Presentation to the Savannah River Site Citizens Advisory Board

Savannah River Ecology Laboratory (SREL)
FY21 and REMOP Update

January 25, 2022

Dr. Olin E. Rhodes, Jr. – Director SREL
Professor, University of Georgia (UGA)
Objectives

- Savannah River Ecology Lab (SREL) Mission
- Staffing
- Funding and Work Scope
- Significant Events
- Advances
- Opportunities For Fiscal Year 2021
- Challenges for Fiscal Year 2021
- REMOP Summary

Consistent with the Facilities Disposition and Site Remediation Committee's 2021 Work Plan
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tr>
<td>ACP</td>
<td>Area Closure Project</td>
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<tr>
<td>DOE</td>
<td>Department of Energy</td>
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<tr>
<td>DOE-HQ</td>
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<td>DOE-SR</td>
<td>Department of Energy – Savannah River</td>
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<tr>
<td>ERDA</td>
<td>U.S. Energy Research and Development Administration</td>
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<td>HVAC</td>
<td>Heating, Ventilation and Air Conditioning</td>
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<td>National Nuclear Security Administration</td>
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<td>SREL</td>
<td>Savannah River Ecology Laboratory</td>
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<tr>
<td>SRNL</td>
<td>Savannah River National Laboratory</td>
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<td>SRR</td>
<td>Savannah River Remediation</td>
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<td>SRS</td>
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<td>University of Georgia</td>
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<td>USACE</td>
<td>U.S. Army Corps of Engineers</td>
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<td>USDA</td>
<td>U.S. Department of Agriculture</td>
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<td>USFS-SR</td>
<td>U.S. Forest Service – Savannah River</td>
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SREL History

1951 - Atomic Energy Commission (AEC) had concerns about environmental impacts resulting from Savannah River Site (SRS) construction and operations.

1951 to present – Funding from AEC, ERDA, and Department of Energy (DOE)

1954 – Established permanent lab on the SRS

Dr. Eugene Odum

1977 – Established current lab facilities
SREL’s Mission:

“To enhance our understanding of the environment by acquiring and communicating knowledge that contributes to sound environmental stewardship.”

“To provide the public with an independent evaluation of the ecological effects of SRS operations on the environment”

- An interdisciplinary program of field and laboratory **Research** conducted largely on the SRS and published in the peer-reviewed scientific literature
- **Education** and research training for undergraduate and graduate students
- **Service** to the community through environmental outreach activities
SREL Research Program’s

- >3630 peer-reviewed scientific publications to date
- 66 books
SREL Education Program

Education Programs

- >450 theses and dissertations

- SREL graduate students have received more than 200 awards

- Over 700 undergraduates representing all 50 states have participated in SREL-sponsored research to date
SREL Environmental Outreach Program

- Integrates SREL research into presentations for the general public
- Provides hands-on classroom and field experience for students
- Conducts educator workshops

In 2021 – SREL moved largely to digital Platforms due to COVID

In FY21, SREL:
- Held 66 events reaching ~2,000 people
- Had 4,219 social media followers – 467K media impressions
- Appeared in 130 media outlet · 7.2 million media impressions
SREL in 2021 (this is our 70th anniversary year)

- UGA Employees
  - Research Faculty – 7
  - Tenure Track Faculty - 7
  - Emeritus Faculty - 4
  - Post Docs – 12
  - Outreach - 6
  - Res. Professional - 24
  - Research Support - 38
  - Graduate Students - 74
  - Admin & Support - 19

191 Staff & Students
Disciplinary Expertise

- Geology / Soil Science
- Environmental Microbiology
- Epigenetics
- Molecular Genetics
- Environmental Chemistry
- Radioecology
- Ecotoxicology and Risk Assessment
- Wildlife Ecology
- Disease Ecology
- Plant Physiology
- Proteomics and Glycomics
47% of Budget Represents a 2 to 1 Return Per Dollar on BMF Funding

- UGA 21%
- EM Baseline 31%
- Other External 26%
- NNSA 16%
- ACP 6%
Significant Events in FY21

- UGA
  - Allowed majority (75%) of the 34% Indirect Costs to be retained by SREL
  - Cost-Shared 6 faculty positions with SREL
  - Provided funding for equipment and personnel
  - Cost-shared graduate student and postdoctoral positions

- DOE / SRS / External
  - Building, equipment, utilities, and site access
  - Funding provided by Department of Energy – Savannah River (DOE-SR) under 5-year Cooperative Agreement with DOE - EM
  - Funding provided by DOE – National Nuclear Security Administration (NNSA)
  - Continued project funding from Area Closure Project (ACP) and Savannah River Remediation (SRR)
  - 2.5 million in external funding from non-SRS sources leveraged
1. Work scope:

Research Set-Asides, Site Use Permitting

Enacted significant land management activities for set asides

Graduate and Undergraduate Education Programs

Advised 74 graduate students
Mentored over 102 graduate students total
Taught 15 courses on main UGA campus and 3 at SREL

Interdisciplinary Research

Continuing collaborative research programs with Savannah River National Laboratory (SRNL), U.S. Forest Service–Savannah River (USFS-SR), Savannah River Remediation (SRR), UGA, U.S. Department of Agriculture (USDA), National Science Foundation (NSF), U.S. Army Corps of Engineers (USACE) & other university, federal, state, and private partners Involving research on radionuclide and metal remediation, feral swine control & radioecology
1. Work scope: Continued

Site-wide Source of Ecological Expertise

- Provided ecological research support to Area Closures Project, SRR, SRNL, etc.

Scientific Expertise

- Submitted 33 Proposals as PI or coPIs to External Granting Agencies
- Hired a New Assistant Research Scientist – Wetland Ecology - Microbiology

Scientific Productivity

- SREL staff and students published over 95 scientific articles and gave over 100 scientific presentations in FY21

Analytical Services

- SREL staff and students analyzed over 4,400 samples for metal contaminants using ICP-MS or ICP-OES technologies
- SREL staff and students analyzed over 2,800 samples for total or methyl mercury using SREL-based equipment
SUMMARY

Radiological Environmental Monitoring and Outreach Project
Background

- Outreach project focused on radiological environmental monitoring programs
- Data collection from and with the community as an educational tool
- DOE-funded University of Georgia Savannah River Ecology Lab (UGA SREL) as the independent, third-party
- Working with Georgia WAND to create valuable community connections and networks
Background

- Historic Burke County

- Radiological Environmental Monitoring
  - South Carolina DHEC sampling in Savannah River
  - SRS has 9 water well locations (2016)
    - Historic SRS air monitoring station located within the county
  - Southern Company's Plant Vogtle through the NRC
  - Georgia EPD monitored in the county until 2004

- Community Involvement
  - Engaged in figuring out what is in their environment
  - EPA Technical Assistance Needs Assessment
Background

REMOP Goals

- Data-driven understanding of environment
- Educate community about monitoring programs and associated resources
- Collect community samples to illustrate how environmental monitoring programs operate
- Synthesize data from environmental monitoring programs for use in educational talks and resources
ACHIEVEMENTS

Education and Outreach Programming

- Community Talks
  - 20 Community Talks (July 2017-January 2019)
  - 148 Community Residents Attended
- Middle School Curriculum
  - 7th Grade STEM Curriculum (2017-18 & 2018-19)
  - 50 Students/Every 3 Weeks/Each Year
- Burke County Ecology Day
  - 19 Table Displays and 22 SREL Volunteers
  - 2018 – 36 Attendees
  - 2019 – 806 3rd, 4th & 5th Graders and 41 Teachers
**02: Radiation in Our Lives**

Elements are made up of 3 units: protons, neutrons, and electrons. These are the units that decay.

Elements can exist as a solid, liquid, or gas. Elements are found everywhere and are the building blocks of matter.

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**Source (Element)**

Alpha, beta, and gamma radiation can be prevented. Due to their energy levels, different thicknesses and preventative measures can be used. For example, alpha radiation can be prevented by putting a piece of paper between it and yourself.
**RADIOLICAL ENVIRONMENTAL MONITORING PROGRAMS**

**DEPARTMENT OF ENERGY SAVANNAH RIVER SITE**

The Department of Energy Savannah River Site (SRS) monitors radiological contaminants in the environment throughout the year and releases an annual environmental report. This report includes information about site-wide environmental monitoring and surveillance effectiveness as well as to confirm SRS is complying with environmental regulations.

The SRS monitoring program began in 1951 with air monitoring, surface water, sediment, food crops, and well water. The SRS continues to monitor air, surface water, sediment, food crops, and well water. The SRS has added monitoring of deep groundwater wells and fish and game species.

This report can be found on the SRS website, [www.srs.gov](http://www.srs.gov) under Environmental Reports.

**GEORGIA POWER**

Georgia Power’s environmental monitoring report is prepared by Southern Nuclear Operating Company as the Annual Radiological Environmental Operating Reports to the Nuclear Regulatory Commission.

This report includes comparisons between samples taken at locations where there is no expected radiological levels and where there are expected to be levels of radioactivity.

**OTHER ENVIRONMENTAL MONITORING PROGRAMS IN OUR AREA**

The South Carolina Department of Health and Environmental Control also performs environmental monitoring of radionuclides. This program monitors within the Savannah River as well, which is of interest to Burke County residents who recreate in the river.

[The Georgia Environmental Protection Division also monitored the state for radiological contaminants until 2004, it monitored eight radiological facilities in the state, including Plant Vogtle and the SRS.

Old reports can be requested from their office.]

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**Savannah River Ecology Laboratory UNIVERSITY OF GEORGIA**
CONTAMINANTS IN WATER

REGULATORY LIMITS AND MONITORING
The EPA Drinking Water Standard for Tritium, a radioactive isotope of water, is 20,000 pCi/mL. It is measured at less that 0.03 pCi/mL in Burke County according to the environmental monitoring reports.

THE WATER CYCLE

PROTECTING NATURAL AREAS
Water is can be naturally filtered of certain contaminants when it is held in natural water bodies, like Carolina Bays and wetlands. Protecting these habitats will ensure that natural filtering processes can continue to remove harmful contaminants from our environment.

The most common contaminants found in drinking water are industrial solvents, weed killers, and refrigerants.

CYCLING THROUGH THE WATER
Humans can come into contact with contaminants in all of its forms — rain, surface water, and groundwater. Groundwater is most concerning because humans use groundwater for drinking water wells. Contaminants in groundwater can be natural (like iron or manganese) or from human sources, like industry.
ACHIEVEMENTS

Community Engagement

- Community Advisory Council
  - 4 Meetings over 2 years
  - Regular Requests for Feedback on Educational Materials
  - 12 Community Residents Served
- Community Survey
  - Distributed at Community Events
  - 63 Surveys Returned
- Community Newsletter
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<th>Survey</th>
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<td>5</td>
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<td>Contaminants enter Burke County from the Savannah River Site</td>
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<td>3</td>
<td>4</td>
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<td>3</td>
<td>4</td>
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<td>3</td>
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<td>The contaminants in Burke County affect my health</td>
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<td>3</td>
<td>4</td>
<td>5</td>
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<td>3</td>
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<td>Radiation is present in everyday items like cell phones</td>
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<td>It is healthy to eat all the fish from the Savannah River</td>
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<td>2</td>
<td>3</td>
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<tr>
<td>Scientists make decisions about regulatory limits of contaminants</td>
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<td>3</td>
<td>4</td>
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<tr>
<td>Government officials make decisions about regulatory limits of contaminants</td>
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<td>I alter my behavior based on how risky something is</td>
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<tr>
<td>Living in Burke County is risky due to the contaminants in the environment</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<td>Living in Burke County is risky due to the Savannah River Site</td>
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<td>Living in Burke County is risky due to Plant Vogtle</td>
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<td>Living in Burke County is risky due to the radiation in the environment</td>
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<td>3</td>
<td>4</td>
<td>5</td>
<td>Don’t know</td>
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<tr>
<td>It is a greater risk for me to receive an X-ray at the doctor than to live next to a nuclear power plant</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>Don’t know</td>
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<tr>
<td>I feel very prepared for potential nuclear emergencies in Burke County</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>Don’t know</td>
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The Radiological Education, Monitoring, and Outreach Project (REMOP) is an outreach project with the goal of increasing community-wide understanding of environmental monitoring programs as well as understanding the data collected by these programs. Monthly talks on different subjects will build foundational knowledge to understanding the multiple pieces of a monitoring program. We will also collect limited samples for educational purposes so that citizens can experience sample collection and learn how data generated from such samples are used in long-term monitoring programs in the region.

If you have any questions or would like to submit information for potential sampling, please call 803-725-2648 or email remop@srel.uga.edu.

EVENTS

Radiation in Our Lives
Monday, September 18, 2017 | 9:30 am | 10:30 am | 1 pm | 6:30 pm

Savannah River Site Citizen’s Advisory Board Meetings
Monday, September 25 & 26, 2017
Courtyard Charleston Historic District, 125 Calhoun Street, Charleston, SC 29401

Environmental Monitoring Programs
Monday, October 16, 2017 | 9:30 am | 10:30 am | 1 pm | 6:30 pm

What is Risk?
Monday, November 27, 2017 | 9:30 am | 10:30 am | 1 pm | 6:30 pm
ACHIEVEMENTS

Environmental Sampling

- Radionuclide Analyses of Samples
  - 17 Radionuclides Surveyed 24 times in Air
  - 38 Radionuclides Surveyed in 9 Fruit & 10 Meat Samples
  - 7 Radionuclides Surveyed in 10 Milk Samples
  - 36 Radionuclides Surveyed in 10 Soil Samples
  - 37 Radionuclides Surveyed in 10 Surface Water Samples
  - 38 Radionuclides Surveyed in 10 Vegetable samples

- Historical Data
  - SRS – Summarized Data From 2005-2015
  - SCDHEC – Summarized Data From 2006-2017
  - VOGTLE – Summarized Data From 2005-2016
ACHIEVEMENTS

Environmental Sampling

- Heavy Metals Analyses of Samples
  - 23 Heavy Metals Surveyed in 7 Fruit Samples
  - 23 Heavy Metals Surveyed in 10 Meat Samples
  - 23 Heavy Metals Surveyed in 10 Milk Samples
  - 23 Heavy Metals Surveyed in 10 Soil Samples
  - 23 Heavy Metals Surveyed in 10 Surface Water Samples
  - 23 Heavy Metals Surveyed in 10 Vegetable samples
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Some Lessons Learned

- Outreach and Education
  - Engage the Community Where it Lives
  - Work with Local Partners
  - Put Your Effort Where it is Most Effective

- Environmental Monitoring Data
  - Difficult to Collect and Expensive to Analyze
  - Data Directly Influenced by Sample Type and Methods Used

- Environmental Monitoring Programs
  - Data Not Easily Comparable Across Programs
  - Differing Media Collected
  - Differing Sample Types, Volumes, and Analytical Methods
  - Differing Data Management Methods
Opportunities for FY22

1. Pursuing Land Lease Near Conference Center
2. New UGA Involvement with SRNL
3. Addition of 5 New Faculty Lines to SREL Through UGA Hiring Campus Initiatives (4 in FY23, 1 in FY24)
4. New Cooperative Agreement Initiated FY22-FY26
5. Continued Development of Core Missions on the SRS:
   a) Radioecology and Low Dose Radiation Effects
   b) Metal and Radionuclide Ecotoxicology
   c) Radionuclide Fate and Transport Studies
   d) Enhanced Biomonitoring Technologies
   e) Outreach and Education Programs
Challenges for FY22

1. Funding Environment for External Grants and Contracts
2. Long Term Stability of SREL Model
3. Administrative Burden at Current Staff Levels
4. Staff Turnover
5. Additional Resources to Fulfill NERP Mission on SRS
6. Graduate and Undergraduate Housing Needs**

** Working with DOE and SRNL to try and acquire funding to support this need