An Overview of SRS's Environmental Monitoring Program

Aiken, SC
February 25, 2004

Presented to Nuclear Regulatory Commission

Presenter
J. D. Heffner, WSRC, Environmental Monitoring

DOE Representative
G. R. Whitney, Environmental Quality Management

SUMMARY

SRS has a...

- long history of environmental monitoring activities
- comprehensive environmental monitoring program
- thorough knowledge of releases (types and quantities)
- clear understanding of dose impacts to the public

Environmental Monitoring

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

Environmental Monitoring

- History
  - Baseline Studies (1951–1952)
    - » Du Pont
    - » U.S. Department of Health, Education and Welfare
  - Academy of Natural Sciences of Philadelphia (1951)
  - Environmental Monitoring Program (1953)

Program Requirements

- **State and Federal Regulations**
  - Clean Air Act
  - Clean Water Act
  - Hazardous Waste Regulations (RCRA)
  - Landfill Regulations
- **DOE Orders**
  - Environmental Monitoring Plan
- **Best Management Practices**

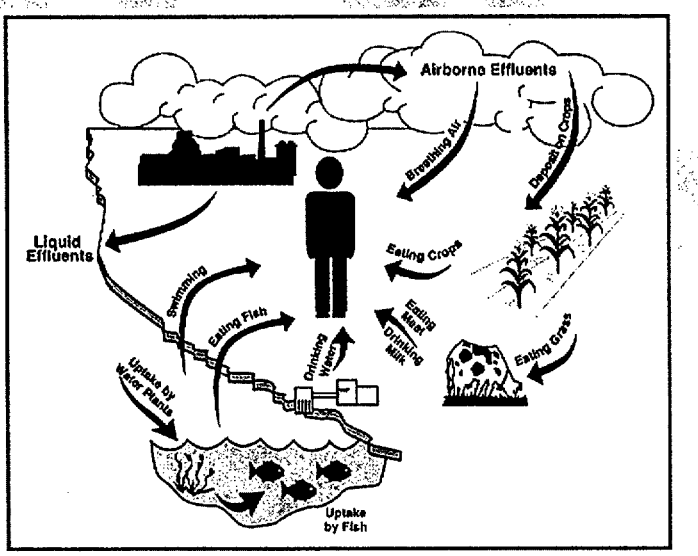
Effluent Monitoring vs. Environmental Surveillance

- **Effluent Monitoring**
  - The collection of samples or data from the point at which a facility discharges liquid or gaseous releases to the environment
- **Environmental Surveillance**
  - The collection of samples of air, water, soil, foodstuffs, biota, and other media—or of data—from the ambient environment

Program Design

- **Radionuclide Selection**
  - Process knowledge
  - Movement through environment
  - Health impacts
- **Sample Location Selection**
  - Exposure pathways

Contaminant Pathways



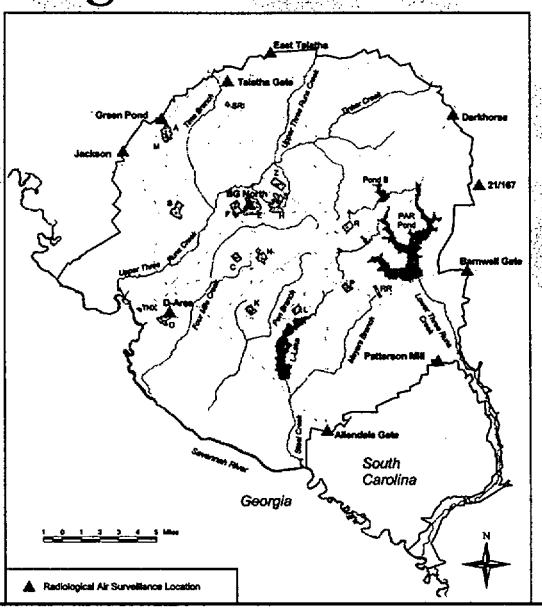
Critical Contaminant-Critical Pathway Analysis

- **Guides the monitoring program**
- **Many factors are considered, including**
  - Facility operation
  - Types of releases and release paths
  - Exposure pathways
  - Present and future health & environmental impacts

Types of Samples

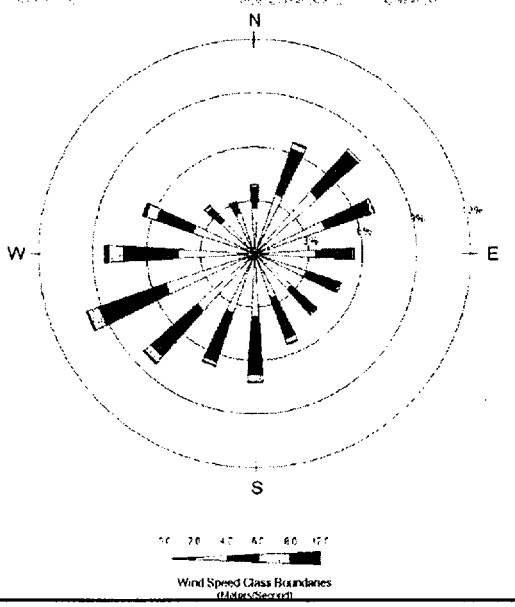
- **Ambient Air**
- **Rainwater**
- **Surface Water**
- **Drinking Water**
- **Food Products**
- **Deer and Hogs**
- **Fish**
- **Soil**
- **Sediment**
- **Vegetation**
- **Groundwater**

Radiological Air Surveillance

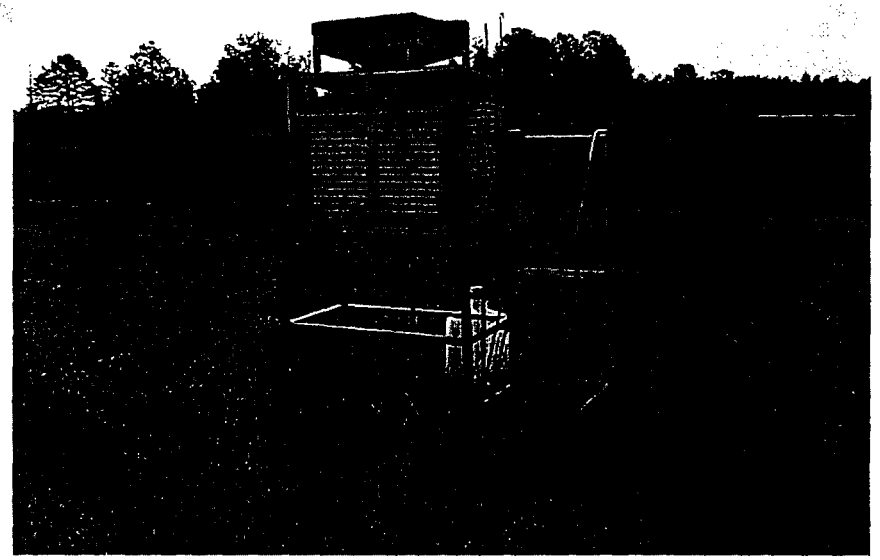


11

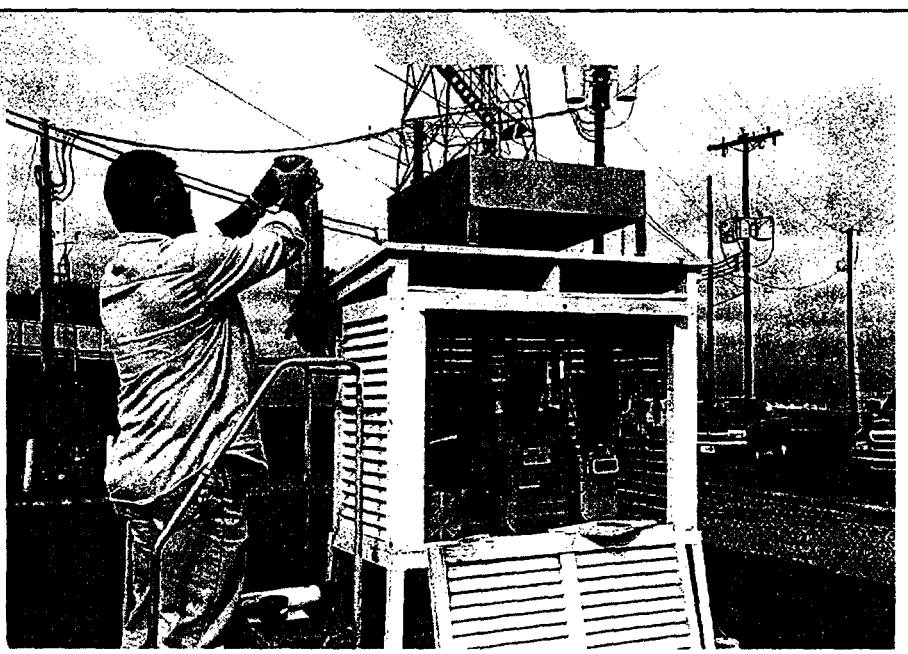
Wind Rose



12

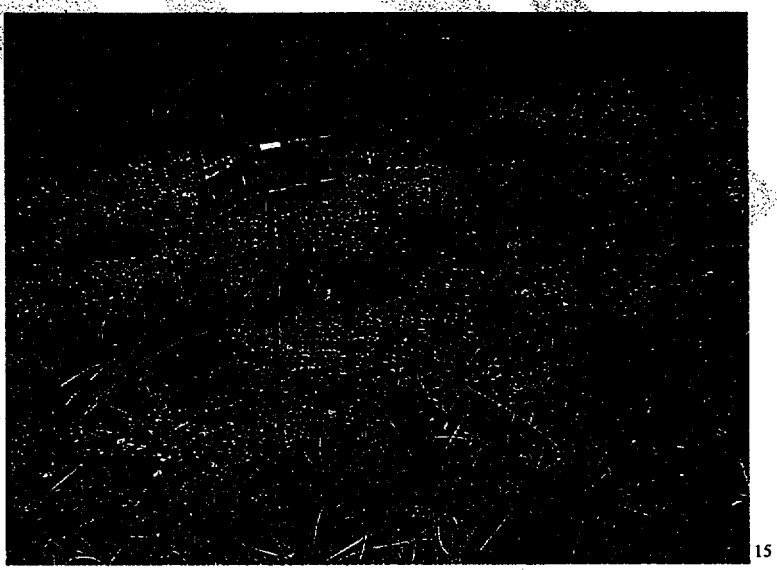


13



14

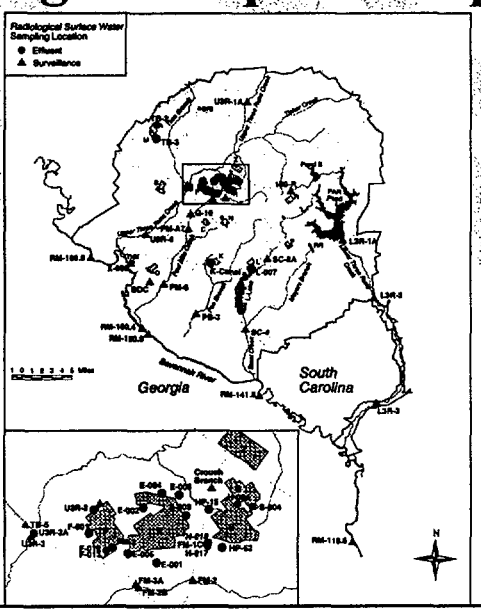
Gamma Radiation Monitoring



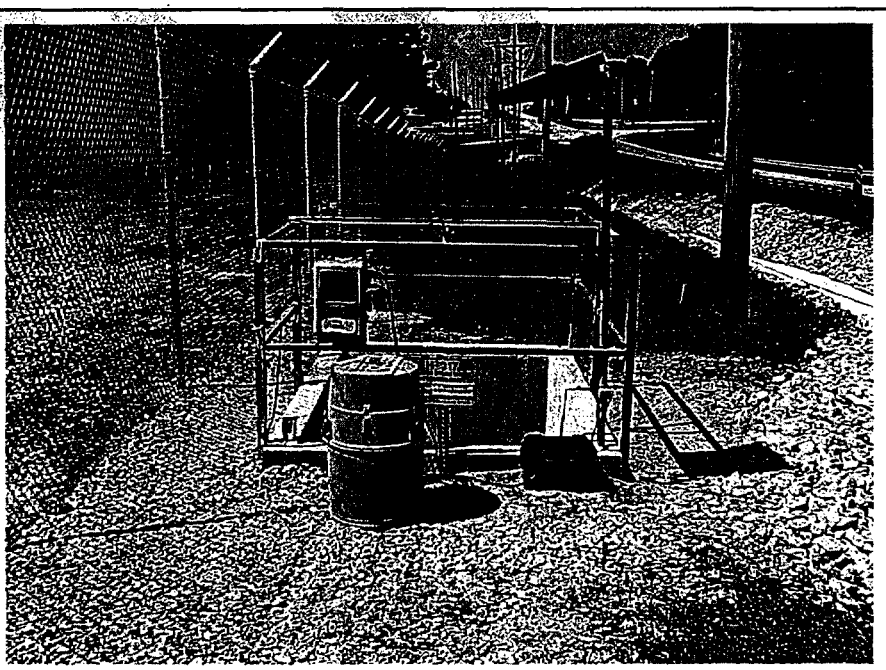
Types of Samples

- Ambient Air
- Rainwater
- Surface Water
- Drinking Water
- Food Products
- Deer and Hogs
- Fish
- Soil
- Sediment
- Vegetation
- Groundwater

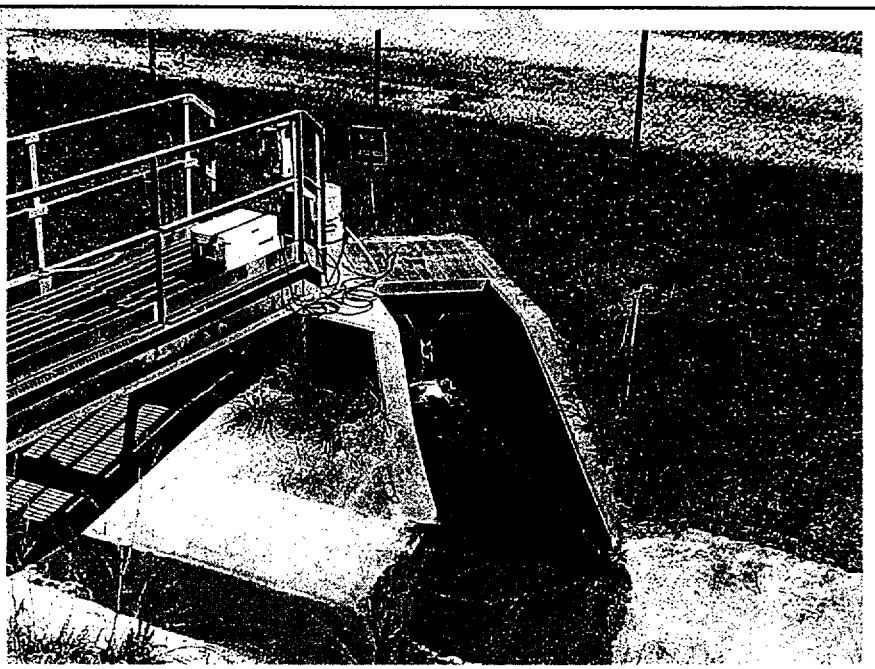
Radiological Liquid Sampling



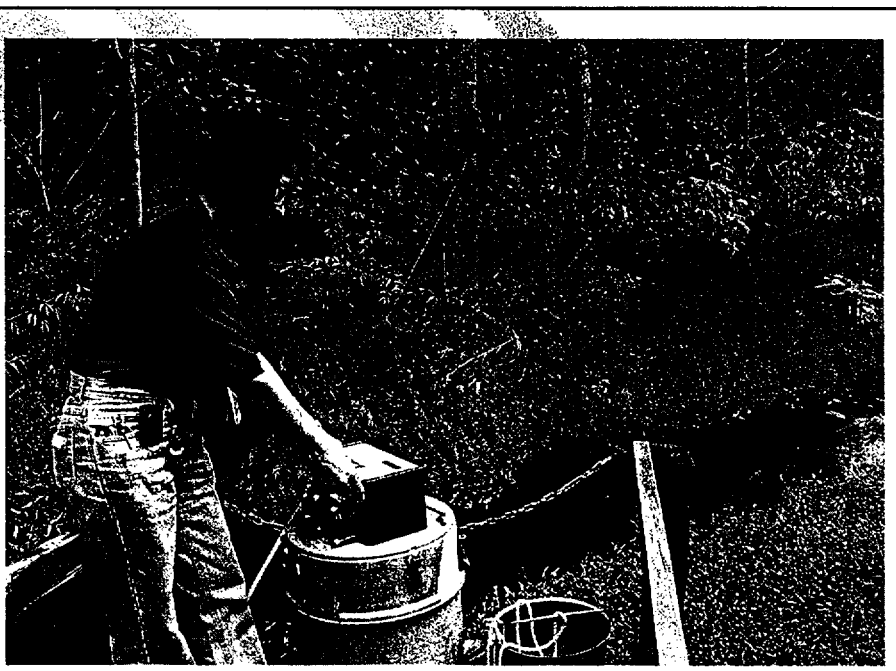
17



18



19

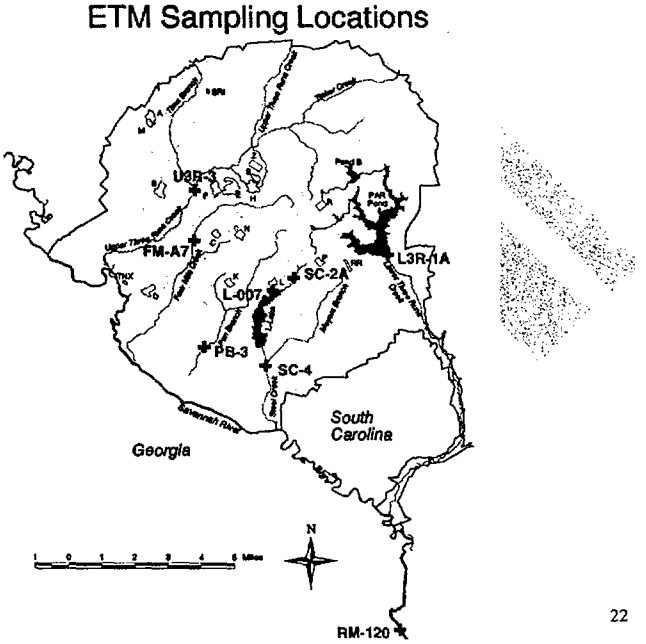


20

Enhanced Tritium Monitoring (ETM) Program

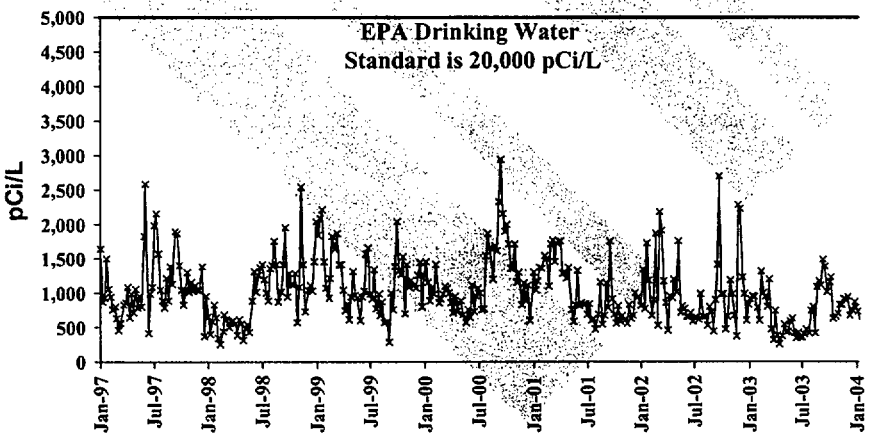
- ETM is designed to
  - provide timely notification to downriver consumers of significant changes in the river's tritium levels
    - » measure tritium concentrations at onsite stream locations
    - » calculate river concentrations
    - » notify downstream if Savannah River is projected to exceed 5,000 pCi/L

ETM Sampling Locations

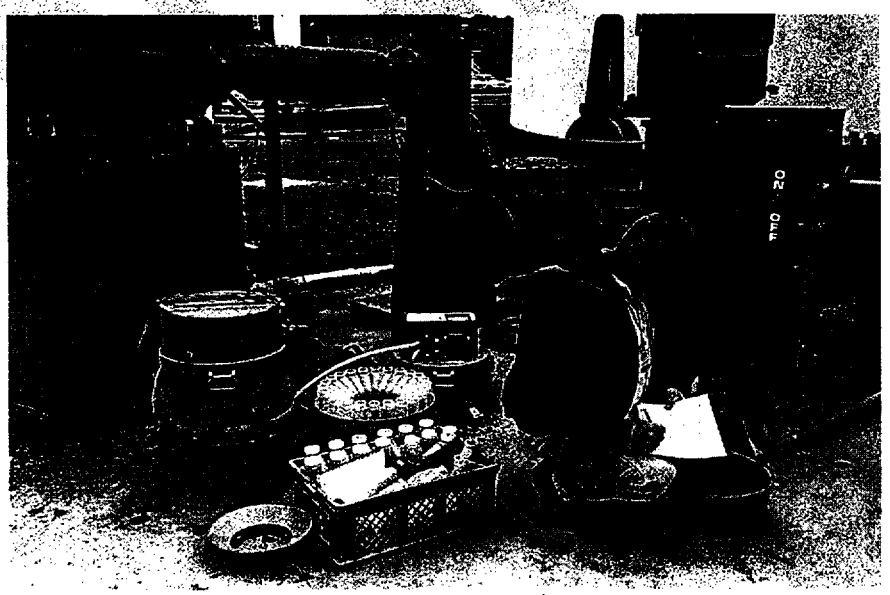


Savannah River Tritium Concentration

(River Mile 120 location, January 1997–Present)



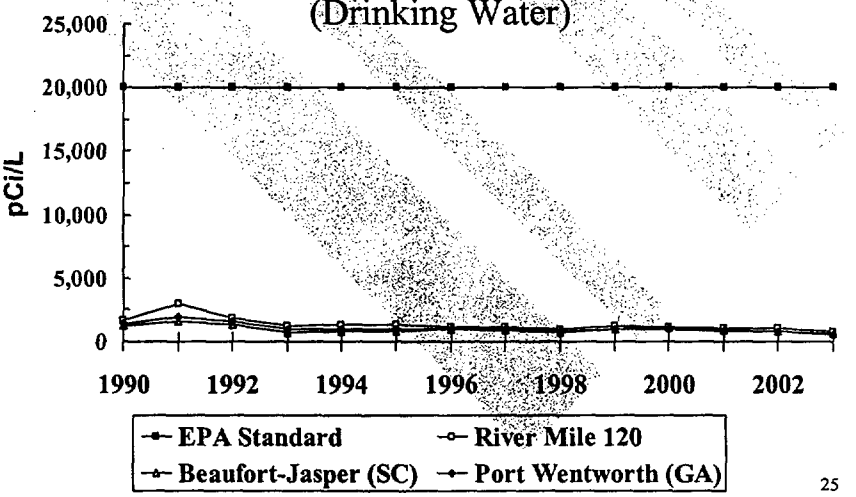
23



24

Annual Average Tritium Concentrations

(Drinking Water)



Types of Samples

- Ambient Air
- Rainwater
- Surface Water
- Drinking Water
- Food Products
- Deer and Hogs
- Fish
- Soil
- Sediment
- Vegetation
- Groundwater

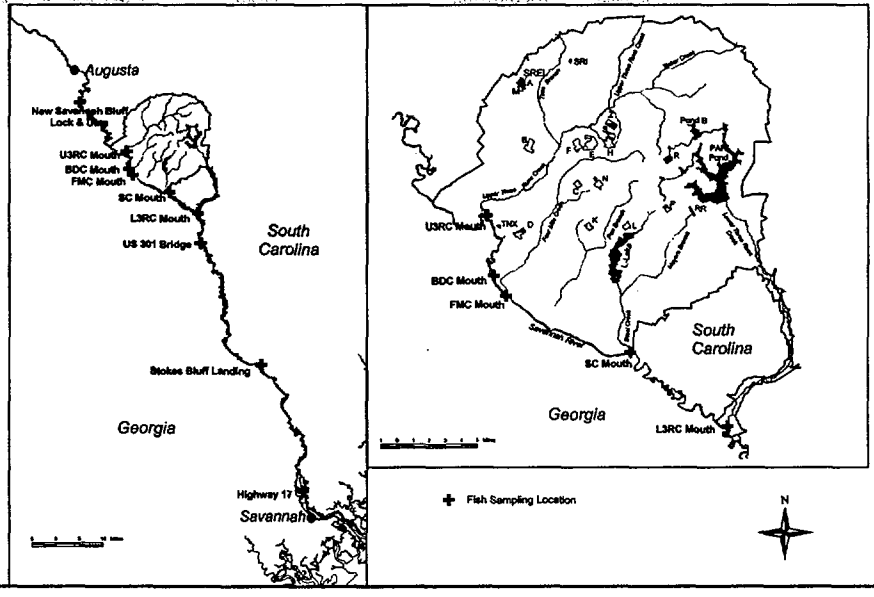
27

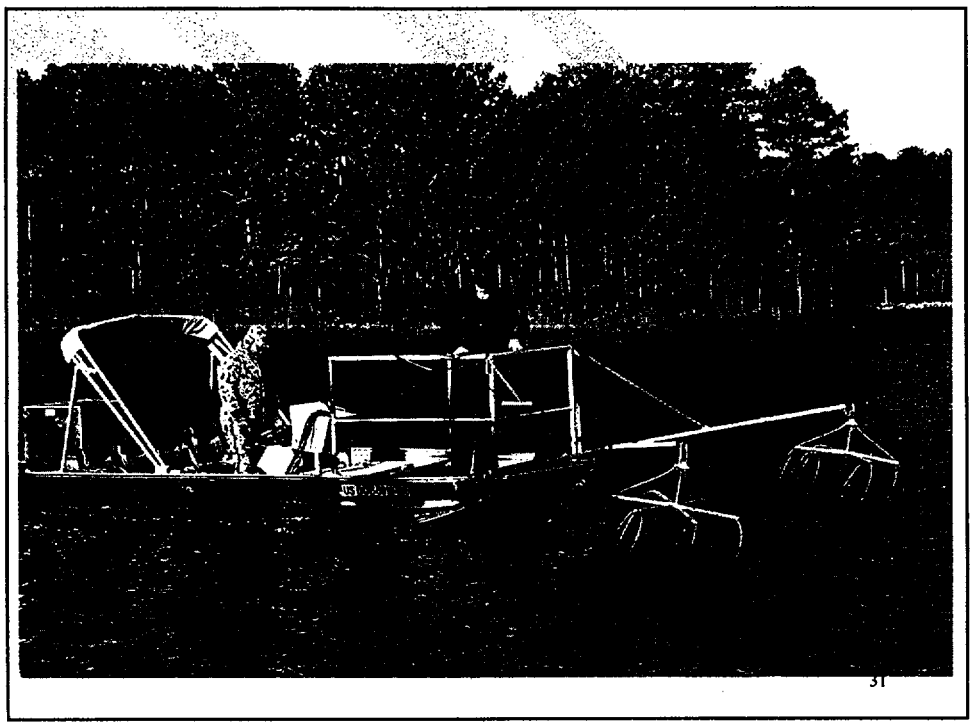
28

Types of Samples

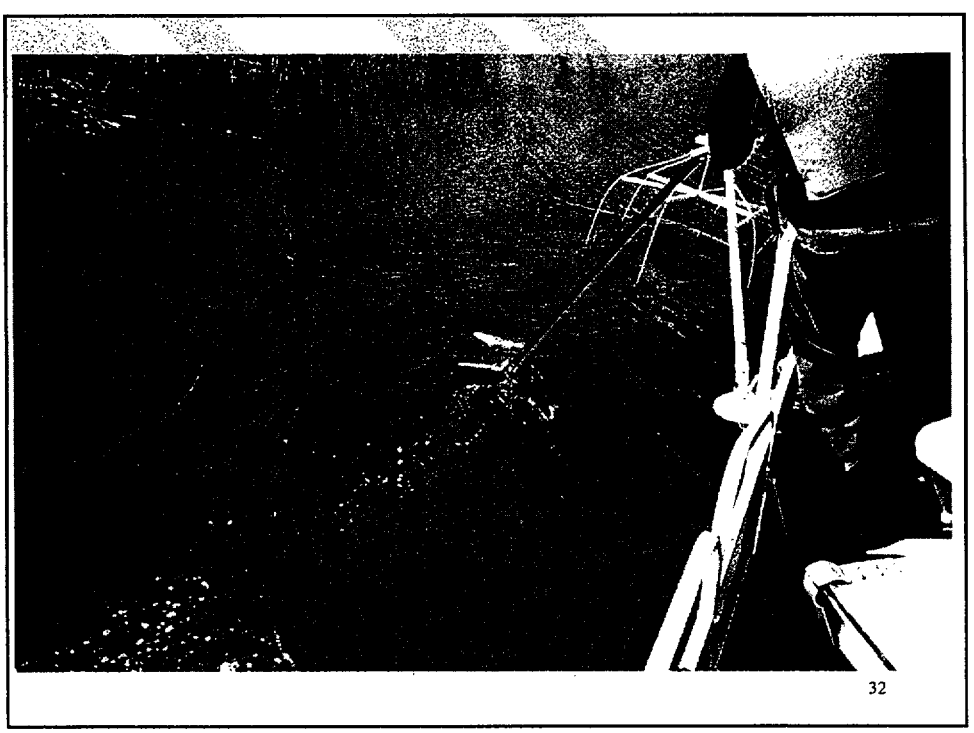
- Ambient Air
- Rainwater
- Surface Water
- Drinking Water
- Food Products
- Deer and Hogs
- Fish
- Soil
- Sediment
- Vegetation
- Groundwater

Fish Sampling Locations





31



32

Types of Samples

- Ambient Air
- Rainwater
- Surface Water
- Drinking Water
- Food Products
- Deer and Hogs
- Fish
- Soil
- Sediment
- Vegetation
- Groundwater

33

34

Environmental Monitoring

- SRS environmental impacts well known

  In 2003

  - 12,000 samples collected
  - 30,000 analyses performed

Quality Assurance and Quality Control (QA/QC)

- Ensures that field sampling, laboratory analysis, and data management and review yield results that are:
  - Precise
  - Accurate
  - Reasonable

Field QA/QC

- Ensures representative samples and accurate data
- Examples:
  - Field calibration
  - Consistency of measurements (time and spatial)
  - Audits

Laboratory QA/QC

- Ensures accurate result
- Examples
  - Standards and calibration
  - Blanks, duplicates, spikes
  - Inter-lab comparison
  - External QA programs
  - Certification
  - Audits

Data QA/AC

- Ensures reasonableness of data
- Identifies samples for investigation
- Examples
  - Data trending
  - Data consistency (radionuclide ratios)
  - Data consistency (transport pathway)
  - Release / flux calculations
  - Comparison with external agencies

Reporting

- Results are reported annually in the SRS site environmental report
- The 2002 report is complete and has been distributed
- Preparation of the 2003 report is underway

Program Verification

- South Carolina and Georgia maintain independent environmental monitoring programs
- Other organizations also conduct environmental monitoring near SRS
  - Georgia Power (Plant Vogtle)
  - City of Savannah

Program Verification

- Continuous communication with regional monitoring organizations via semiannual meeting
  - Conduct analytical and data comparisons
  - Discuss monitoring programs and issues
- Varied active participants
  - SCDHEC, GDNR, GPC, SRS, DOE, EPA, Savannah, Beaufort-Jasper, Chem-Nuclear

Monitoring Results Summary

- Savannah River Site's 2002 airborne and liquid releases, as well as all potential radiation doses from the site, were well below applicable regulatory standards.

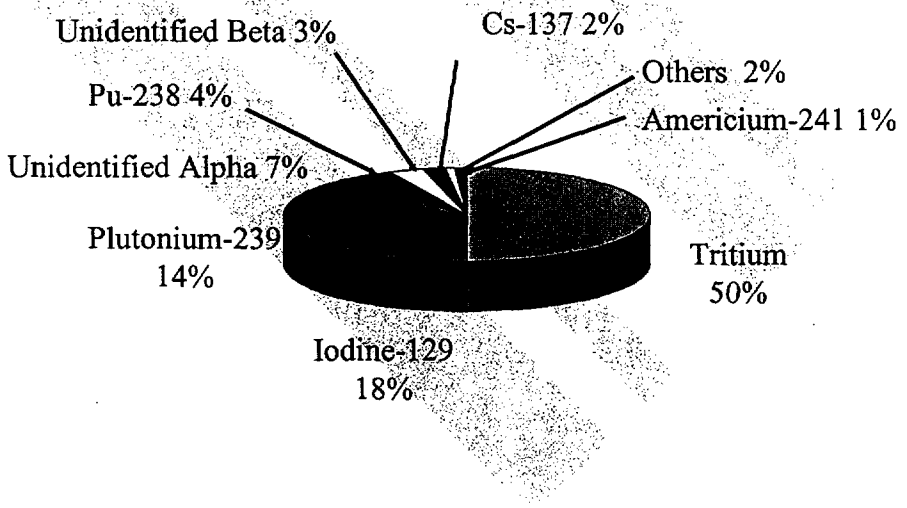
Dose Standards

- **All-Pathway Standard**: 100 millirems per year
- **DOE Clean Air Act Standard**: 10 millirems per year
- **Drinking Water Standard**: 4 millirems per year

2002 SRS All-Pathway Dose: 0.18 millirems

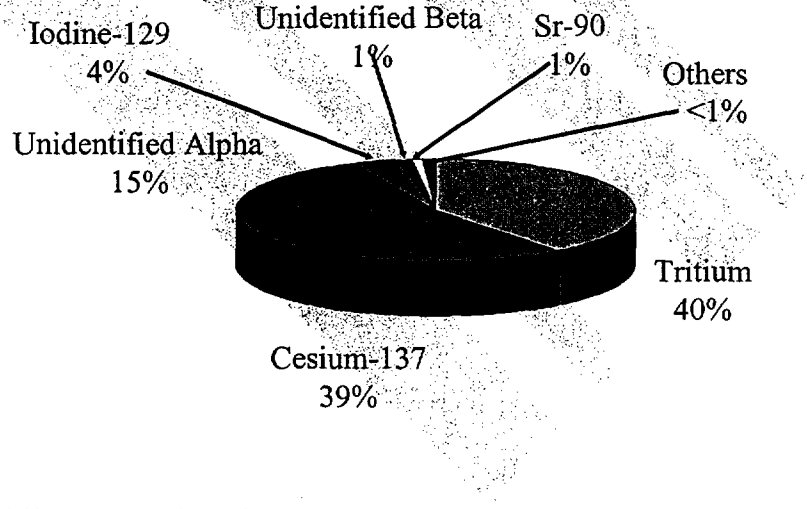
- **Local Background**: 360 millirems per year

2002 Airborne Dose Contributors



2002 Air Pathway Dose = 0.06 mrem

2002 Liquid Dose Contributors



2002 Liquid Pathway Dose = 0.12 mrem

Closing Comments

- For 2002, the radiation dose
  - to the downriver water consumer is 0.06 mrem, well below EPA's 4-mrem/year standard
  - from air exposure is 0.06 mrem, well below the EPA's 10-mrem/year standard
  - to sportsmen is 39.5 mrem from deer and 0.35 mrem from fish, well below DOE's 100-mrem/year standard
- The total radiation dose to the public living near SRS is well below DOE's 100-mrem/year standard