



## **Savannah River Site Citizens Advisory Board**

# **2011 SRS Environmental Report Overview**

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**Presentation by**  
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# Acronyms and Definitions

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- **Environmental Monitoring-** Program at SRS that includes effluent monitoring and environmental surveillance with a dual purpose of showing compliance with federal, state, and local regulations, as well as, DOE Orders.
- **Criteria Pollutant-** Six common air pollutants found all over the United States: particle pollution, carbon monoxide, sulfur oxides, nitrogen oxides, and lead. National Ambient Air Quality Standards for the criteria pollutants are established by the EPA.
- **Exposure-** Incidence of radiation on living or inanimate material.
- **Dose-** The amount of energy a person receives internally or externally as a result of a radioactive source.

# Acronyms and Definitions, continued

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- **rem = roentgen equivalent man-** A unit of radiation dose equivalent; a product of the absorbed dose and a weighting factor which accounts for the effectiveness of radiation to cause biological damage; millirem (mrem) is one thousandth of a rem
- **MEI = Maximum Exposed Individual-** Hypothetical person when all potential routes of exposure from a facility's operations are considered, receive the greatest dose equivalent.
- **NPDES** = The National Pollutant Discharge Elimination System
- **BGN** = Burial Ground North
- **PMR** = Patterson Mill Road
- **ug/g** = microgram per gram
- **ug/kg** = microgram per kilogram

# Purpose

- To provide the CAB and public an understanding of the SRS Environmental Report results for 2011
- To present data that show SRS operations result in minimal impact to the public and environment



# SRS Environmental Program Compliance

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- **Environmental program requirements provide specific standards and limits for protection of the public and environment**
  - DOE Order 5400.5, *Radiation Protection of the Public and the Environment*
    - Replaced by DOE Order 458.1 (same name), issued 2/11/2011
  - DOE Order 450.1A, *Environmental Protection Program*
    - Replaced by DOE Order 436.1, *Departmental Sustainability*, issued 5/2/2011
  - The Clean Air Act
  - The Clean Water Act
  - The Safe Drinking Water Act
  - The Comprehensive Environmental Response, Compensation, and Liability Act
  - The Endangered Species and Migratory Bird Treaty Act
  - The National Environmental Policy Act

# Why SRS Monitors

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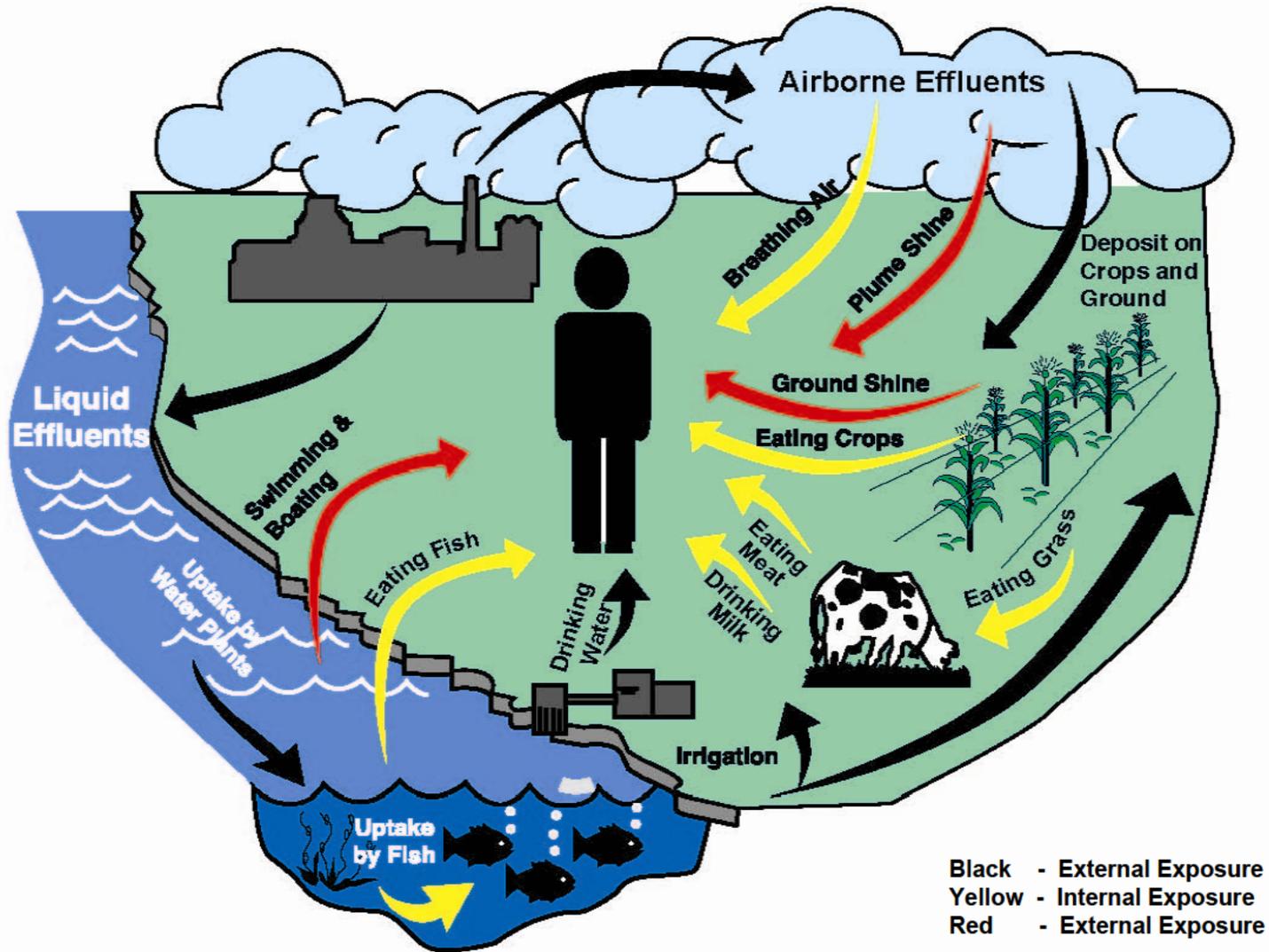
- **Purpose**
  - Characterize and quantify contaminants
  - Demonstrate compliance with applicable standards
  - Calculate radiation exposures to the public
  - Assess the effects, if any, to the public and the environment

# What is Environmental Monitoring?

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- Effluent Monitoring
  - The collection of samples or data from the point at which a facility discharges liquid or gaseous releases to the environment
    - Used for dose models in calculating the dose to the public.
- Environmental Surveillance
  - The collection of samples of air, water, soil, foodstuffs, biota, and other media—or of data—from the environment
    - Used to validate models and monitor the environment.

# Exposure Pathways



# Non-Radiological Effluent Monitoring

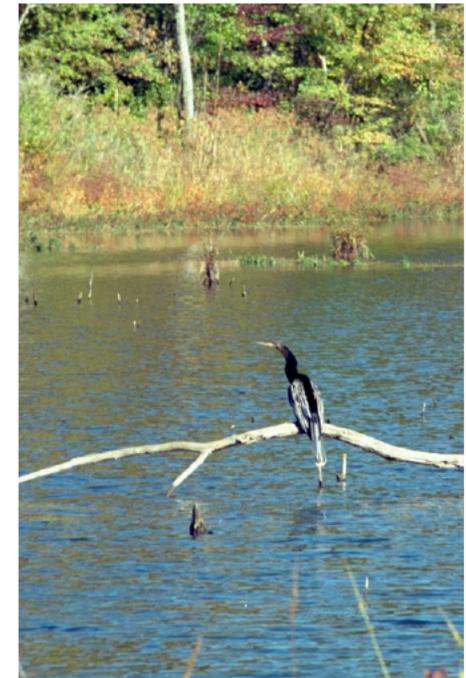


Environmental Technician Records Data from a flow meter at an Industrial Wastewater Outfall

- **Liquid**
  - NPDES Compliance Status
    - Industrial Wastewater
      - **ALL** analyses of >5,000 samples were compliant with industrial wastewater permit requirements
    - Stormwater Outfalls
      - **ALL** outfalls were monitored and in 100% compliant with stormwater permit requirements
- **Air**
  - **ALL** permitted emission limits for air pollutants were met in 2011

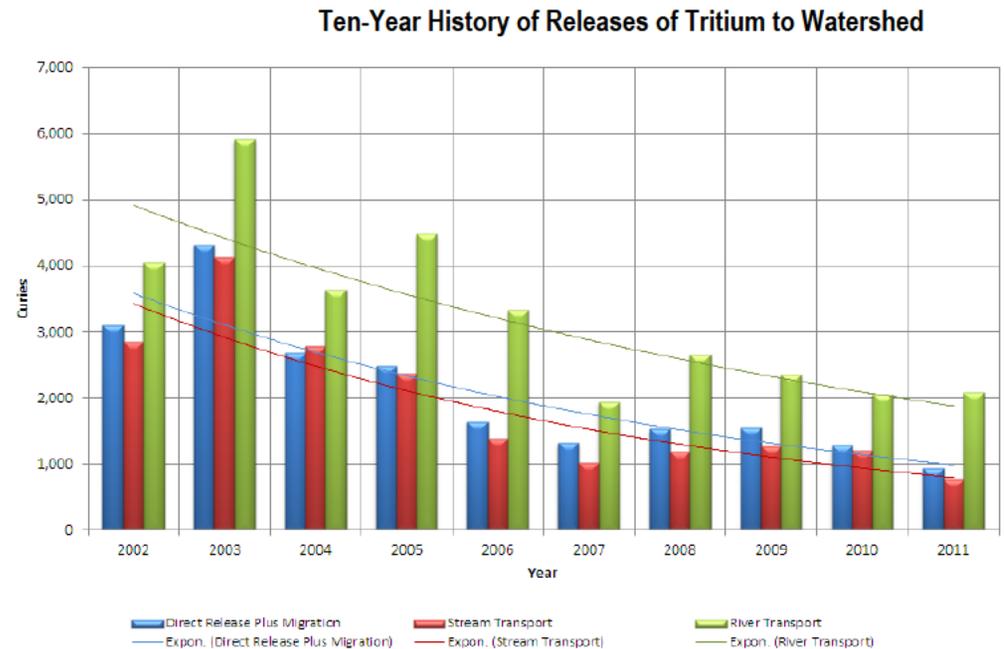
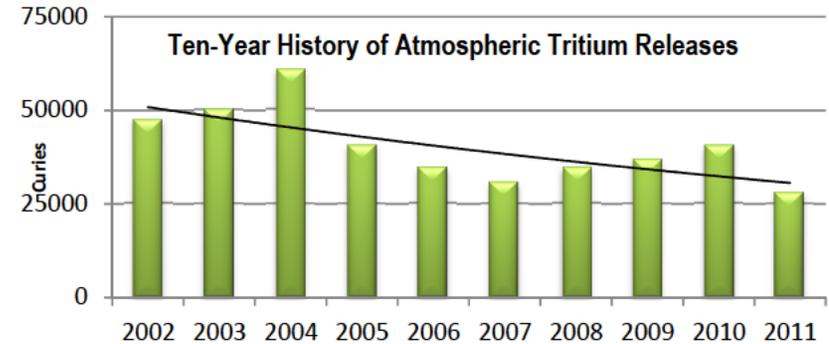
# Non-Radiological Surveillance - Water Quality

- **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 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

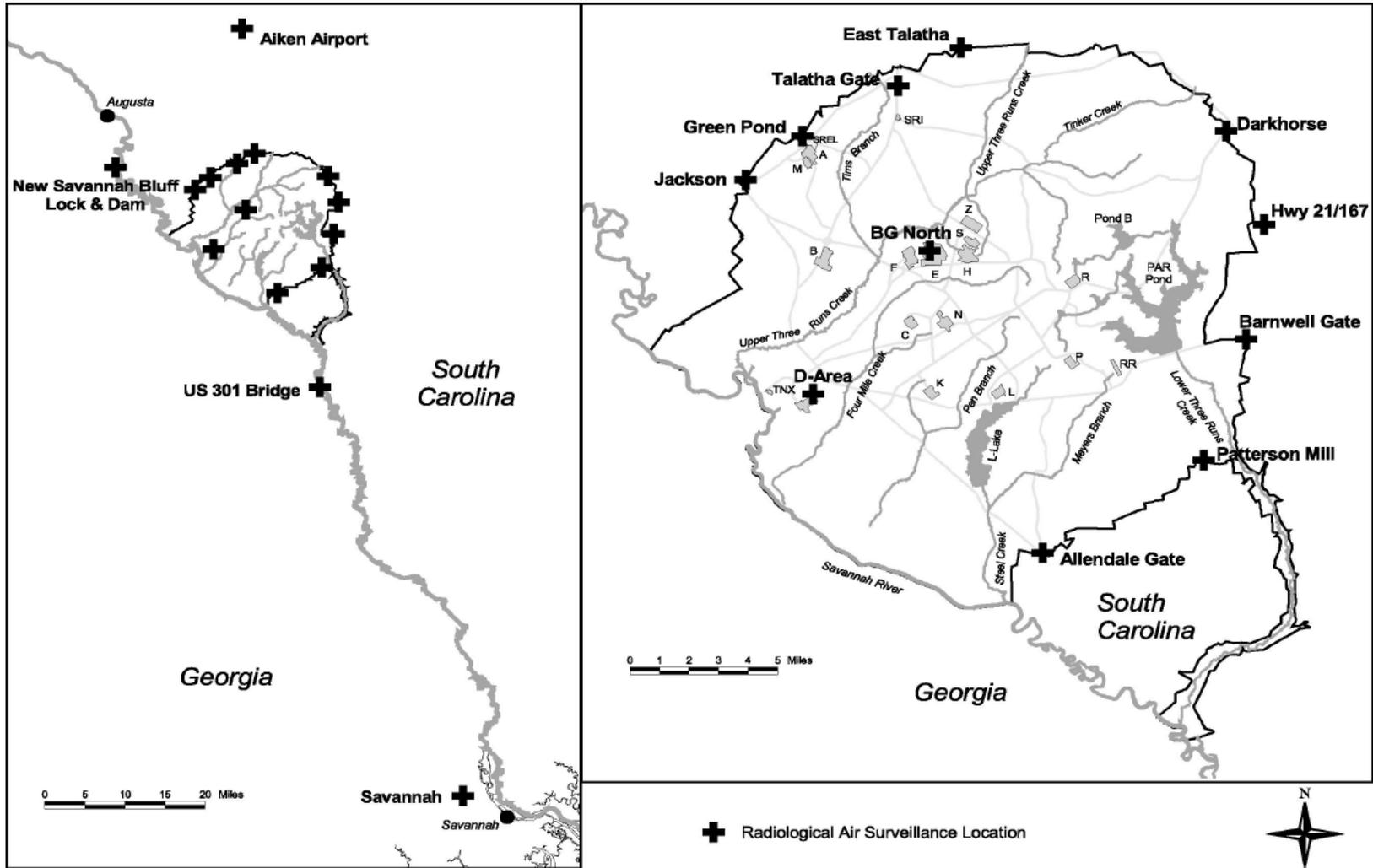


# Radiological Effluent Monitoring

- Tritium is the radionuclide of greatest abundance in SRS releases
- In 2011, SRS released a total of 31,908 Curies versus ~45,000 in 2010
  - Air
    - 28,100 Curies to the atmosphere
  - Liquid
    - 3,808 Curies to the Watershed (includes VEGP)

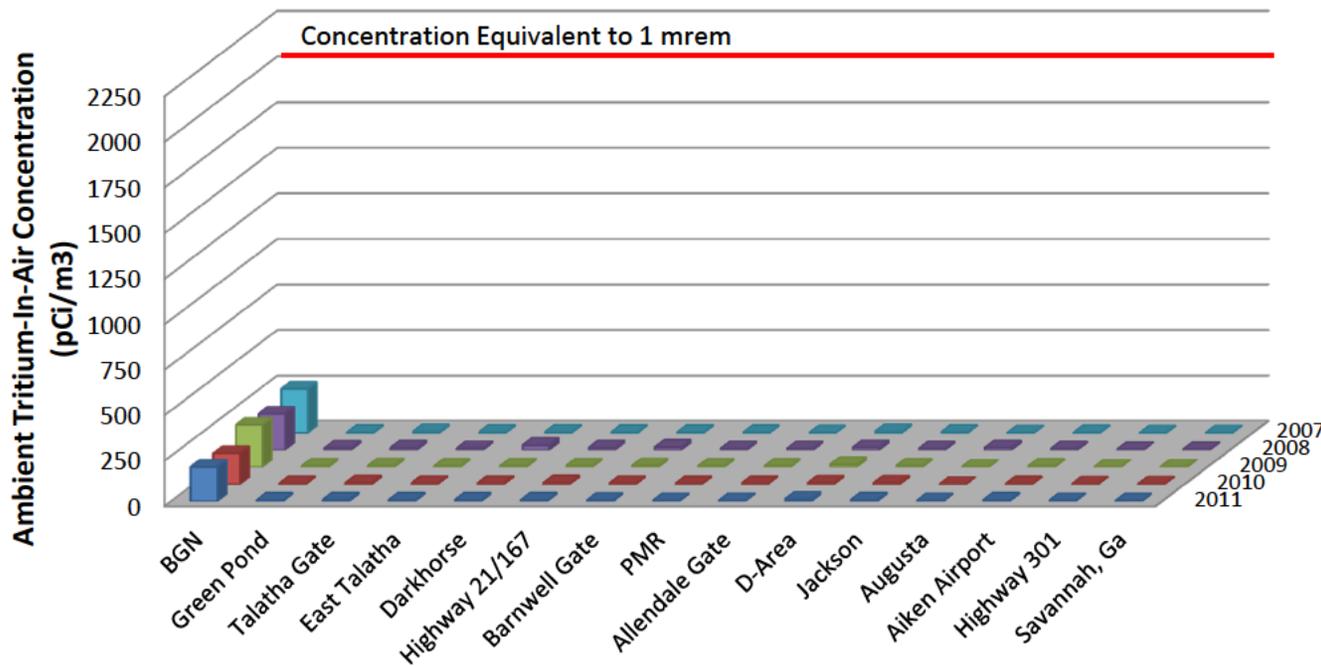


# Radiological Air Surveillance Locations

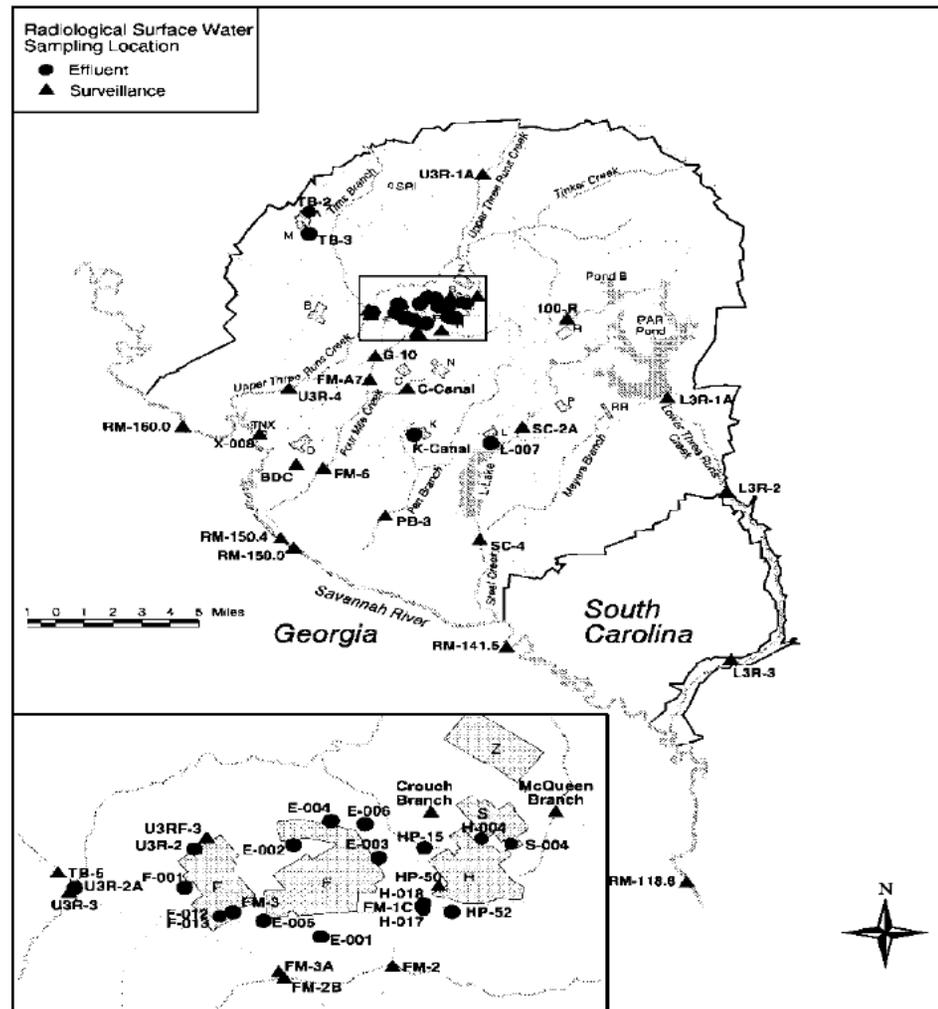


# Radiological Air Surveillance Results

Tritium in air results are well below concentration equivalent of 1 mrem for inhalation (airborne pathway limit is 10 mrem)

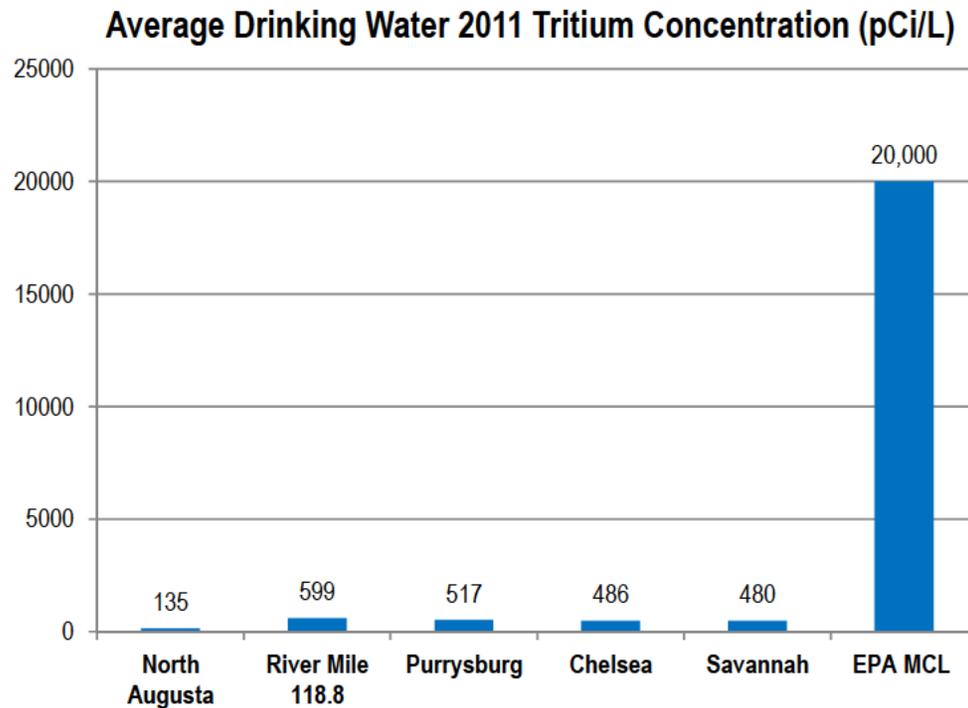


# Radiological Liquid Sampling Locations

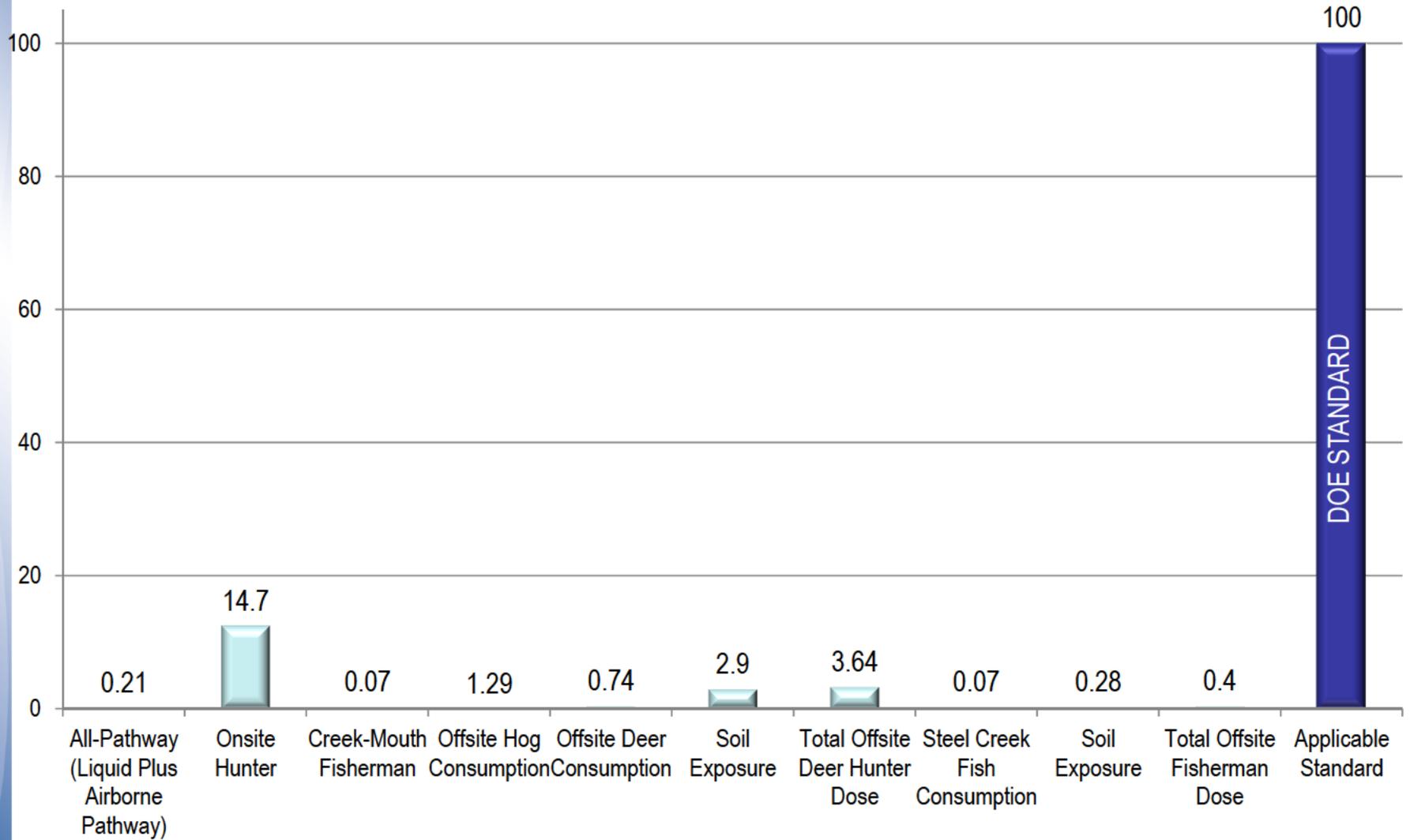


# Drinking Water Surveillance

- Monitored above and below SRS
- Tritium concentrations remain well below the drinking water standard



# 2011 Sportsman Dose (mrem)



# Potential Offsite Doses

	2007	2008	2009	2010	2011
<b>Atmospheric Releases</b>					
Site Boundary Individual (mrem)	0.04	0.04	0.04	0.05	0.04
<b>Liquid Releases</b>					
Downriver Individual (mrem)	0.05	0.08	0.08	0.06	0.08
Irrigation (mrem)					0.09
<b>TOTAL MEI (Air + Liquid)</b>	<b>0.10</b>	<b>0.12</b>	<b>0.12</b>	<b>0.11</b>	<b>0.21</b>

DOE Order Compliance Dose = 100 mrem/year

# Conclusions

- **SRS has a comprehensive environmental monitoring program**
- **Monitoring results demonstrate a long-term decreasing trend and are well below regulatory and health-based standards**
- **Maximally Exposed Individual Doses - Remain Low**
  - 0.21% of the limit

# Contact Information

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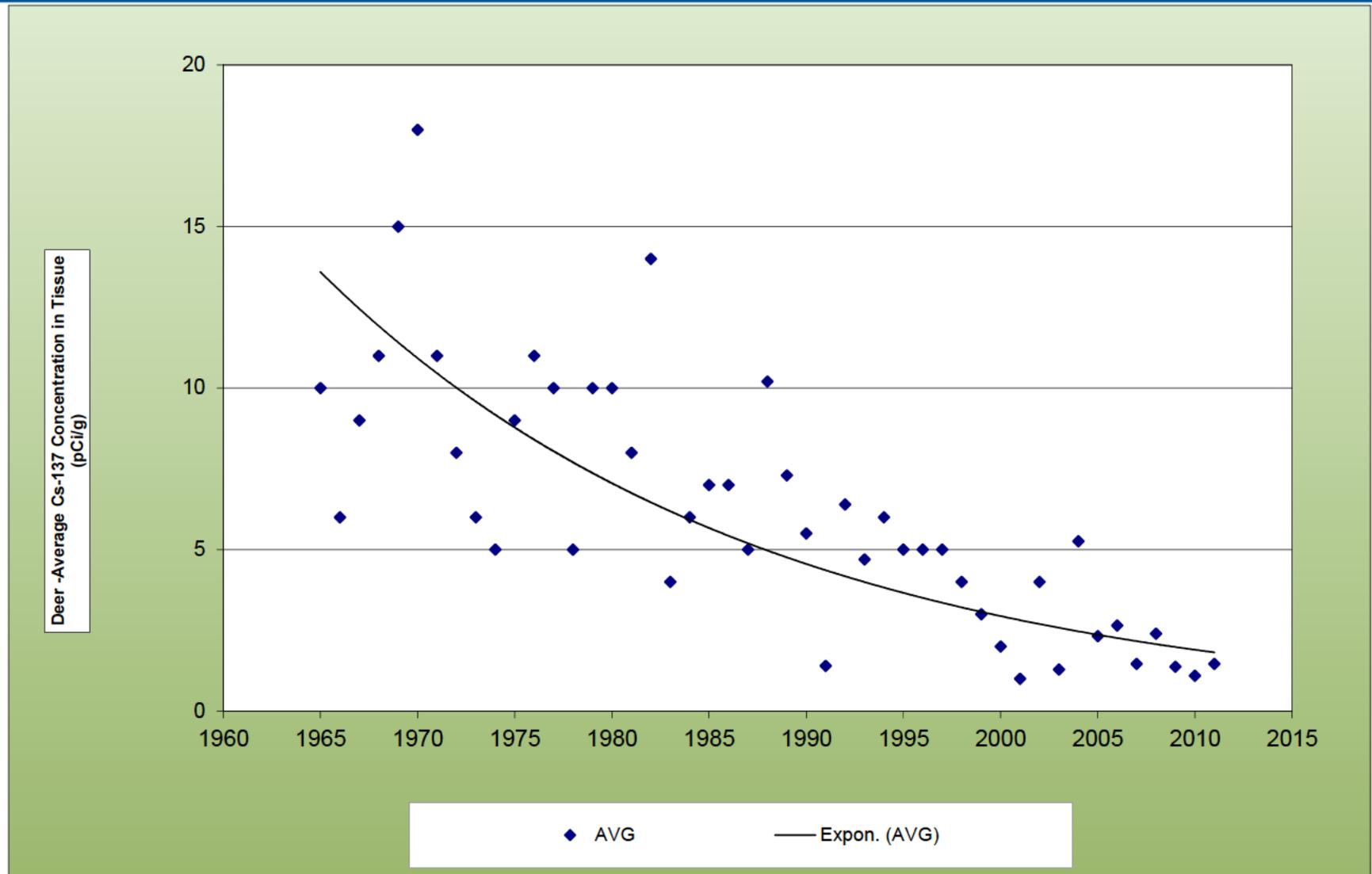
- **The report is available on the web at:**
  - <http://www.srs.gov/general/pubs/ERsum/index.html>
- **To inquire about the report, contact:**

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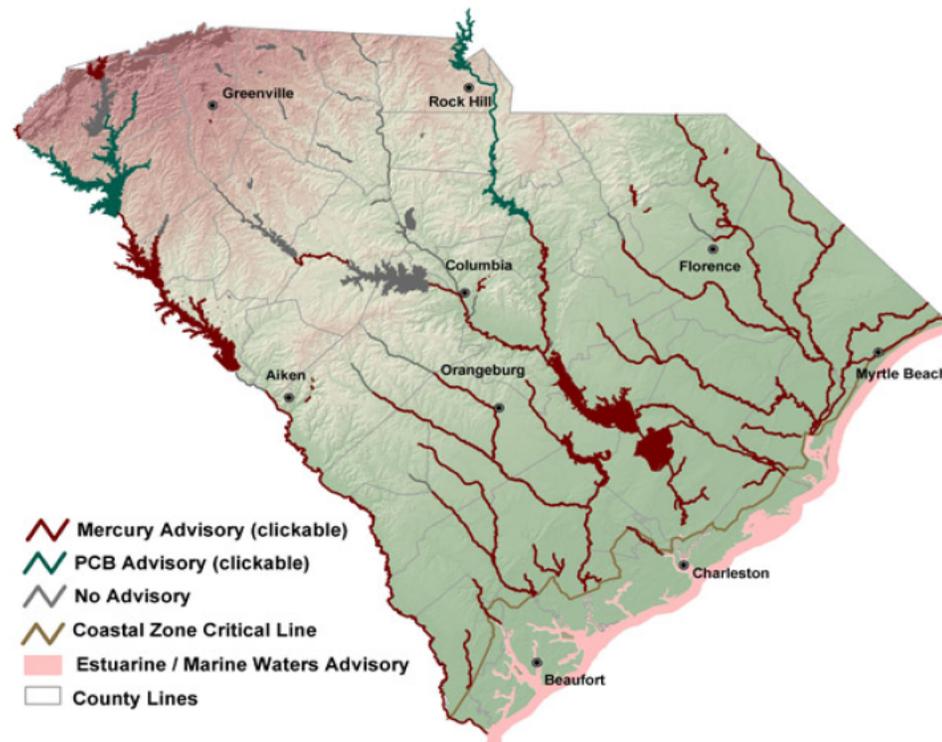
# Backup Slides

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# Wildlife Surveillance Cs-137 Historical Trend

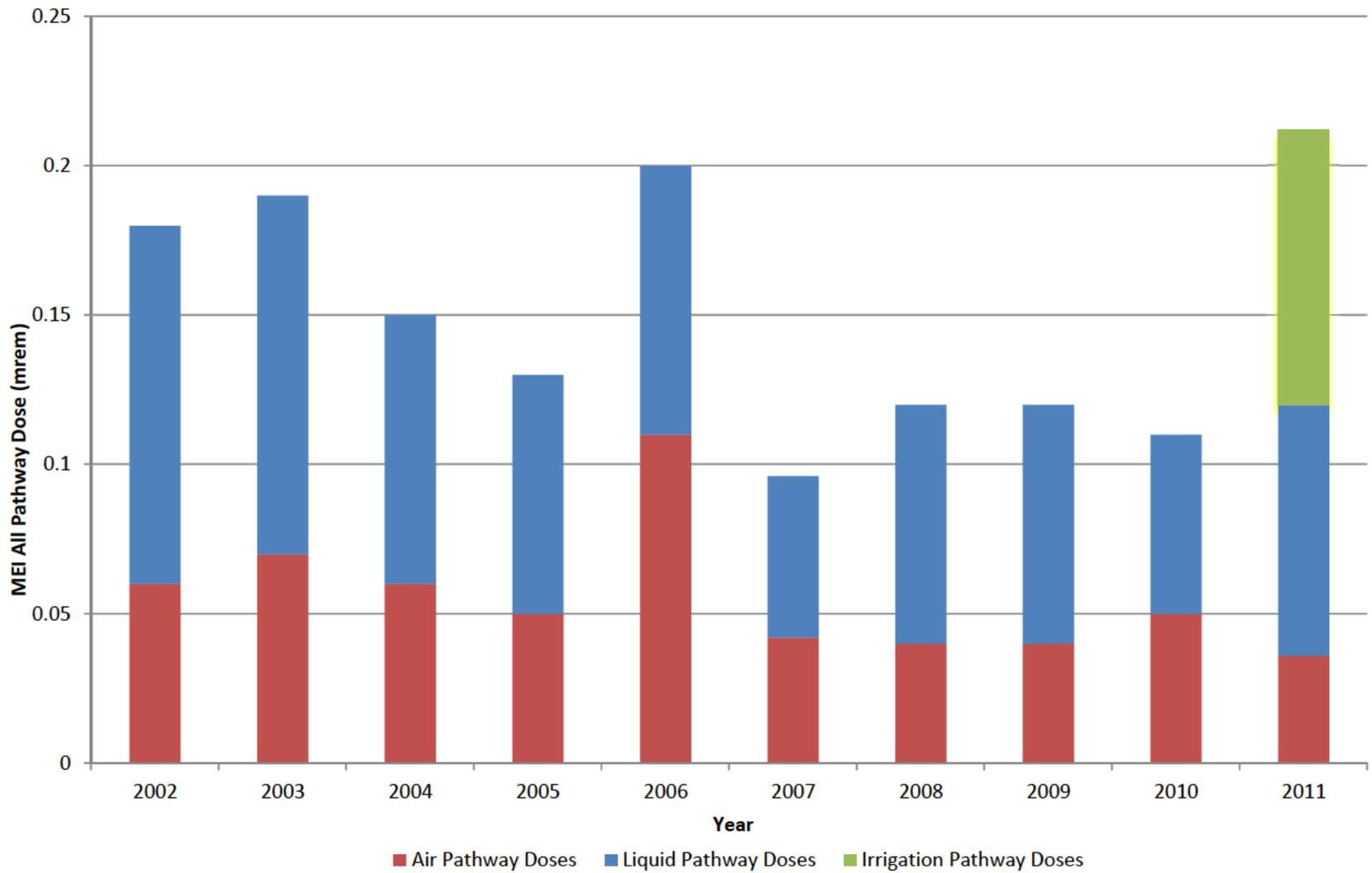


# Non-Radiological Surveillance - Water Quality

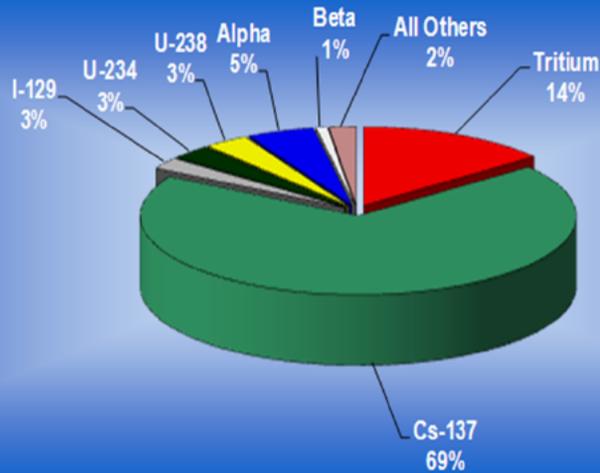


- SCDHEC issued fish consumption advisory for the Savannah River in 2007  
<http://www.scdhec.gov/environment/water/fish>
- FDA & EPA issued a joint consumer advisory about mercury in fish/shellfish in 2004  
<http://www.epa.gov/mercury/advisories.htm>

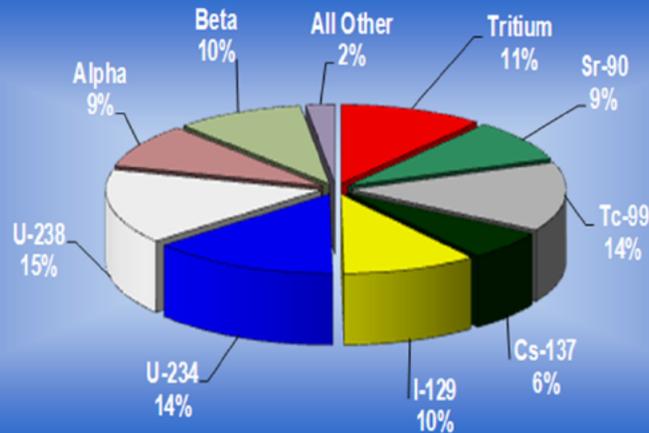
# Historic Dose Trend



# Critical Liquid Pathway Radionuclides



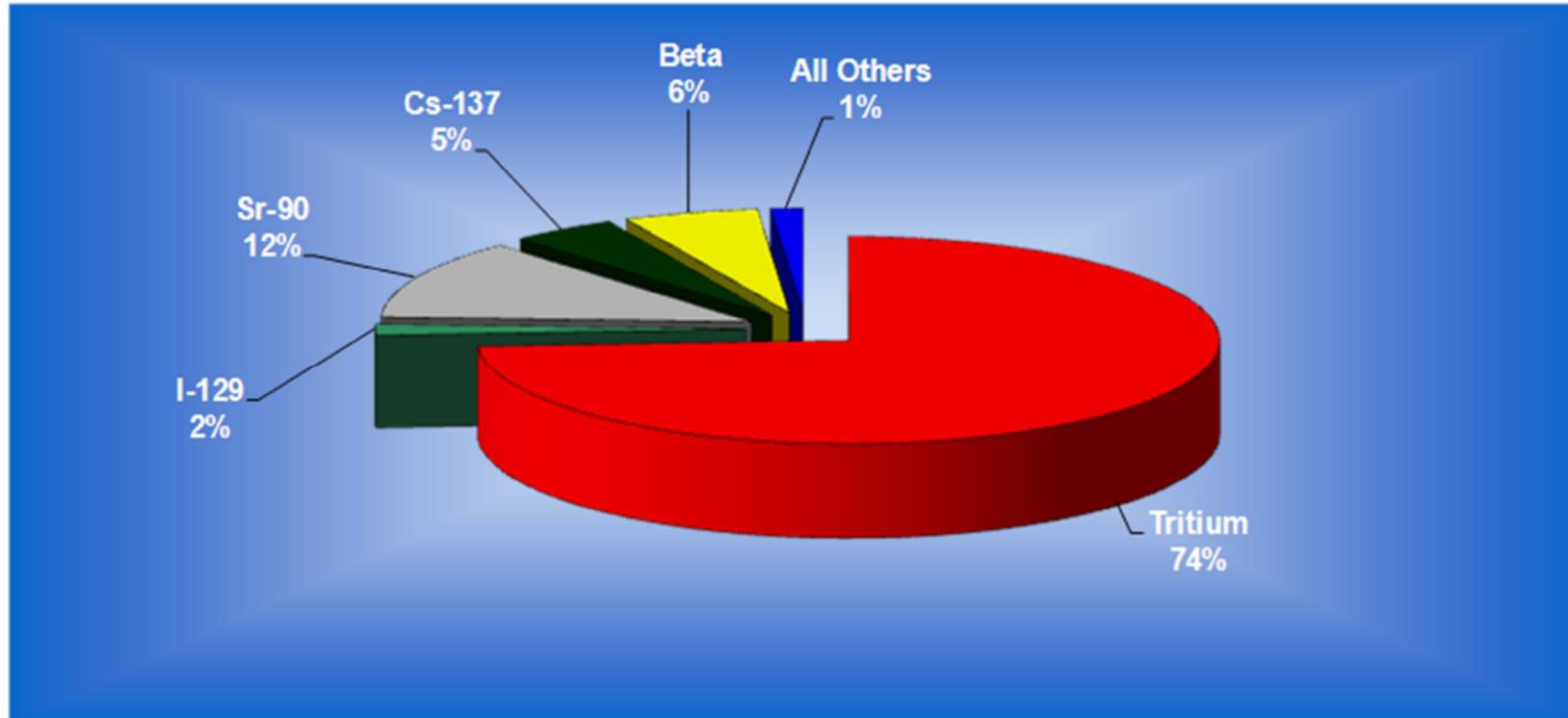
Critical Liquid (Non-Irrigation)  
Pathway Radionuclides



Critical Liquid Irrigation  
Pathway Radionuclides

2011 Liquid Pathway Dose = 0.17 mrem

# Critical Air Pathway Radionuclides



**2011 Air Pathway Dose = 0.04 mrem**

## Post March 2011 Japan Tsunami/Earthquake and Nuclear Incident

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- SRS Environmental Monitoring results onsite and offsite revealed greater than the Minimum Detectable Concentration levels of Iodine-131 on the following samples during 3/23/2011 – 4/6/2011
  - air charcoal canisters, air particulate filters, vegetation, and milk
- SRS results are consistent with published EPA results and local Southern Nuclear Company results
- Dose impact from the I-131 levels for the airborne pathway would equate to  $< 1$  mrem/year

**Average Cs-137  
Concentrations in Deer and  
Hogs, 2006–2010 (pCi/g)**

