Presentation to the Savannah River Site Citizens Advisory Board

Savannah River Ecology Laboratory (SREL) FY16 Update

January 24, 2017

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 2017
- Emerging Missions For Fiscal Year 2017

Consistent with the Facilities Disposition and Site Remediation Committee's 2016 Work Plan
<table>
<thead>
<tr>
<th>Acronyms</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACP</td>
<td>Area Closure Project</td>
</tr>
<tr>
<td>DOE</td>
<td>Department of Energy</td>
</tr>
<tr>
<td>DOE-HQ</td>
<td>Department of Energy – Headquarters</td>
</tr>
<tr>
<td>DOE-SR</td>
<td>Department of Energy – Savannah River</td>
</tr>
<tr>
<td>ERDA</td>
<td>U.S. Energy Research and Development Administration</td>
</tr>
<tr>
<td>HVAC</td>
<td>Heating, Ventilation and Air Conditioning</td>
</tr>
<tr>
<td>NNSA</td>
<td>National Nuclear Security Administration</td>
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<tr>
<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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<tr>
<td>SRR</td>
<td>Savannah River Remediation</td>
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<tr>
<td>SRS</td>
<td>Savannah River Site</td>
</tr>
<tr>
<td>UGA</td>
<td>University of Georgia</td>
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<tr>
<td>USACE</td>
<td>U.S. Army Corps of Engineers</td>
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<tr>
<td>USDA</td>
<td>U.S. Department of Agriculture</td>
</tr>
<tr>
<td>USFS-SR</td>
<td>U.S. Forest Service – Savannah River</td>
</tr>
</tbody>
</table>
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

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

- >3380 peer-reviewed scientific publications to date
- 64 books
SREL Education Program

Education Programs

- >400 theses and dissertations
  - 198 M.S.
  - 223 Ph.D.

- SREL graduate students have received more than 125 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 FY16, SREL reached ~ 39,000 people by providing:

- 310 talks
- 31 public tours
- 20 exhibits at local or regional events, and
- 45 “Ecologist for a Day” programs for local schools
SREL in FY16

**UGA Employees**
- Research Faculty – 5
- Tenure Track Faculty - 7
- Post Docs – 7
- Outreach - 6
- Res. Professional - 9
- Research Support - 19
- Graduate Students - 25
- Undergraduates - 13
- Admin & Support - 17

**Facilities & Research Areas**
- A-Area (laboratories, equipment, offices, animal care, storage)
- Par Pond (low-dose facility)
- 30 DOE Set-Asides
- 75 field research sites

**103 Staff & Students**
Disciplinary Expertise

- Aquatic and Terrestrial Ecology
- Geology / Soil Science
- Environmental Microbiology
- Hydrology
- Molecular Biology
- Environmental Chemistry
- Radiation Ecology
- Ecotoxicology and Risk Assessment
- Wildlife Ecology

Current Research Areas

- Characterization and Effects
- Ecological and Health Risks
- Remediation and Restoration
Significant Events in FY16

- **UGA**
  - Allowed majority (66%) of the 30% Indirect Costs to be retained by SREL
  - Cost-Shared 6 faculty positions with SREL
  - Provided over 70K in new 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 **new 5-year Cooperative Agreement**
  - Funding provided by DOE – National Nuclear Security Administration (NNSA) for Mixed Oxide Fuel Fabrication Facility and Tritium related research
  - Continued project funding from Area Closure Project (ACP) and Savannah River Remediation (SRR)
  - 1.9 million in external funding from non-SRS sources leveraged
Advancements in FY16

1. Work scope:

   Research Set-Asides, Site Use Permitting
   Enacted significant land management activities for set asides

   Graduate and Undergraduate Education Programs
   Advised 47 graduate students and hosted 13 undergrads in new NSF funded Research Experience for Undergraduates Program in Radioecology
   Hosted a total of over 84 graduate students conducting research on SRS
   Taught 1 course on main UGA campus and 3 at SREL

   General Public Outreach and Education Programs
   Conducted over 400 public outreach events reaching >39,000 people

   Interdisciplinary Research
   Initiated collaborative research programs with Savannah River National Laboratory (SRNL), U.S. Forest Service–Savannah River (USFS-SR), UGA, U.S. Department of Agriculture (USDA), 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
Advancements in FY16

1. Work scope: Continued

Site-wide Source of Ecological Expertise

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

Scientific Expertise

Added New faculty in Epigenetics and Disease Ecology

International Leadership

Hosted international workshop on the Integration of Ecosystem Science into Radioecology

along with the International Union of Radioecology and the US Association of Ecosystem Research Centers – over 60 attendees

Scientific Productivity

SREL staff and students published over 100 scientific articles and gave over 175 scientific presentations in FY16
Advancements in FY16

2. Facilities:

Main SREL facilities

- Major repairs, paint, carpet and lab renovations
- Updated major HVAC systems
- Remodeled 10 laboratories

Par Pond Radioecology Lab

- Updated HVAC and carpet

3. Scientific Equipment:

- Analytical equipment purchases to enhance research on contaminants of soil, water, and biological materials
- Significant upgrades to equipment related to radioecology and wildlife research
Opportunities for FY17

1. Continued growth in graduate student enrollment
2. Continued growth in undergrad experiential learning
3. Continued growth in scholarly productivity
4. Continued investments in equipment & facilities
5. Development of new missions and roles on the SRS:
   a) Radioecology and Low Dose Radiation Effects
   b) Feral Swine Control on SRS
   c) Metal and Radionuclide Ecotoxicology
   d) Environmental Justice
Enhance Graduate Training Using SRS as a Living Laboratory
Low Dose Radiation Surveillance and Monitoring Research and Development

DNA molecule → DNA micro array → protein

ecosystem → organisms
Next Generation Radioecology
Research on Wild Pig Movement, Behavior and Contaminants
Outreach and Monitoring for Local Communities

Environmental Justice
SREL Radionuclide Education, Monitoring and Outreach Program (REMOP)

WHERE:
Shell Bluff Georgia

WHO:
DOE (Funder)
SREL (Outreach and Monitoring)
GA WAND (Facilitate Communication to Local Residents)

WHEN:
January 2017- December 2019
Goal:
To utilize radionuclide and metals data collected within the local community of Shell Bluff to inform outreach and education efforts on radionuclide monitoring programs and risks designed for delivery to local residents.

*** NOT A NEW MONITORING PROGRAM***
SREL Radionuclide Education, Monitoring and Outreach Program (REMOP)

**Summary Details:**

1. Three year project
2. Pre-Post surveys of residents
3. Community participation in selection of sites and media
4. Review of existing monitoring program data from DOE, SCDHEC, and Vogtle for comparative purposes
5. Development of outreach programing to help residents interpret data and gain perspective on risk
SREL Radionuclide Education, Monitoring and Outreach Program (REMOP)

Current Activities:

1. Postdoc Hired and on Site
2. Outreach Coordinator Hired and on Site
3. Coordinating with EPA Needs Assessment for Community
4. Targeting Initial Community Engagement February 2017
5. Targeting Initial Sample Collection Beginning June 2017
<table>
<thead>
<tr>
<th>Sample Type</th>
<th>Radionuclides</th>
<th>Annual Frequency</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Environmental</strong></td>
<td>(Locations:Sites:Samples)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air (filter)</td>
<td>8 spectrometry, gross alpha/beta</td>
<td>Biweekly (1:1:24)</td>
<td>24</td>
</tr>
<tr>
<td>Air (filter)</td>
<td>Sr-89/90, actinides, Tc-99</td>
<td>Quarterly (1:1:4)</td>
<td>4</td>
</tr>
<tr>
<td>Air (charcoal)</td>
<td>8 spectrometry, $^{131}$I</td>
<td>Quarterly (1:1:4)</td>
<td>4</td>
</tr>
<tr>
<td>Air (silica gel)</td>
<td>H-3</td>
<td>Monthly (1:1:12)</td>
<td>12</td>
</tr>
<tr>
<td>Rainwater</td>
<td>H-3</td>
<td>Monthly (1:1:12)</td>
<td>12</td>
</tr>
<tr>
<td>Rain Ion Column</td>
<td>8 spectrometry, gross alpha/beta, Sr-89/90, actinides, Tc-99, $^{129}$I</td>
<td>Monthly (1:1:12)</td>
<td>12</td>
</tr>
<tr>
<td>Groundwater</td>
<td>H-3</td>
<td>Quarterly (1:5:4)</td>
<td>20</td>
</tr>
<tr>
<td><strong>Fresh Foods</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruits</td>
<td>H-3, 8 spectrometry, Am-241, Cu-244, Np-237, Tc-99, Pu-238/239, Sr-89/90, U-234/235/238</td>
<td>Annual (1:5:2)</td>
<td>10</td>
</tr>
<tr>
<td>Vegetables</td>
<td>H-3, 8 spectrometry, Am-241, Cu-244, Np-237, Tc-99, Pu-238/239, Sr-89/90, U-234/235/238</td>
<td>Annual (1:5:2)</td>
<td>10</td>
</tr>
<tr>
<td>Meat</td>
<td>H-3, 8 spectrometry, Am-241, Cu-244, Np-237, Tc-99, Pu-238/239, Sr-89/90, U-234/235/238</td>
<td>Annual (1:5:2)</td>
<td>10</td>
</tr>
<tr>
<td>Milk -Cow</td>
<td>H-3, 8 spectrometry, Am-241, Cu-244, Np-237, Tc-99, Pu-238/239, Sr-89/90, U-234/235/238, $^{131}$I</td>
<td>Annual (1:5:2)</td>
<td>10</td>
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</tbody>
</table>
## Heavy Metals

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>METALS</th>
<th>Annual Frequency</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental</td>
<td>(Location: Sites: Samples)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil</td>
<td>Total Mercury, Methyl Mercury, ~20 metals</td>
<td>Annual (1:12:2)</td>
<td>24</td>
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<tr>
<td>Surface Water</td>
<td>Total Mercury, Methyl Mercury, ~20 metals</td>
<td>Annual (1:12:2)</td>
<td>24</td>
</tr>
<tr>
<td>Groundwater</td>
<td>Total Mercury, Methyl Mercury, ~20 metals</td>
<td>Annual (1:12:2)</td>
<td>24</td>
</tr>
<tr>
<td>Fresh Foods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruits</td>
<td>Total Mercury, Methyl Mercury, ~20 metals</td>
<td>Annual (1:12:2)</td>
<td>24</td>
</tr>
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<td>Total Mercury, Methyl Mercury, ~20 metals</td>
<td>Annual (1:12:2)</td>
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</tr>
<tr>
<td>Meat</td>
<td>Total Mercury, Methyl Mercury, ~20 metals</td>
<td>Annual (1:12:2)</td>
<td>24</td>
</tr>
<tr>
<td>Milk -Cow</td>
<td>Total Mercury, Methyl Mercury, ~20 metals</td>
<td>Annual (1:12:2)</td>
<td>24</td>
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<tr>
<td>Milk -Goat</td>
<td>Total Mercury, Methyl Mercury, ~20 metals</td>
<td>Annual (1:12:2)</td>
<td>24</td>
</tr>
</tbody>
</table>
THANK YOU