2016 Savannah River Site Environmental Report Overview

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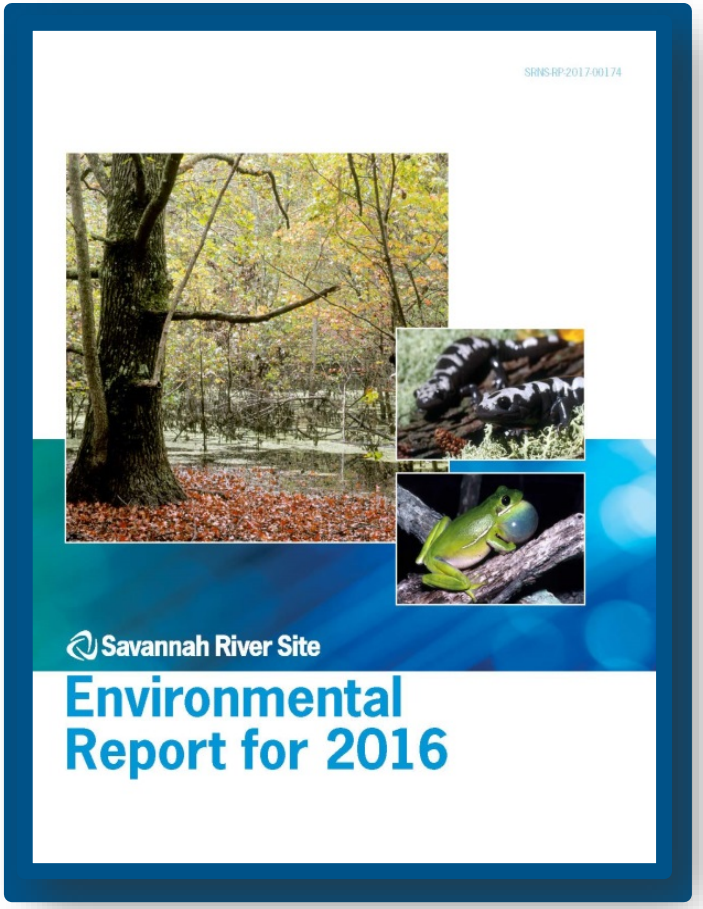
Purpose

- To fulfill a 2017 Facilities Disposition and Site Remediation Committee Work Plan Commitment
- To provide an overview of the Savannah River Site (SRS) Environmental Report and the 2016 results

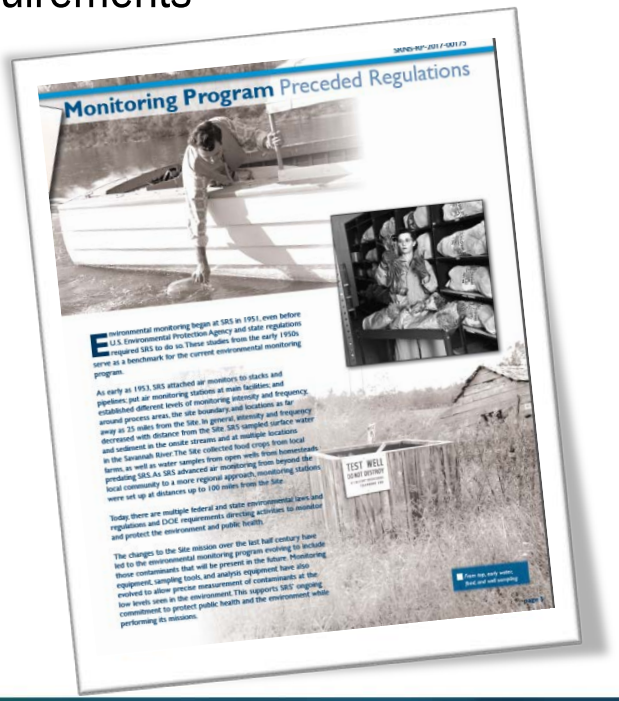


Presentation Outline

- SRS Environmental Report: Background
- Environmental Monitoring Program Video
- 2016 SRS Environmental Report Highlights
- Improvements to the 2016 SRS Environmental Report
- Communication and Outreach
- Summary

SRS Environmental Report for 2016: 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
  - Compliance status with environmental standards and requirements
- SRS began publishing the ASER in 1959



SRS Environmental Report for 2016: 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 and 48% of electricity used on site is from renewable energy sources
- SRS continues to use less petroleum and more alternative fuel
  - Over 90% of SRS light duty vehicles are hybrid, electric, or use E85 (ethanol) fuel
- SRS continues to reduce greenhouse gas emissions (74% since 2008)
- SRS continues to implement "One Simple Act of Green"

1 Simple Act of Green
SAVANNAH RIVER SITE

SRNS personnel explained the SRS Sustainability Program at Earth Day

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
  - 426 construction and operating permits
- Achieved 100% compliance rate for Air Quality and Protection in FY16
- Achieved compliance for the 14th consecutive year for all 19 underground storage tanks containing usable petroleum fuel (Resource Conservation and Recovery Act)

Green Tree Frog and Southern Hognose Snake

Chapter 3 – Compliance Summary (cont'd)

- Achieved 100% compliance rate for National Pollutant Discharge Elimination System (NPDES) Industrial Stormwater
- Achieved 99.9% compliance rate for NPDES Industrial Wastewater
- SRS did receive one Notice of Violation in 2016
  - Issued December 9, 2016 by SCDHEC with no fine or penalty
  - National Pollutant Discharge Elimination System
    - *Exceeded Total Suspended Solids permit limit for a wastewater outfall*
  - All results prior to and after the exceedance were within permit limits
  - The exceedance was an isolated event

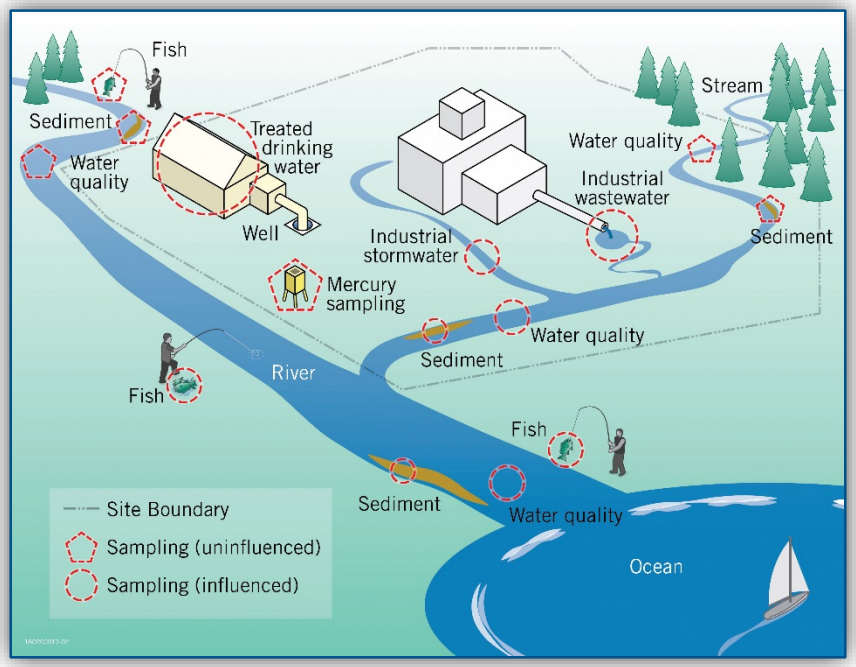
- Emphasis: Nonradiological environmental monitoring program confirms compliance and monitors any effects SRS has on the environment.
- Liquid Effluent
  - NPDES Permit Compliance Status

Industrial Wastewater and Stormwater Outfalls

Monitored 28 industrial wastewater outfalls

Monitored 35 industrial stormwater outfalls

- *More than 3275 analyses performed*
- *One analytical result above permit limit*
- *One flow result above permit limit due to a rain event*



Types and Typical Locations of Nonradiological Sampling

99.9 % Compliance

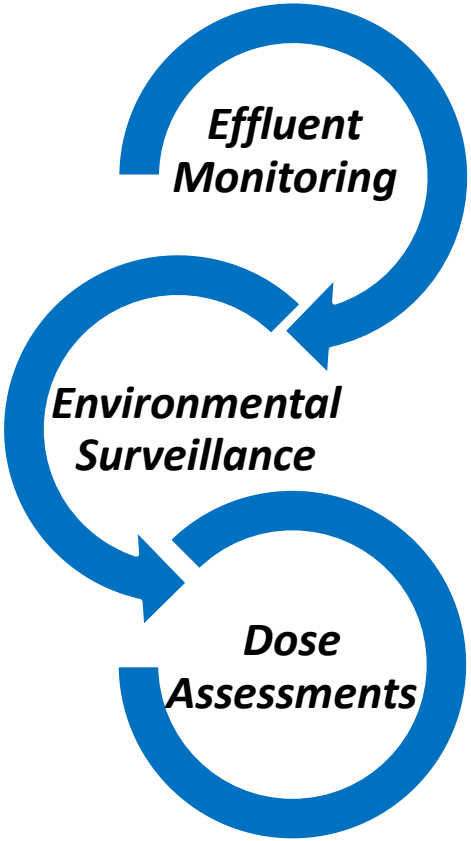
Chapter 4 – NonRadiological Sampling Results (cont'd)

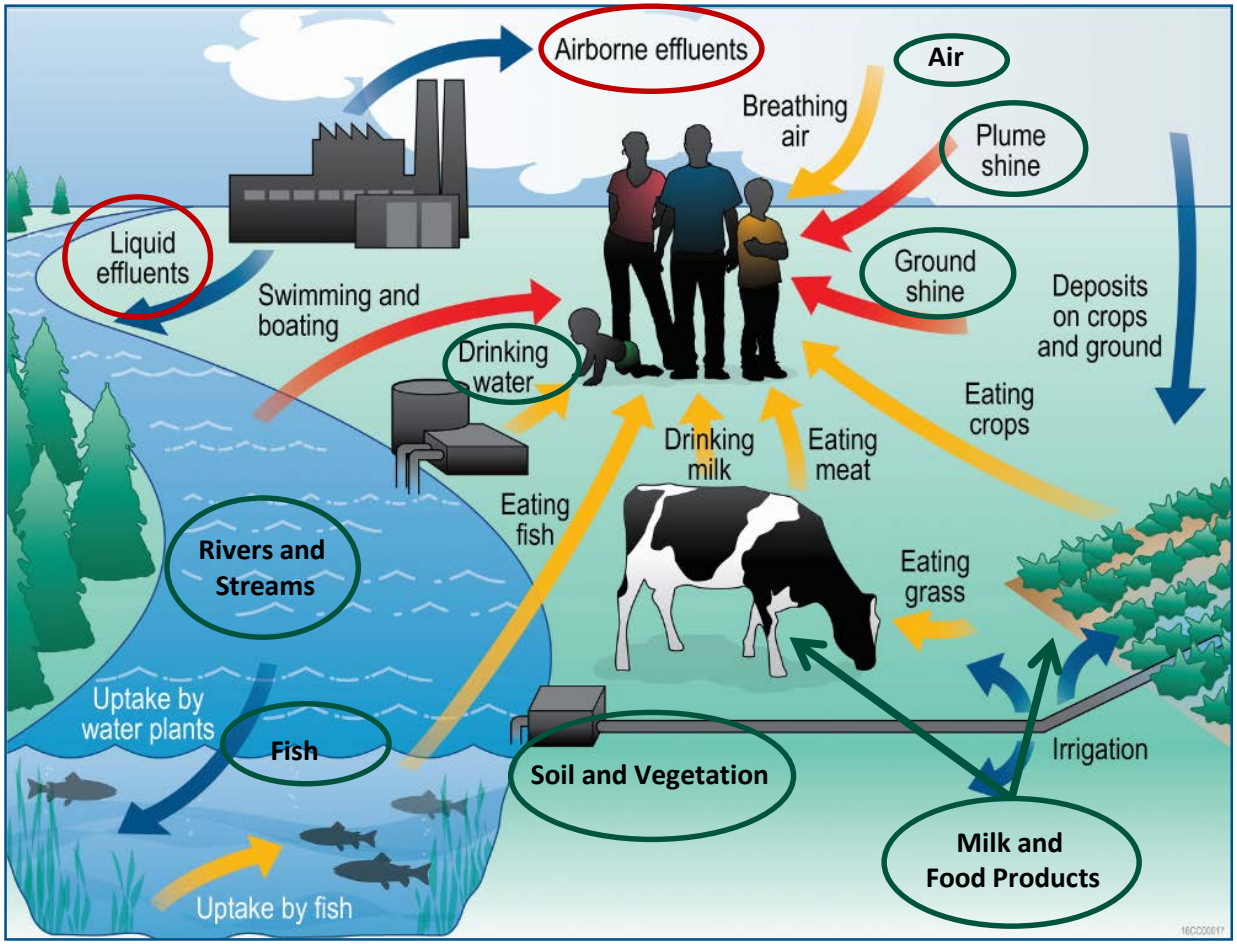
- Water Quality
  - SRS discharges did not impact the water quality in onsite streams or the Savannah River
    - *Parameters include pH, temperature, dissolved oxygen, metals, organics, total suspended solids, pesticides, herbicides, and PCBs*
- Fish
  - Mercury levels for fish in the Savannah River ranged from below detectable levels to 1.4 µg/g in bass
    - *Bass results are similar to 2014 and 2015 results*
    - *Catfish and panfish results are similar to 2012 through 2016 results*

Technician Measures the Amount of Dissolved Oxygen in a Water Sample

Technician Deploys Fish Sampling Equipment

Chapters 5 and 6 – Radiological Monitoring and Dose Assessment



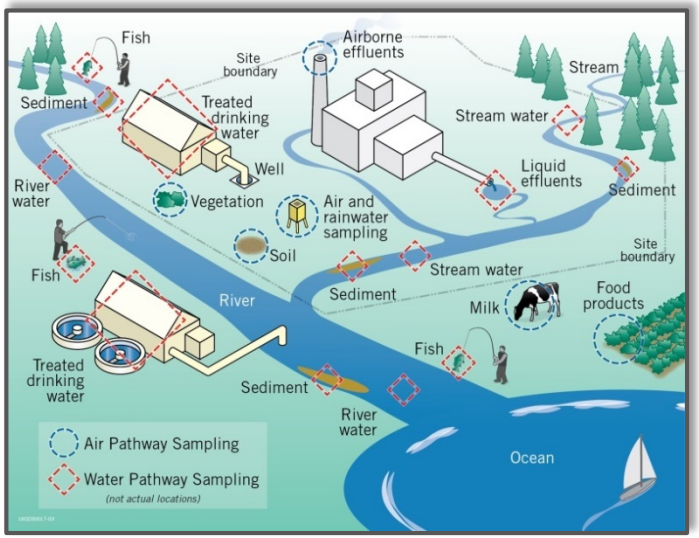


Green Circle - Environmental Surveillance
Red Circle - Effluent Monitoring

Chapter 5 – Radiological Sampling Results

- Emphasis: Radiological environmental monitoring program confirms compliance and monitors any effects SRS has on the environment.
- Over 20,000 radiological analysis performed annually
  - Liquid Effluent
    - *Liquid releases remained well below DOE Derived Concentration 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*

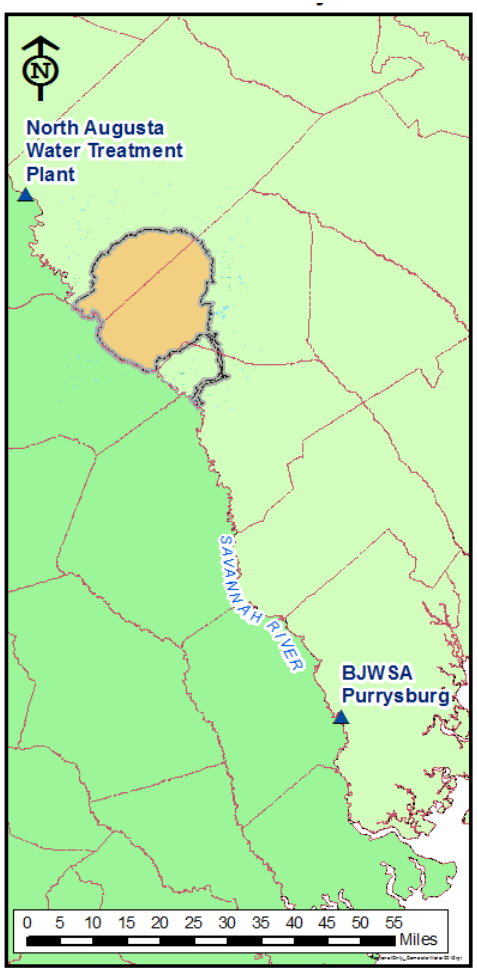
Air Emission Stack in L Area



Radiological Air and Liquid Pathway Samples

Chapter 5 – Radiological Sampling Results (cont'd)

- Drinking Water
  - Tritium concentrations remain well below the drinking water standard of 20 pCi/ml at North Augusta and Beaufort-Jasper Water Treatment Plants
- Wildlife
  - All animals monitored prior to release from SRS
  - Of 367 animals, one deer was not released
  - Average cesium-137 concentrations in deer indicate an overall decreasing trend for past 50 years, as well as the last ten years
- Fish
  - Cesium-137 levels for fish in the Savannah River ranged from below detectable levels to 0.414 pCi/g in panfish

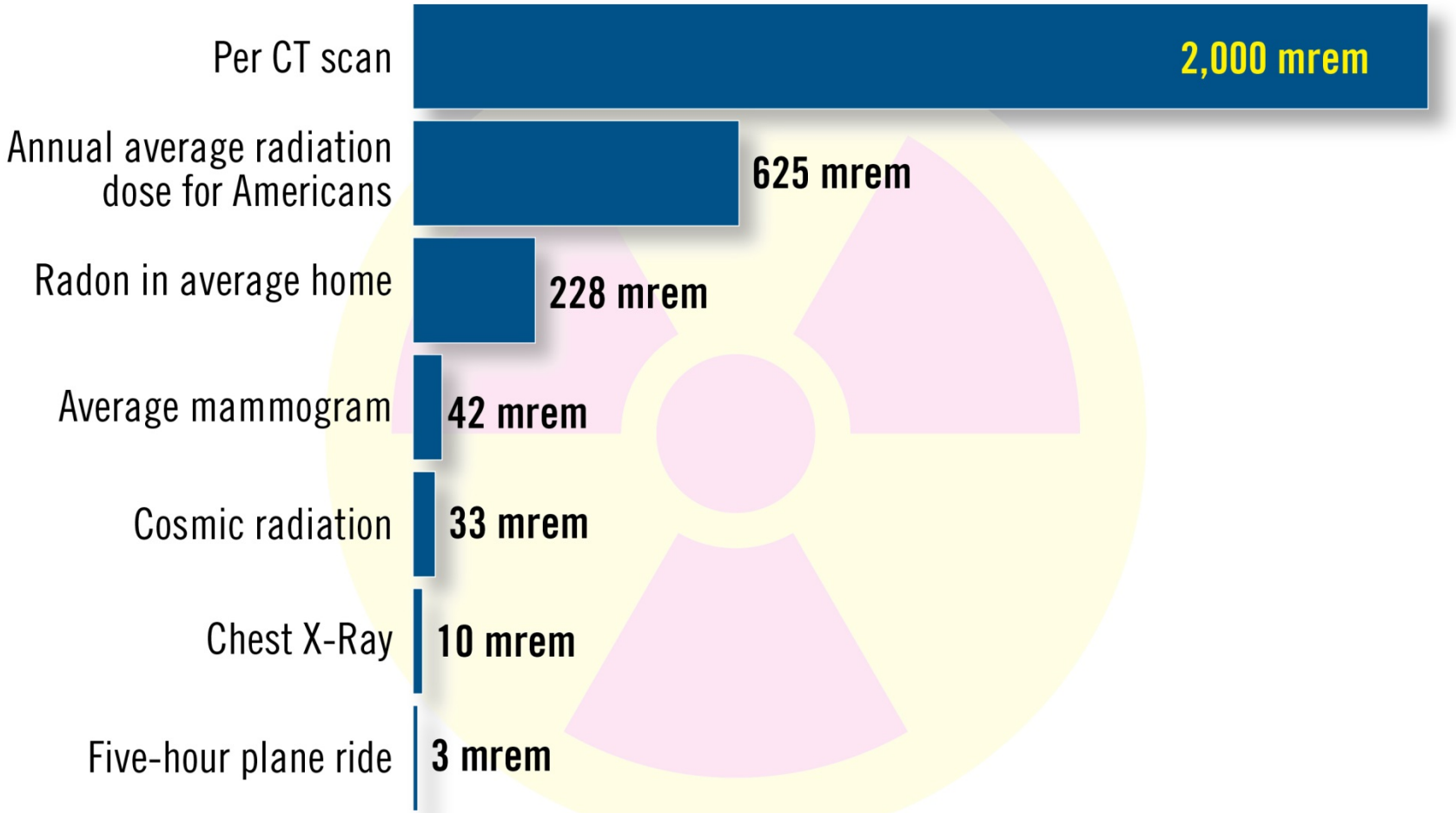


Offsite Drinking Water Sampling Locations

Chapter 6 – Dose Assessments

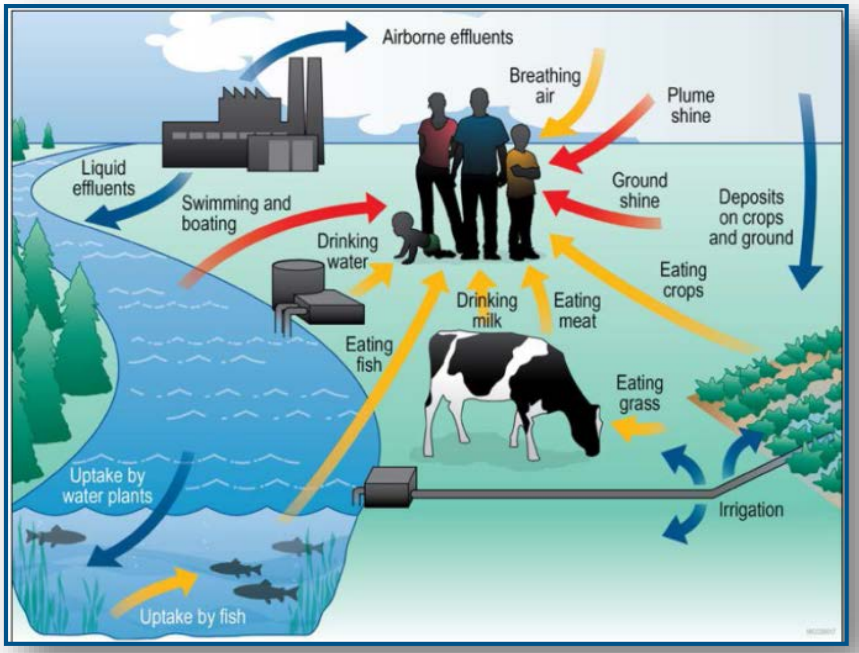
- Emphasis: Radiological Dose Assessments confirms compliance and protects the public from the effects of radiation from SRS activities.
- What is Dose?
  - The amount of energy absorbed by the human body as a result of a radioactive source
- What is the unit of measure?
  - Rem or millirem (mrem), which 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

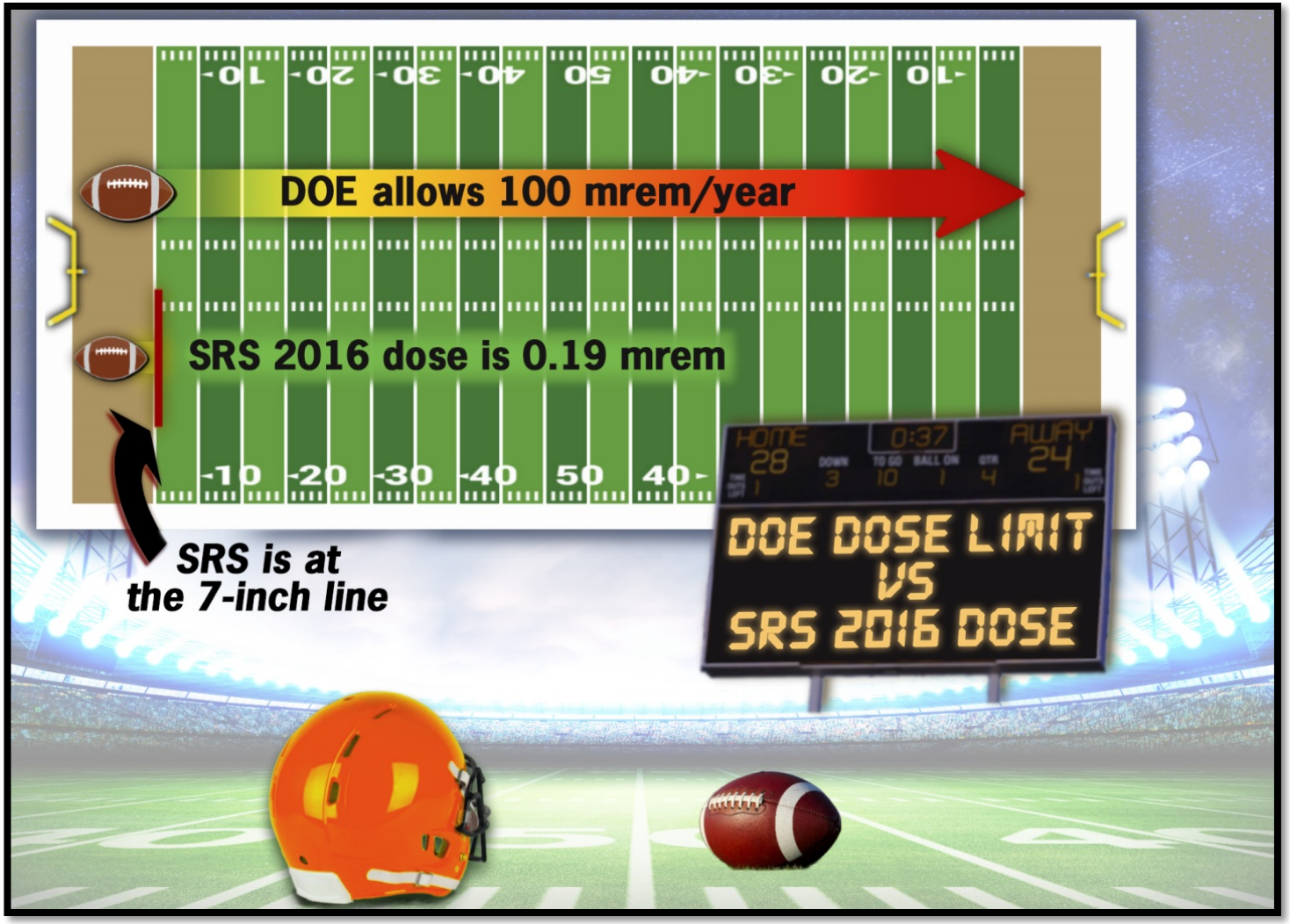


Chapter 6 – Dose Assessment Results

- For 2016, the potential representative person all-pathway dose was 0.19 mrem
  - 0.038 mrem from air pathways
  - 0.15 from liquid pathways
    - *Liquid pathway includes irrigation (ingestion of meat, milk and vegetables), fish consumption, and drinking water*
- The all-pathway dose is 0.19% of the 100 mrem/yr DOE dose standard



Chapter 6 – Dose Assessment Results (cont'd)



Chapter 7 – Groundwater Management Program

- Emphasis: Protects, monitors, and remediates groundwater at SRS.
- During 2016, SRS removed
  - 11,300 lbs of volatile organic compounds (VOCs) from groundwater and the vadose zone, and
  - Prevented 133 curies of tritium from reaching SRS streams
- No exceedances of drinking water standards in the SRS Boundary wells near A/M Area

Sampling a Monitoring Well

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
  - Implemented composite sampling of sediment samples
  - Initiated compositing air effluent samples to get a lower minimum detectable concentration
  - Relocated sample location on the Savannah River to improve representativeness of low river flow
  - Upgraded wildlife monitoring equipment yielding improved correlation with laboratory results

Technician Collecting Sediment Sample from a Stream on SRS

SRS Environmental Report for 2016: Improvements

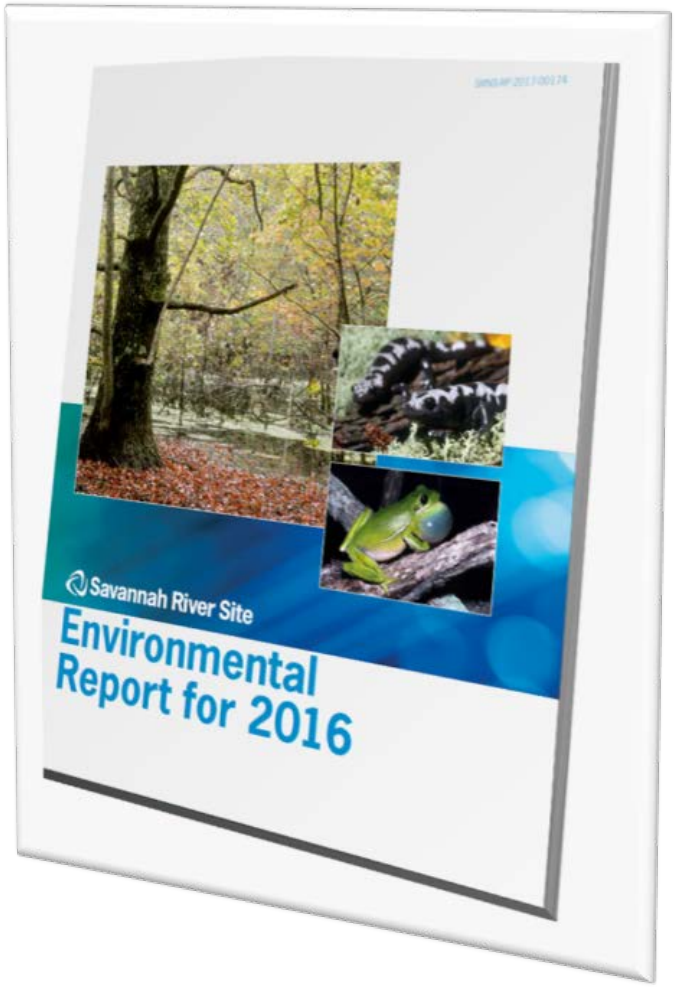
- Main Emphasis is revamping the Summary Document
  - Magazine format
    - *Divided into Three Main Sections*
    - *Articles of one page or less*
  - Educate and summarize versus report
  - Articles highlight
    - *Integration of compliance, monitoring, and research*
    - *Improvements to environmental monitoring*
    - *Linkages between past and present monitoring*
    - *Radiation Dose*
    - *Community Investment*

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.