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
Chapter 2 – Environmental Management System

• 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”

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)
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
Chapter 4 – NonRadiological Sampling Results

• 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

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
Chapters 5 and 6 – Radiological Monitoring and Dose Assessment

- **Effluent Monitoring**
- **Environmental Surveillance**
- **Dose Assessments**

**Diagram**: A diagram illustrating the flow of radiological monitoring and dose assessment, showing the monitoring of effluents, environmental surveillance, and dose assessments. The diagram highlights the pathways of airborne effluents, breathing air, plume shine, ground shine, deposits on crops and ground, eating crops, eating grass, eating meat, drinking milk, drinking water, swimming and boating, and uptake by water plants and fish.

- **Green Circle** - Environmental Surveillance
- **Red Circle** - Effluent Monitoring

**Legend**:
- Rivers and Streams
- Fish
- Soil and Vegetation
- Uptake by fish
- Milk and Food Products
- Irrigation

**Text**: Effluent Monitoring, Environmental Surveillance, Dose Assessments, Rivers and Streams, Air, Soil and Vegetation, Fish, Drinking milk, Eating meat, Eating fish, Drinking water, Swimming and boating, Uptake by water plants, Eating grass, Deposits on crops and ground, Breathing air, Plume shine, Ground shine.

**Supporting Text**:
- Effluent Monitoring
- Environmental Surveillance
- Dose Assessments

**Image Source**: Savannah River Site (SRS) - SAVANNAH RIVER SITE • AIKEN • SC • WWW.SRS.GOV

**Image Number**: 11
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
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
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

- Per CT scan: 2,000 mrem
- Annual average radiation dose for Americans: 625 mrem
- Radon in average home: 228 mrem
- Average mammogram: 42 mrem
- Cosmic radiation: 33 mrem
- Chest X-Ray: 10 mrem
- Five-hour plane ride: 3 mrem
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
DOE allows 100 mrem/year

SRS 2016 dose is 0.19 mrem

SRS is at the 7-inch line
• 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
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
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
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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.