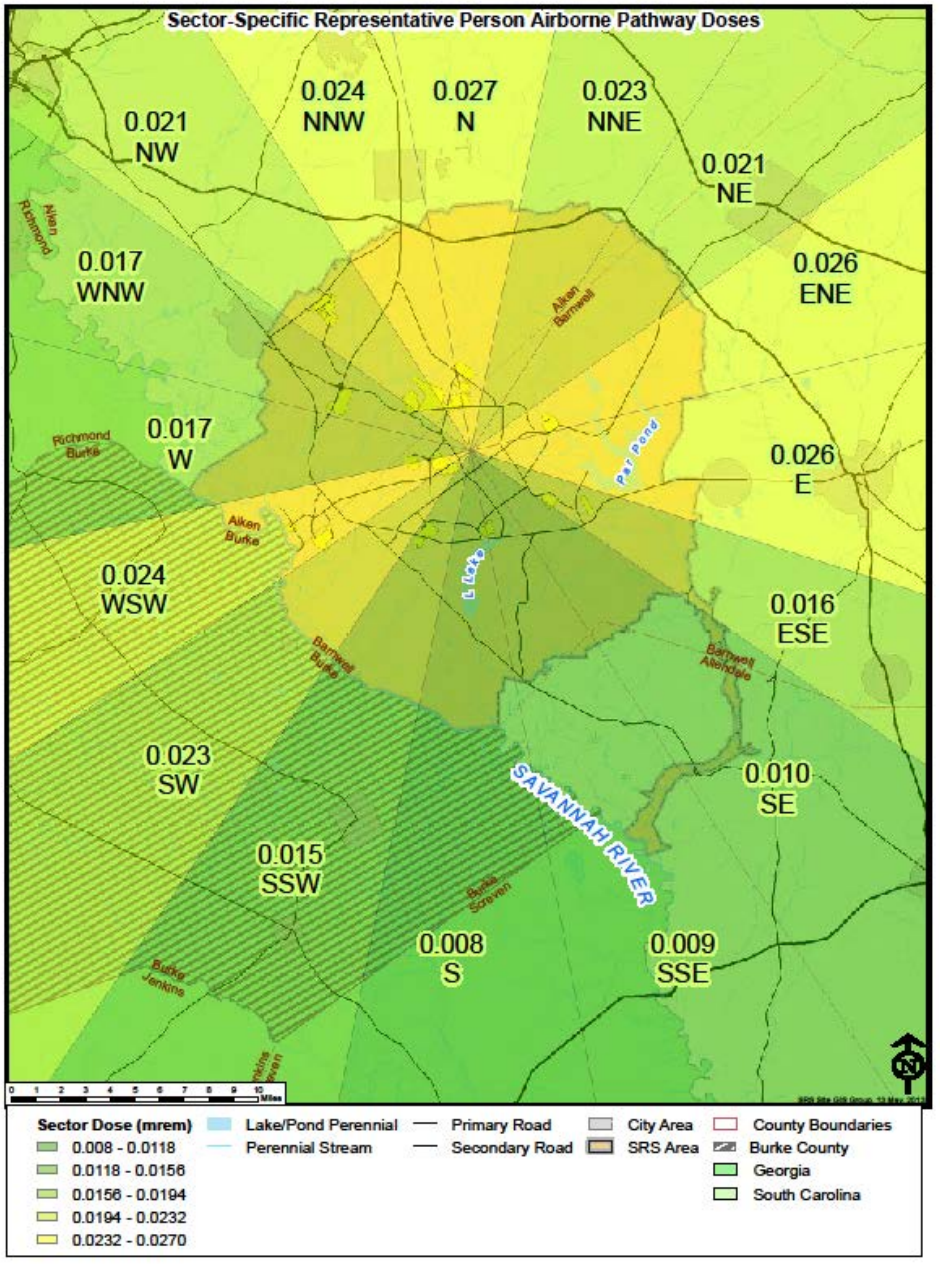
BACKUP SLIDES


Sector-Specific Representative Person Airborne Pathway Doses
0.021
NW
0.024
NNW
0.027
N
0.023
NNE
0.021
NE
0.017
WNW
0.026
ENE
0.017
W
0.026
E
0.024
WSW
0.016
ESE
0.023
SW
0.010
SE
0.015
SSW
0.008
S
0.009
SSE
SAVANNAH RIVER
Aiken
Richmond
Aiken
Barnwell
Richmond
Burke
Aiken
Burke
Par Pond
L Lake
Barnwell
Burke
Barnwell
Aiken
Burke
Screven
Burke
Jenkins
Jenkins
Screven
0 1 2 3 4 5 6 7 8 9 10
Miles
Sector Dose (mrem)
0.008 - 0.0118
0.0118 - 0.0156
0.0156 - 0.0194
0.0194 - 0.0232
0.0232 - 0.0270
Lake/Pond Perennial
Perennial Stream
Primary Road
Secondary Road
City Area
SRS Area
County Boundaries
Burke County
Georgia
South Carolina

BURKE COUNTY GA MONITORING

AIR SURVEILLANCE*	Conducted at the SRS perimeter
SURFACE WATER SURVEILLANCE*	Burke County does not utilize surface water
VEGETATION (Edible)	Vegetables and fruit collected locally
MILK	Collected locally
GROUNDWATER	Miller's Pond, Mobley's, Thompson Oak Flooring (Bluff), Georgia Power, Nalley's Farm, De Laige Trailer Park, Brigham's Landing, Girard
FISH	Samples are collected from near the SRS Creek mouths (50 yards upstream – two miles downstream) Highway 301 in Screven County.
THERMOLUMINESCENT DOSIMETERS	Various locations

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SRS OFFSITE SAMPLE COLLECTION & MONITORING LOCATIONS BY STATE

ENVIRONMENTAL MEDIA	SOUTH CAROLINA	GEORGIA
AIR	1	3
FOODSTUFF	5	3
MILK	4	2
SOIL	1	3
DRINKING WATER	3	1
GROUND WATER	0	10
VEGETATION (Non-edible)	1	3
GAME ANIMALS	-	1

GEORGIA GRANT CHRONOLOGY

- In 2001, based on an agreement between DOE Secretary Bill Richardson and Georgia Governor Roy Barnes, DOE established a three-year grant ($1,856,568) to the Georgia Department of Natural Resources (GDNR) to offset the costs of start-up of their Augusta office for environmental monitoring associated with DOE/SRS missions.

- In 2004, DOE extended the grant and provided an additional $300, 000 to provide GDNR additional time to arrange for alternate non-DOE funding for any monitoring conducted by Georgia after 2004.

- In 2006, GDNR submitted an unsolicited proposal to DOE for $700, 000 in financial assistance for environmental monitoring in 2007. DOE declined the GDNR request, because it did not meet the "unique and innovative" criteria required of an unsolicited proposal.

GEORGIA GRANT CHRONOLOGY

- In April 2010, DOE-SR invited GDNR to submit a grant proposal for environmental monitoring. Subsequently, GDNR submitted a proposal requesting $8.3 Million over five years, which was significantly higher than the previous grant ($2.2 Million over four years).
  - DOE reviewed the grant proposal and attempted to help GDNR revise the proposal to achieve a reasonable scope and cost. These negotiations became protracted over the next year and a half.
  - Administration of the grant was moved to the contracting office of the Environmental Management Consolidated Business Center, Cincinnati, OH. As the Fiscal Year 2012 was about to start, the contracting officer assigned to the grant was unable to get any response from GDNR. As the deadline to apply passed, the grant was not awarded.
  - In the interim, DOE annual budgets became increasingly austere and were punctuated by repeated Continuing Resolutions, which prevented any "new starts," including any new grants.
- In FY 2012, reduced budget realities prompted DOE and GDNR to cease pursuing any new grant.

GEORGIA GRANT SCOPE

- The GDNR radiological monitoring focused on SRS waterborne releases and pathways, and to a lesser extent on airborne pathways. Greatest monitoring emphasis was placed on an area approximately 1-5 miles wide along the Georgia side of the Savannah River from Augusta to Savannah.

- Sampling was conducted on air, surface water, sediments, crops, milk, fish, soil, vegetation, thermo luminescent dosimeters, and groundwater.

- The grant also supported GDNR's participation in regional data-sharing meetings.