2017 Savannah River Site Environmental Report Overview

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Purpose

- To fulfill a 2018 Facilities Disposition and Site Remediation Committee Work Plan Commitment
- To provide an overview of the Savannah River Site (SRS) Environmental Report and the 2017 results

Presentation Outline

- SRS Environmental Report: Background
- 2017 SRS Environmental Report Highlights
- Improvements to the 2017 SRS Environmental Report
- Communication and Outreach
- Summary

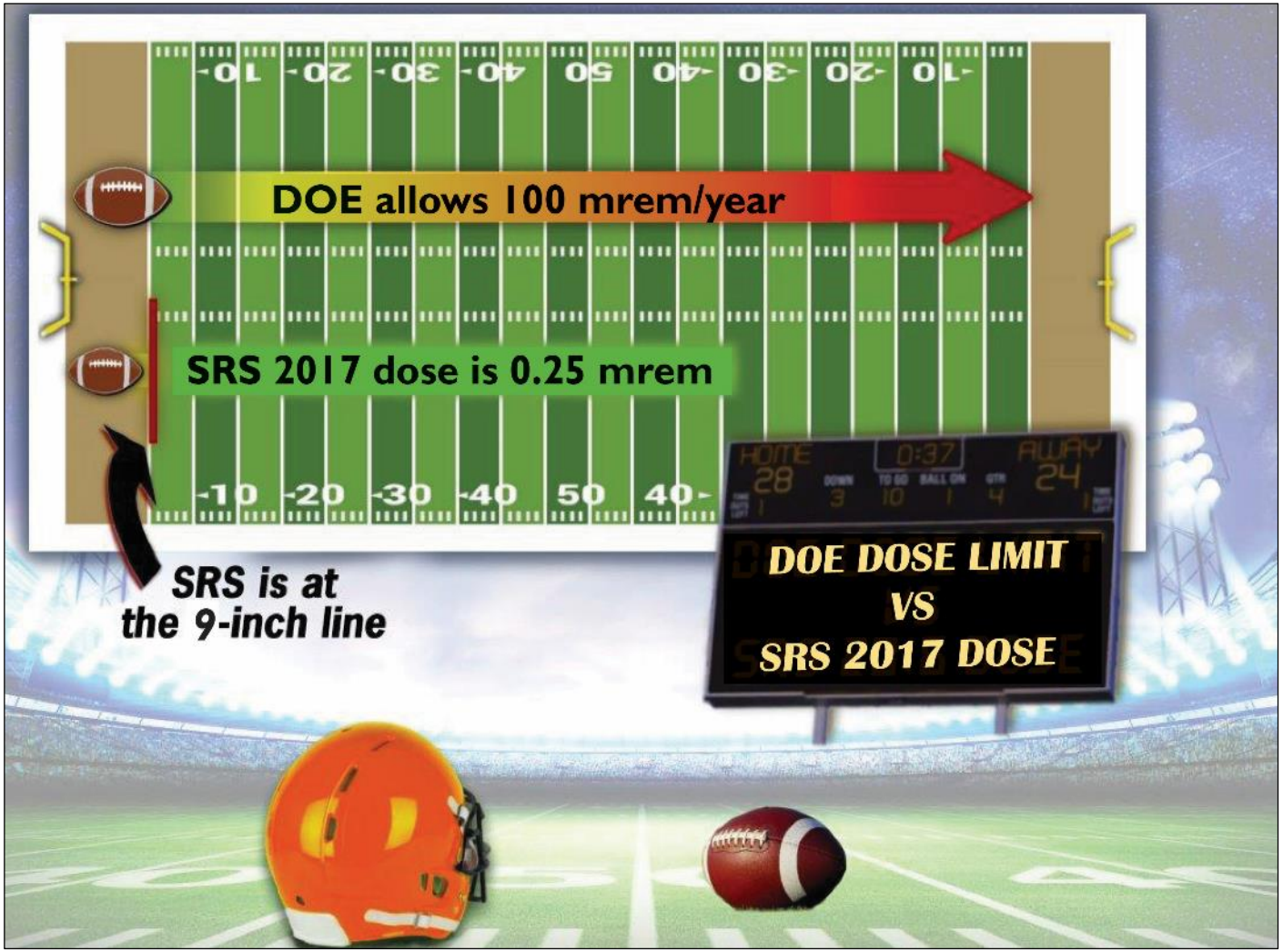
SRS Environmental Report for 2017: Background

Annual Site Environmental Reports (ASERs) are required by U.S. Department of Energy (DOE) Order 231.1B (*Environment, Safety, and Health Reporting*) to provide the public and stakeholders information on:

- Environmental program performance
- Site-wide environmental monitoring and surveillance effectiveness
  - Meets requirements of DOE Order 458.1 *Radiation Protection of the Public and the Environment*
- Compliance status with environmental standards and requirements

SRS began publishing the ASER in 1959

2017 SRS All Pathway Dose Compared to DOE Limit

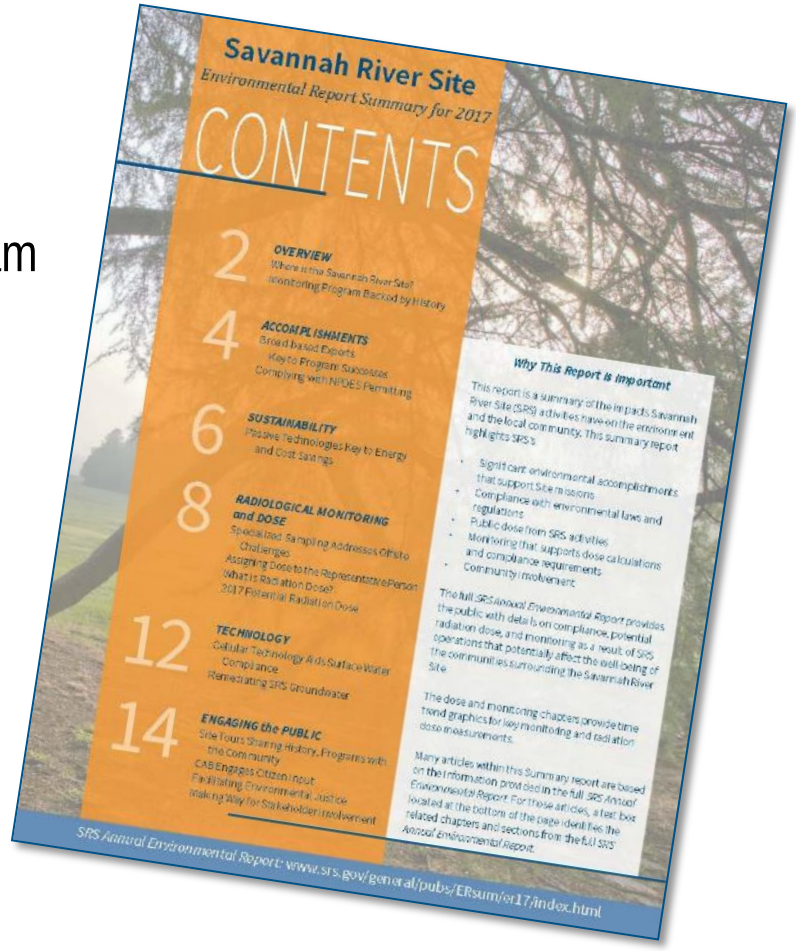


SRS Environmental Report for 2017: Background

Topics Covered in Report

- Environmental Management Systems
- Environmental Compliance Summary
- Nonradiological Environmental Monitoring Program
- Radiological Environmental Monitoring Program
- Radiological Dose Assessments
- Groundwater Management Program
- Quality Assurance

Separate Document: Savannah River Site Environmental Report Summary



Emphasis: Environmental Sustainability

SRS continues to use renewable energy sources

- 100% of thermal energy from biomass

SRS continues to use less petroleum and more alternative fuel

- Over 83% of SRS cars and pickup trucks are hybrid, electric, or use E85 (ethanol) fuel

SRS continues to reduce greenhouse gas emissions (69% since 2008)

SRS continues to implement “One Simple Act of Green”

SRS commemorates Earth Day by planting a magnolia tree

1 Simple Act of Green
SAVANNAH RIVER SITE

Chapter 3 – Compliance Summary

Emphasis: How SRS performs with environmental requirements

SRS complies with various Laws, Regulations, DOE Orders, and Executive Orders including

- 5 air permits for operating facilities
- 11 permits under the Clean Water Act
- 376 construction and operating permits

Achieved compliance for the 15th consecutive year for all 19 underground storage tanks containing usable petroleum fuel

Killdeer Nest

Killdeer nest enclosed within barricade to protect fledglings

U.S. Forest Service personnel prepares to mount on tree a nesting box for red-cockaded woodpeckers

Chapter 3 – Compliance Summary (cont'd)

Notice of Violation (NOV) Summary

In 2017 SRS received 5 NOVs with no fines nor penalties and completed all corrective actions

All issued by South Carolina Department of Health and Environmental Control

National Emission Standard for Hazardous Air Pollutants – 3 NOVs

- Failed to perform required testing of replacement flow meter in facility stack
- Inadequate documentation required by permit to operate biomass boiler
- Failed to comply with disposal requirements for nonfriable asbestos during an abatement project

National Pollutant Discharge Elimination System – 1 NOV

- Exceeded permit limit at one outfall

Safe Drinking Water Act – 1 NOV

- Failed to collect required number of samples

Chapter 4 – NonRadiological Sampling Results

Emphasis: Nonradiological environmental monitoring program confirms compliance and monitors any effects SRS has on the environment.

Water Quality

- SRS discharges did not negatively impact the water quality in onsite streams or the Savannah River
  - *Parameters include pH, temperature, dissolved oxygen, metals, organics, total suspended solids, pesticides, herbicides, and PCBs*

Sediment

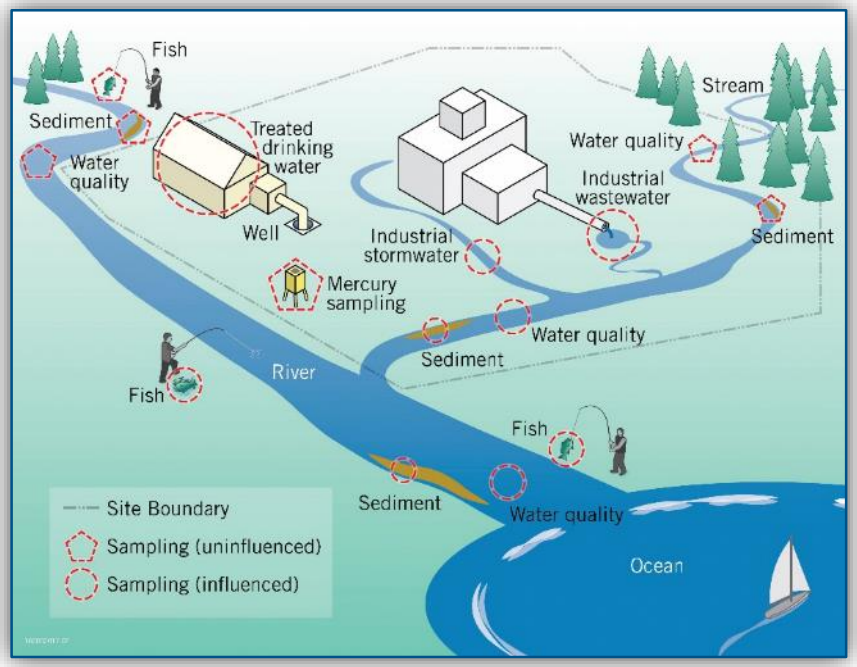
- Results are comparable with results of the previous 5 years
  - *Samples are from onsite streams and stormwater basins, and the Savannah River*
  - *Parameters are metals and cyanide*

A Water Sample

Chapter 4 – NonRadiological Sampling Results (cont'd)

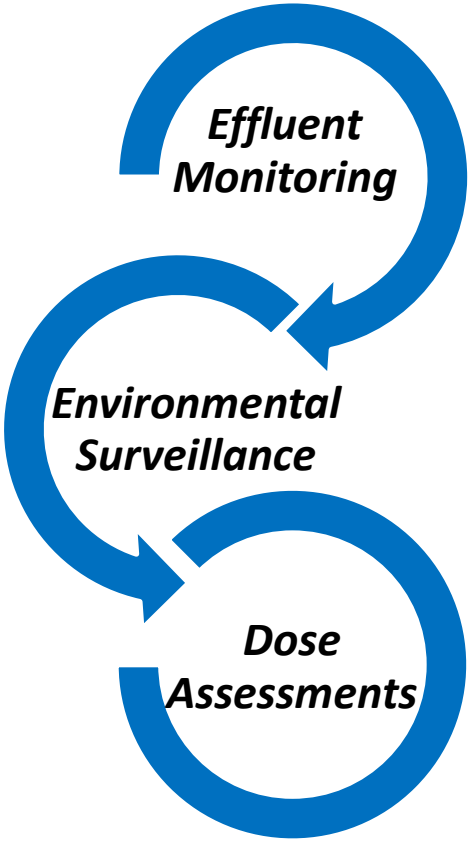
Liquid Effluent - Industrial Wastewater and Stormwater Outfalls

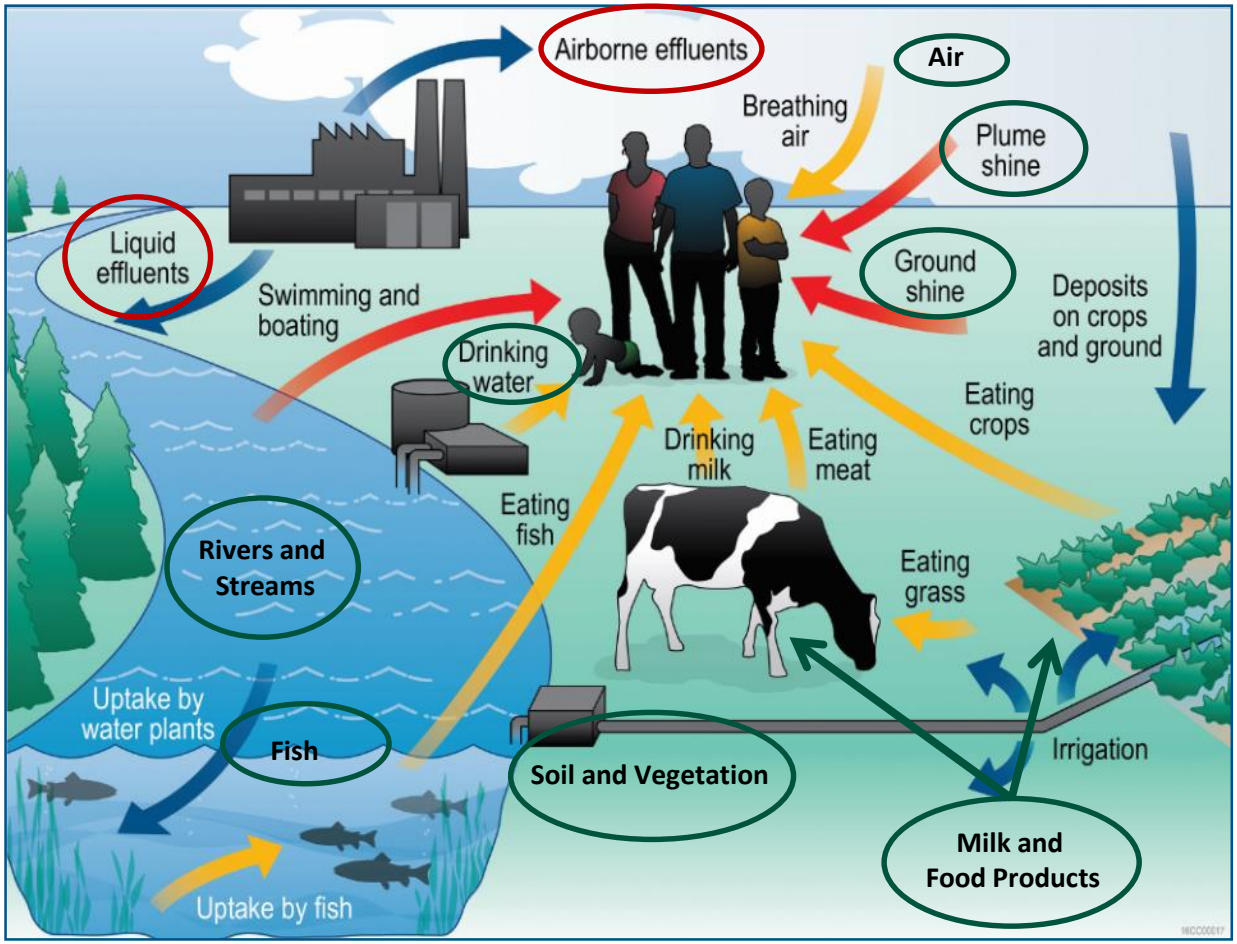
- Monitored 28 industrial wastewater outfalls
- Monitored 34 industrial stormwater outfalls
  - *More than 3000 analyses performed*
  - *One analytical result above permit limit (fecal coliform)*
  - *One flow result above permit limit due to a rain event*



99.9 % of samples within permit limits

Chapters 5 and 6 – Radiological Monitoring and Dose Assessment



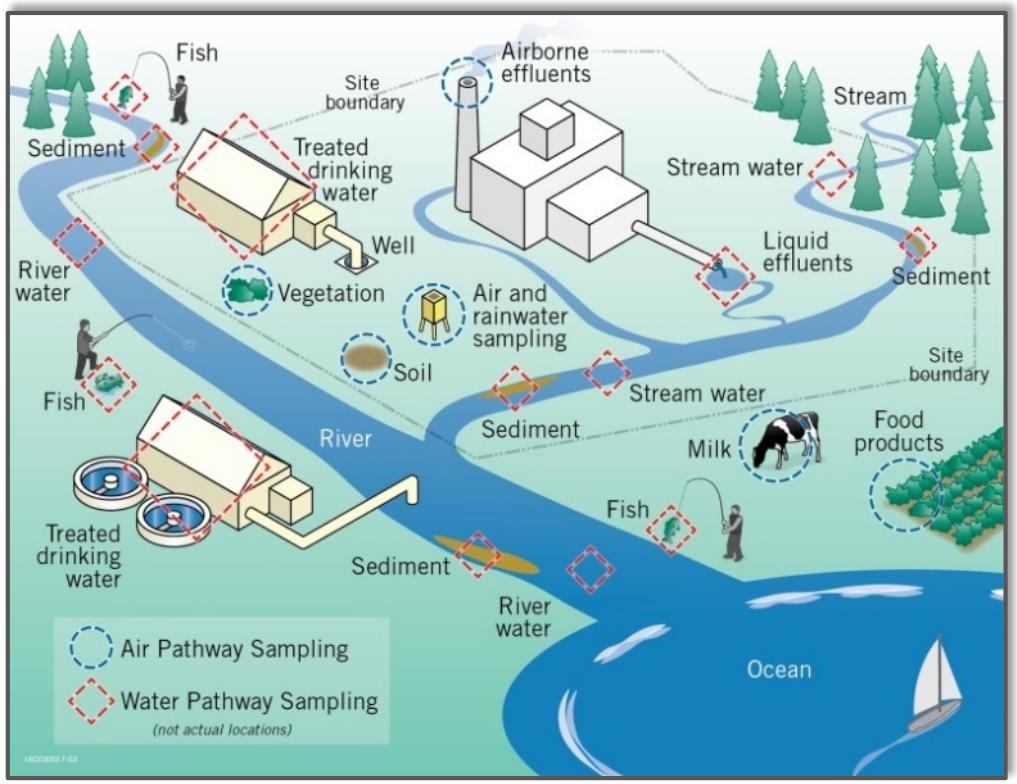


Green Circle - Environmental Surveillance
Red Circle - Effluent Monitoring

Emphasis: Radiological environmental monitoring program confirms compliance and monitors any effects SRS has on the environment.

Over 20,000 radiological analyses performed annually

- Liquid Effluent
  - *Liquid releases remained well below DOE Order 458.1 Standards*
- Air Effluent
  - *Radiological airborne emissions were all within permit limits*
  - *The offsite dose from all airborne releases remained well below the DOE and EPA annual atmospheric pathway dose standard of 10 mrem*



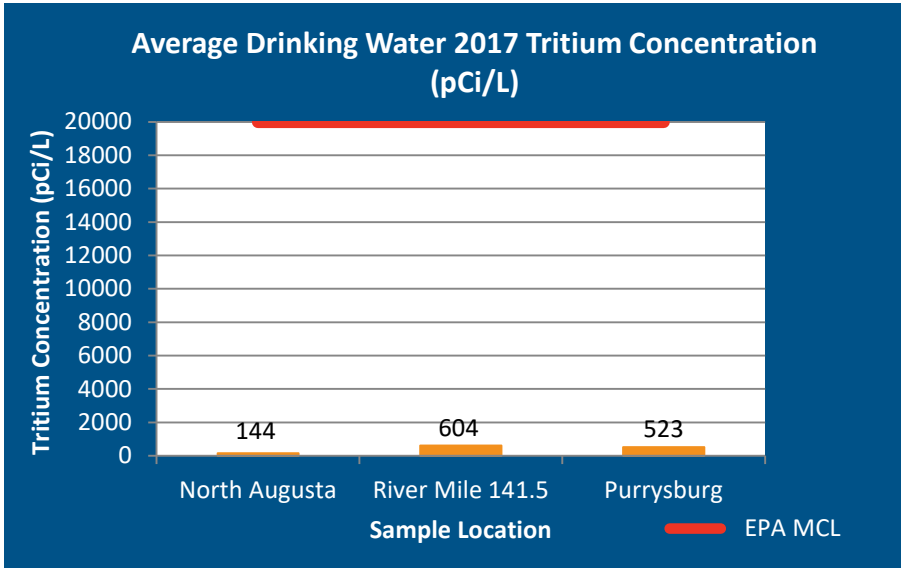
Radiological Air and Liquid Pathway Samples

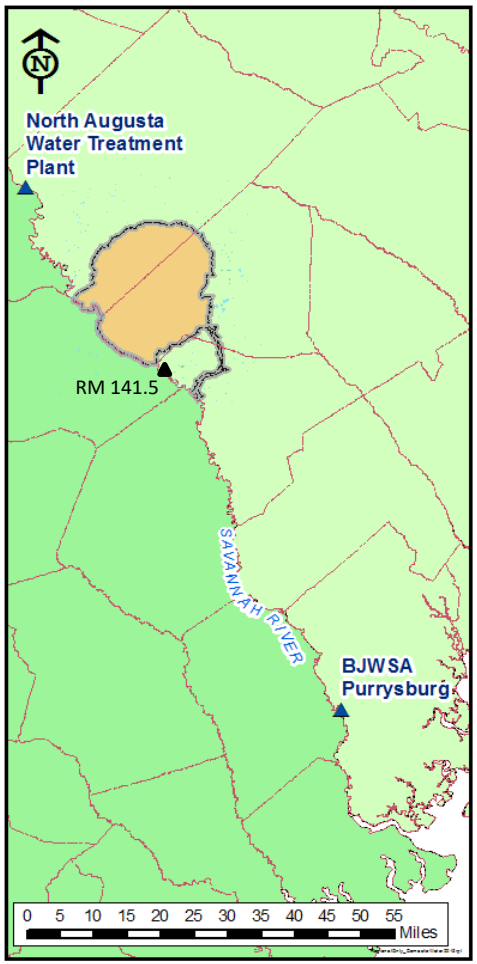
Drinking Water

– Tritium concentrations remain well below the drinking water standard of 20,000 pCi/L at North Augusta and Beaufort-Jasper Water Treatment Plants

Fish

– Cesium-137 levels for fish in the Savannah River are comparable with results for the previous 5 years

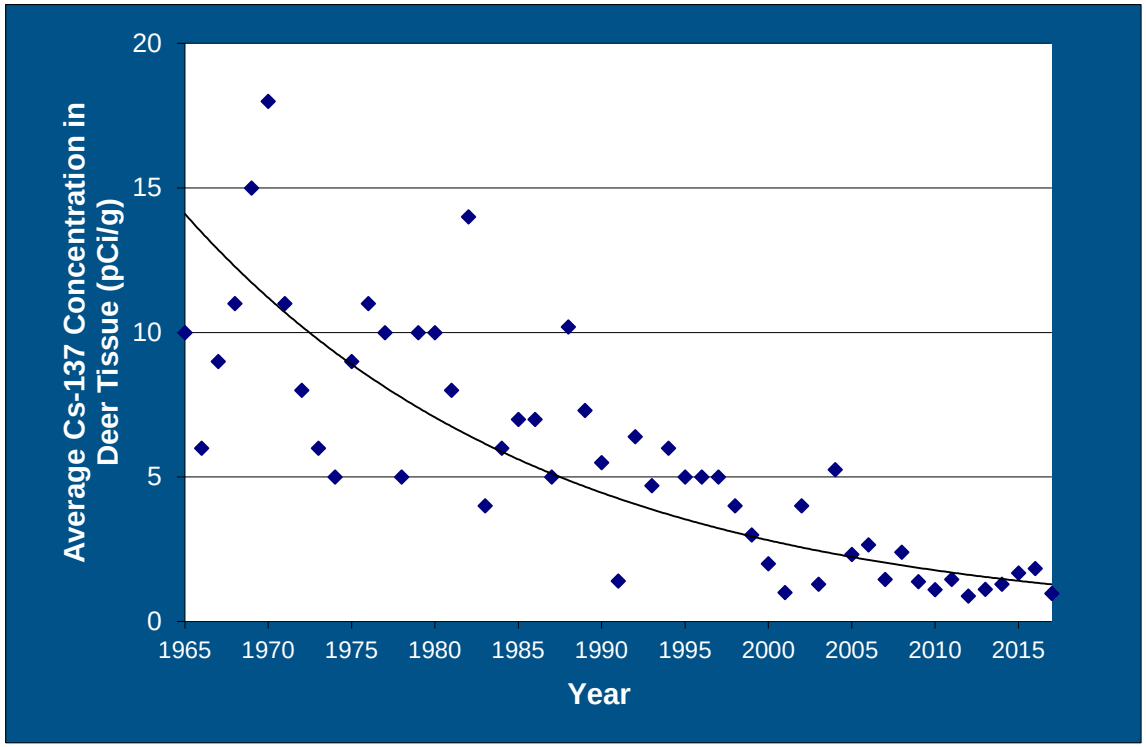




Offsite Drinking Water Sampling Locations

Wildlife

- All animals monitored prior to release from SRS
- 402 animals monitored: All released
  - Average cesium-137 concentrations in deer indicate an overall decreasing trend for past 50 years



Historical Trend of Average Cesium-137 Concentration in Deer Tissue (1965-2017)

Chapter 6 – Dose Assessments

Emphasis: Radiological Dose Assessments confirms compliance and protects the public from the effects of radiation from SRS activities.

What is Dose?

- The amount of energy absorbed by the human body as a result of a radioactive source

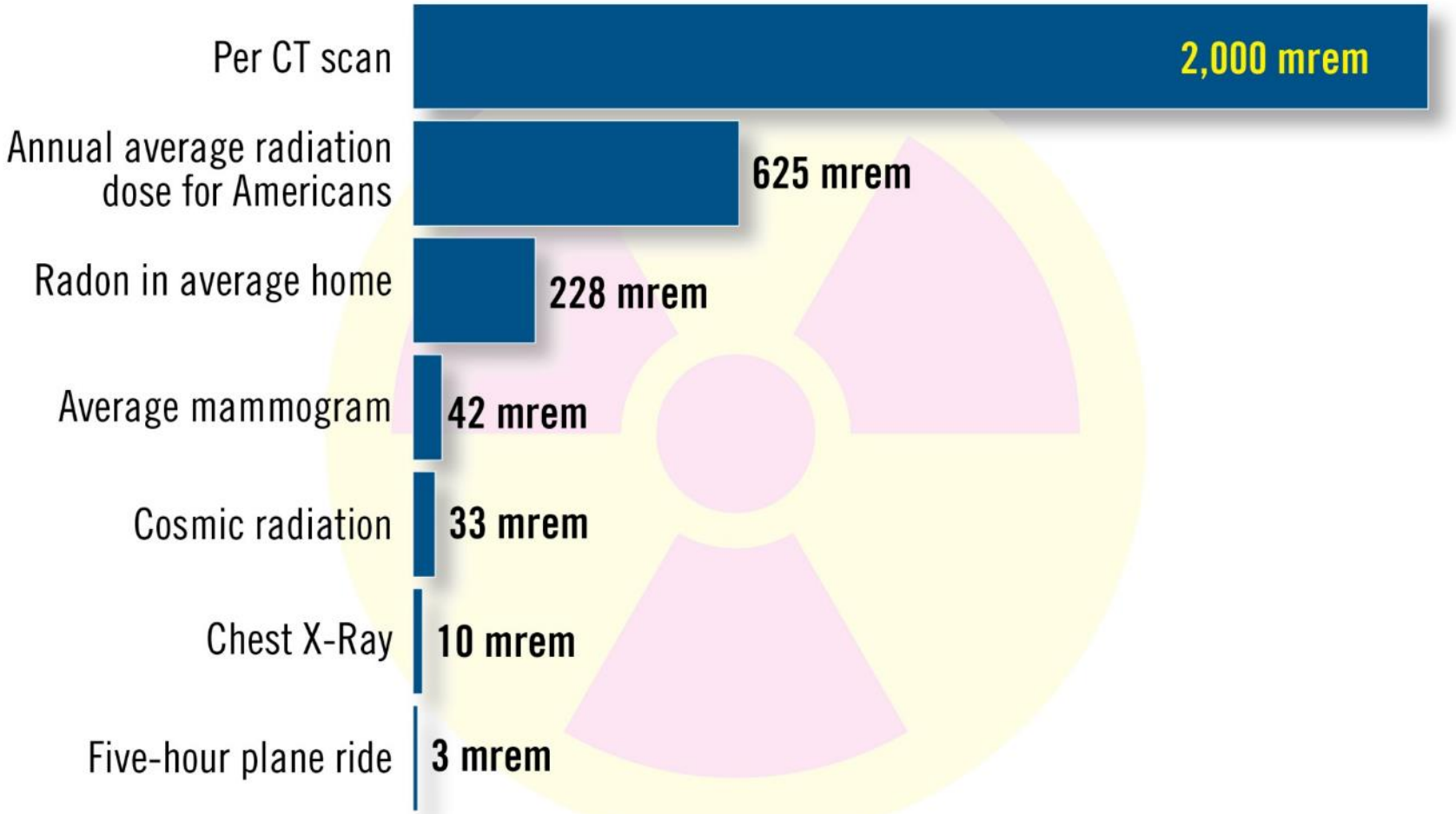
What is the unit of measure?

- Rem or millirem (mrem), which is one-thousandth of a rem
- Millirem is the unit typically used in the report

How do I relate the dose from SRS to dose from other sources?

- On average, people in the U.S. receive a dose of about 300 mrem from natural background sources and another 325 mrem from medical procedures

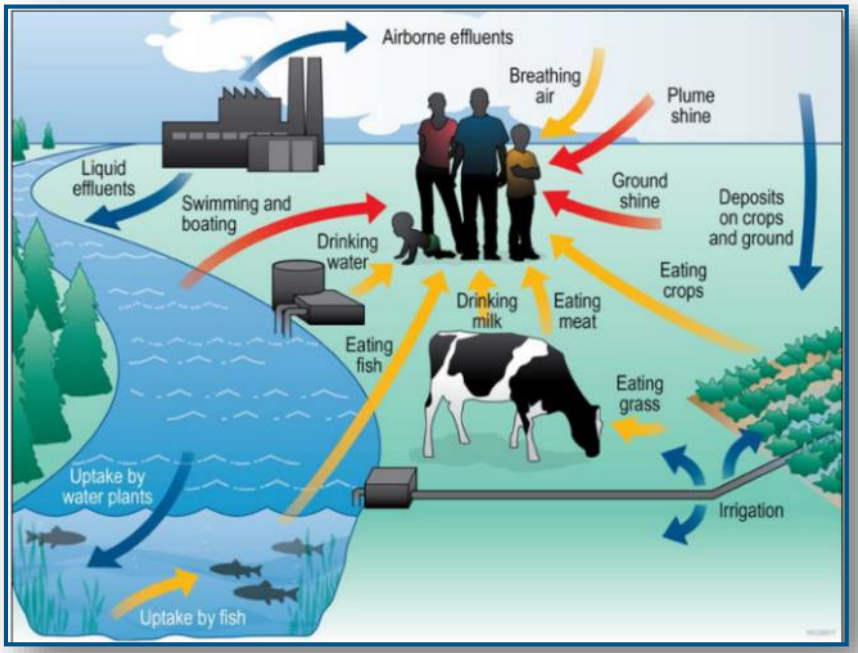
Examples of Impact from Radiation Sources



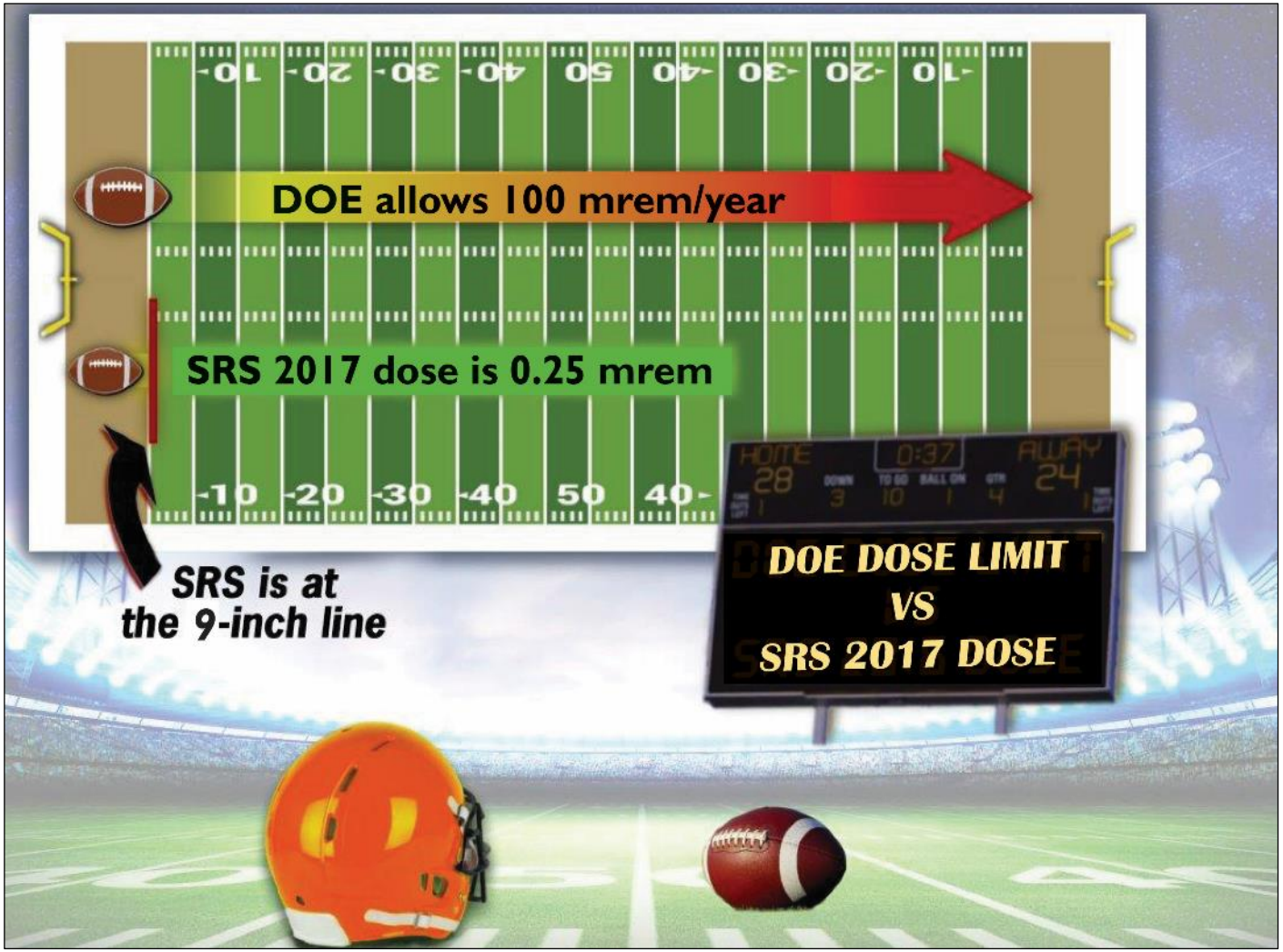
For 2017, the potential representative person all-pathway dose was 0.25 mrem

- 0.027 mrem from air pathways
- 0.22 from liquid pathways
  - *Liquid pathway includes irrigation (ingestion of meat, milk and vegetables), fish consumption, and drinking water*

The all-pathway dose is 0.25% of the 100 mrem/yr DOE dose standard



2017 SRS All Pathway Dose Compared to DOE Limit



Emphasis: Protects, monitors, and remediates groundwater at SRS

During 2017, SRS removed

- 14,000 lbs of volatile organic compounds (VOCs) from groundwater and the vadose zone, and
- Prevented 91 curies of tritium from reaching SRS streams

VOC Removal

- From 1984 to 2017
- 1.54 million pounds

No exceedances of drinking water standards in the SRS Boundary wells near A/M Area

MicroBlowers

Chapter 8 – Quality Assurance

Emphasis: Ensures quality data for the Environmental Monitoring Program

SRS laboratories (onsite and contract)

- Maintained certification by SCDHEC
- Passed audits performed under the DOECAP (U.S. Department of Energy Consolidated Audit Program)

Continuous improvements in environmental monitoring program

- Based on the 2016 update to the *Critical Radionuclide and Pathway Analysis for the Savannah River Site* implemented several monitoring changes
  - *Added several long-lived radionuclides to liquid surveillance program*
  - *Discontinued analysis of fish flesh for tritium*
- Maintained compliance with DOE Order 458.1
  - *Relocated Representative Person from Savannah River mile 118.8 to 141.5*
  - *Radiological Settleable Solids Program – Added total suspended solids analysis at 11 locations*

SRS Environmental Report for 2017: Improvements

Cover photographs are from the surrounding communities and provided by local photographers

Summary Document

- As applicable, provided linkage between articles and sections of full report
- Educate and summarize versus report
- Articles highlight
  - *Changes to the Representative Person*
  - *Effective groundwater remediation uses sustainability concepts*
  - *Modern technology supports safe environmental monitoring*
  - *Public engagement*

Communication and Outreach

- Website Postings
  - Providing link to report and option to request hard copy
- Social Media, Facebook, Twitter
- News Release – local and regional media
- SRS Environmental Bulletin
- Presentations
  - Full CAB, Environmental Justice and CSRA Radiological Environmental Monitoring Program

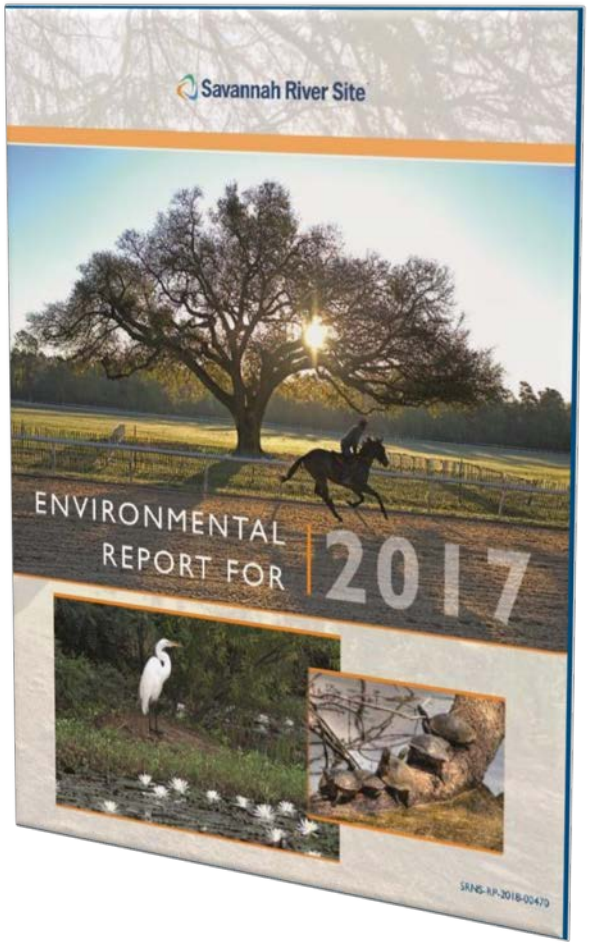
In Summary

SRS has a comprehensive environmental monitoring program

- Monitors facility discharges (air and liquid)
- Monitors extensively on- and off-site extending to Savannah, Georgia
- Evaluate radiological and chemical constituents

Results (chemical and radiological) confirm SRS operations are protective of the environment and human health

Annual dose from SRS operations less than 1 mrem



Contact Information

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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Acronyms and Definitions

ASER = Annual Site Environmental Report

BJWSA = Beaufort-Jasper Water and Sewer Authority

EPA = Environmental Protection Agency

NPDES = National Pollutant Discharge Elimination System

PCB = Polychlorinated biphenyl

pCi/L = picocurie per liter

SCDHEC = South Carolina Department of Health and Environmental Control

TREAT = Teaching Radiation, Energy, and Technology

µg/g = microgram per gram

Acronyms and Definitions (cont'd)

Ci = Curie

- The traditional measure of radioactivity based on the observed decay rate of 1 gram of radium (One curie of radioactive material will have 37 billion disintegrations in 1 second)

Radiation Dose

- The amount of energy a person receives internally or externally as a result of a radioactive source

Environmental Monitoring

- Program at SRS that includes effluent monitoring and environmental surveillance with the purpose of showing compliance with federal, state, and local regulations, as well as DOE Orders

Effluent Monitoring

- The collection of samples or data from the point at which a facility discharges liquid or airborne releases to the environment

Acronyms and Definitions (cont'd)

Environmental Surveillance

- The collection of samples of air, water, soil, vegetation, milk, food products, fish, biota, and other media-or of data-from the environment

Exposure

- Incidence of radiation on living or inanimate material.

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

Representative Person

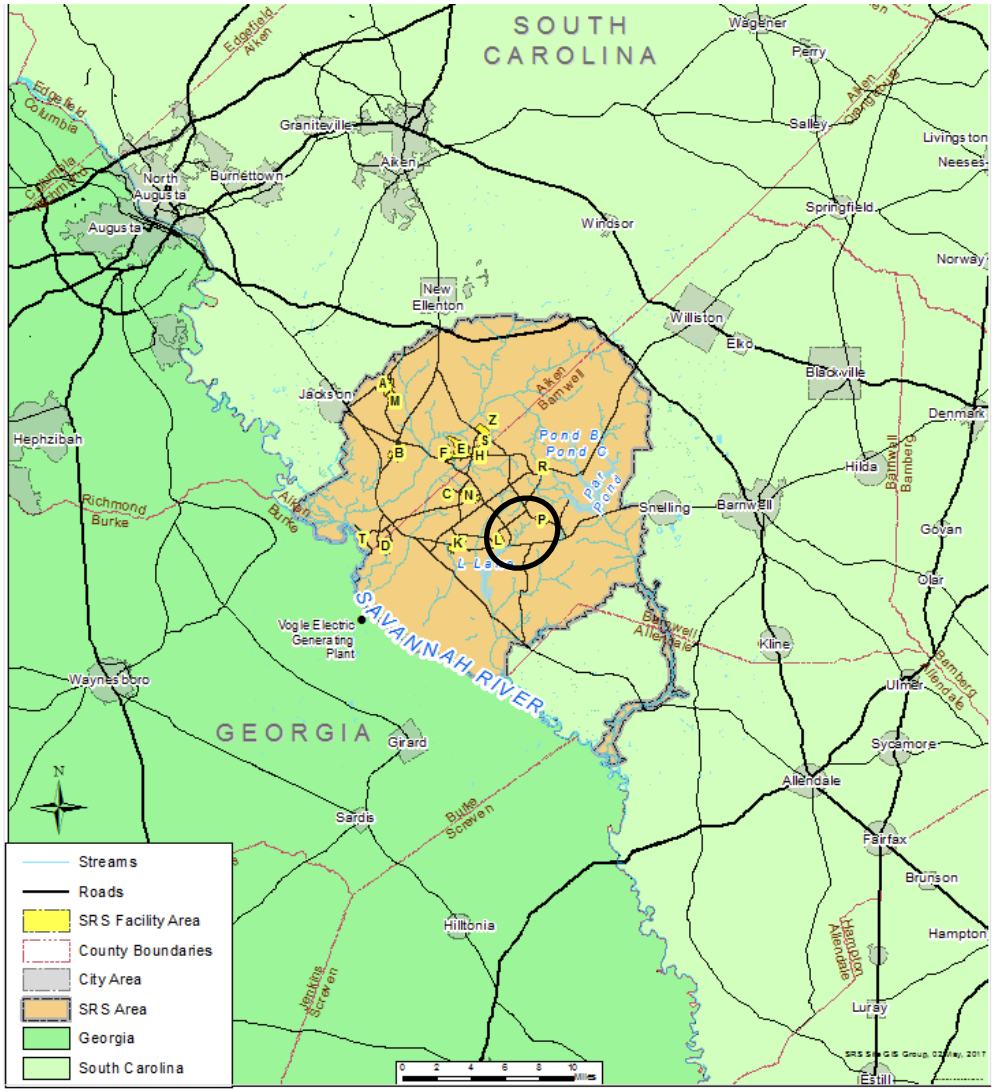
- An individual receiving a dose that is representative of the more highly exposed individuals in the population.

Backup Slides

Chapter 5 – Radiological Sampling Results (cont'd)

Creek Plantation – Comprehensive Sampling – Background Information

- 1960's – release containing cesium-137 occurred from P and L reactors to Steel Creek
- Deposited in swamp sediments of land known as Creek Plantation
  - ✓ privately owned
  - ✓ between Steel Creek and Little Hell Landing
- 1974 – established 10 sampling trails

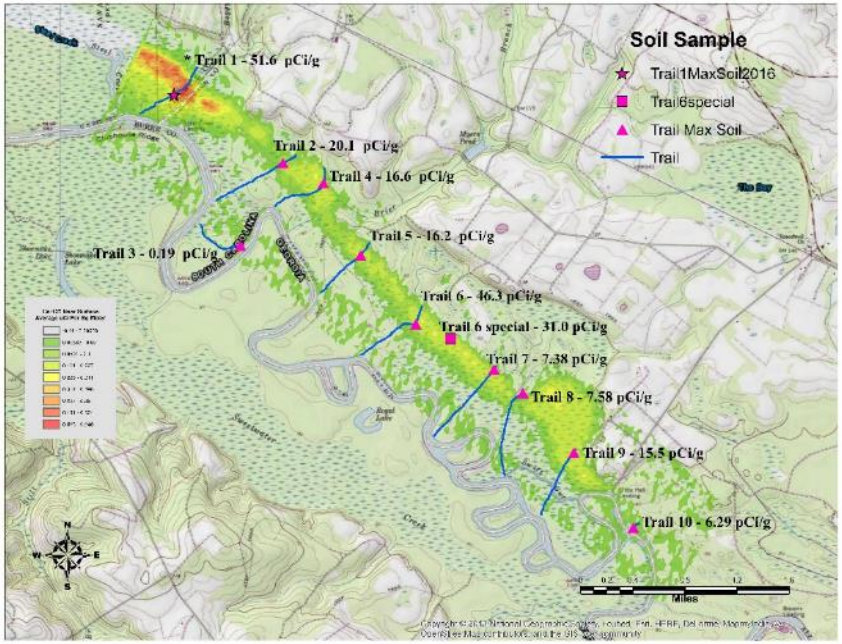


Chapter 5 – Radiological Sampling Results (cont'd)

Creek Plantation – Comprehensive Sampling

- Performed every 5 years and after major flood events
- Collected soil and vegetation samples at 50 locations along 10 trails
- Monitored external gamma radiation using thermoluminescent devices (TLDs)
- Confirmed gamma emitting radionuclide profile using remote aerial monitoring prior to sample collection
- Cesium-137 concentrations are decreasing with time and gamma exposure rates are consistent with past results

Creek Plantation – Trail 5



Liquid Pathway

- Moved from River Mile 118.8 to 141.5
- SRS radiological releases into Lower Three Runs have been small for many years
- New Steel Creek location gives a better indication of potential dose from fish

Air Pathway

- Three Rivers Landfill workers are considered members of the public