Project Name: SR-F Area D-Bio, D&D Plan, Stk Hght Red-D&D-R

**Project Name (Expanded)**
Savannah River ARRA F Area Deactivation Basis for Interim Operation, D&D Plan, and Stack Height Reduction D&D [A combination of activities, including creation of a DBIO for deactivation of several mothballed nuclear facilities, minor deactivation, and partial stack removal]

**Project Type:** Building / Facility D&D Project Type

**Building Type:** B Typ 2

**Project Type Detail:** Generic Radiological Facility(ies)-Extensive Loose Contamination

**Supplementary Reference Documents**
30.3.1.03 F Area D-Bio, D&D Plan [Completion Description Document]

**Site Context:**
All ARRA Projects are specific EM projects developed and executed between 2008 and 2011 in response to the American Reinvestment and Recovery Act. These projects were based on a total of 106 ARRA “Subprojects”, 77 managed by the SRS M&O Contractor (Savannah River Nuclear Solutions, LLC) and 39 managed by the Liquid Waste Program contractor (Savannah River Remediation, LLC), at a total cost of over $1.1B. The projects exist within larger ongoing site operations, depend on those larger elements for site services and support, and typically include costs for those services as indirect costs.

The historical Savannah River Site mission was to reprocess reactor core material to produce plutonium for nuclear weapons, enriched uranium for weapons and military and commercial use, and numerous specialty isotopes such as 238Pu for thermoelectric generators. It covers 300 square miles, and its ongoing mission is storage of weapons-grade plutonium, recovery of tritium from weapons, processing and downblending of enriched uranium materials, construction and operation of a mixed uranium-plutonium oxide nuclear reactor fuel production plant, remediation contamination due to past production activities, and management of wastes from both current processing and remediation activities.

The two major activities associated with the DOE-EM mission are the facility decommissioning, environmental cleanup, and transuranic and solid waste management performed by the M&O, and the vitrification/stabilization of high-level waste held in large below-ground tanks by the Liquid Waste Program contractor. The SRS EM ARRA scope has been divided into three ECAS Level 4 Parent Projects based on the SRS organizational and PBS groupings: Transuranic/Solid Waste Management (PBS SR-0011C and SR-0013), Area Completion Projects (PBS SR-0030 and SR-0040C), and Liquid Waste Program (SR-0014C).

**ECAS Level 4/Parent Project Context:**
The Area Completion Projects (ACP) ARRA Projects Parent Project grouping includes the ARRA ECAS projects shown in the list below. These projects are administered under the SRNS ACP and include decommissioning of facilities (preparation, deactivation, and demolition), remediation of environmental media, and surveillance and maintenance of facilities and areas. There were several ACP ARRA projects that were excluded from the ECAS database pending development of additional data and/or project completion.
- SR-710 B Decommissioning-D&D-R
**Project Name:** SR-F Area D-Bio,D&D Plan,Stk Hght Red-D&D-R

- SR-A Area 53-D&D-R
- SR-C Area Cask Car Railroad Tracks-ER-R
- SR-D Area Bubble Tower Soil Remediation-ER-R
- SR-D Area CPRB D006 Soil Remed-ER-R
- SR-D Area Fac Concrete Soil Detritiation-ER-R
- SR-Decomm Inactive 105-P-D&D-R
- SR-Decomm Inactive 105-R-D&D-R
- SR-ECODSB3/B5 Remedial Action-ER-R
- SR-F Area D-Bio,D&D Plan,Stk Hght Red-D&D-R
- SR-Gunsite 012 Rem Action Construction-ER-R
- SR-H Area (CIF Characterization)-D&D-R
- SR-HWCTR (770-U) Decommissioning-D&D-R
- SR-Inactive Facilities S&M-D&D-R
- SR-K Area 185-3K Cooling Tower D&D-R
- SR-M Area Remedial Action-ER-R
- SR-P Area Cask Car RR Tracks Remedial-ER-R
- SR-P Area Groundwater Remedial Action-ER-R
- SR-P Area P-007 Outfall Remedial Act-ER-R
- SR-P Area Process Swr Lines Remed Act-ER-R
- SR-P Area PSA-3A & 3B Remedial Act-ER-R
- SR-P Area Regulatory Documents-ER-R
- SR-P Area Site Restoration-ER-R
- SR-PAR Pond Facilities-D&D-R
- SR-R Area Cask Car RR Tracks Remedial-ER-R
- SR-R Area Groundwater Remedial Action-ER-R
- SR-R Area North of 105-R Remed Act-ER-R
- SR-R Area Process Swr Lines Remedl Act-ER-R
- SR-R Area Regulatory Documents-ER-R
- SR-R Area Site Restoration-ER-R
- SR-R Discharge Canal & LTR Char-ER-R
- SR-Remediate Inactive P Ash Basin-ER-R
- SR-Remediate Inactive R Ash Basin-ER-R
- SR-SATA Remediation & Decommm-ER-R

### D&D Facility Data:

#### Facilities:

<table>
<thead>
<tr>
<th>Building</th>
<th>Title</th>
<th>Area (SF)</th>
<th>In-Service Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>235-F</td>
<td>Metallurgical Building</td>
<td>48,320</td>
<td>1954</td>
</tr>
<tr>
<td>221-1F</td>
<td>A-Line Facility</td>
<td>12,479</td>
<td>1954</td>
</tr>
<tr>
<td>293-F</td>
<td>Metallurgical Building Stack</td>
<td>77</td>
<td>1952</td>
</tr>
<tr>
<td>607-1F</td>
<td>Sewage Treatment Plant</td>
<td>TBD</td>
<td>1954</td>
</tr>
</tbody>
</table>

#### Construction Details:
The 235-F Metallurgical Building is an old nuclear facility with concrete shear wall construction;
Project Name: SR-F Area D-Bio,D&D Plan,Stk Hght Red-D&D-R

an in-ground sand filter separates the building proper from the stack; the stack is a standard 77’ high concrete stack 7’2” at the base. 607-1F is an inactive sewage treatment plant, and includes a tank and in ground basins (not enclosed); with no buildings no GSF is identified.

The 221-1F A-Line facility consists of a 12,479 square foot main structure with four-stories and three outside concrete pads (aprons) containing associated process equipment. The A-Line facility has reinforced concrete framed exterior walls with flat cement asbestos board on a steel frame. Supporting the structure is a reinforced concrete foundation and a basement with spread footings. There are two sumps in the basement and five sumps in the concrete aprons. The scope of the project also includes 727-F, a 15’ x 15’ storage building located adjacent to the concrete pad south of A-Line. This building is on a concrete pad with no sumps.

Facility Use:
The F-Area, built around the 221-F purex separations canyon, was originally built up in the 1950s to support the separation on plutonium from the spent reactor fuel. 235-F housed the Plutonium Fuel Form Facility (PuFF) which fabricated thermoelectric generators from Plutonium-238. Construction of PuFF began in October 1973 and was completed in mid-July 1977. In total, nine cells were fabricated for the production of General Purpose Heat Sources (GPHS’s) which included facilities to operate the process which started with oxide powder and produced encapsulated heat sources. Production of iridium-encapsulated 100-W Pu-238 spheres for multi-hundred watt RTGs commenced in 1978 and was completed in April 1980. In June 1980, production of the 62.5-W GPHSs for NASA’s Galileo and Ulysses missions began. By December 1983, all heat source production was completed for these missions. The last heat sources were shipped off-site in February 1984 for final assembly. During production, PuFF processed approximately 165 kg of Pu-238. When production was completed, the PuFF facility was placed in standby mode. It was expected that once new fuel clad requirements were identified, fuel clad production could be restarted quickly and at minimal cost. For this reason, and because the hot cell design made cleanup difficult without dismantling the facility, only a limited effort was undertaken to decontaminate the process cells, and an indeterminate amount of Pu-238 oxide powder was left in the cells. Projected new fuel clad requirements did not materialize, and the facility was left in standby. As staffing and budgetary limitations became acute, cell equipment and the maintenance program deteriorated. After 1985, with facility conditions continuing to deteriorate, neither the program office, SR, nor the contractor revisited their original decision for limited cell decontamination.

Building 221-1F (also known as A-Line) is located adjacent to and southeast of F-Canyon in F-Area of the SRS. Previously, F-Canyon discharged uranyl nitrate solutions to A-Line, and A-Line converted the solutions to (depleted) uranium trioxide powder for long-term storage in drums elsewhere at SRS. A-Line has a footprint of approximately 12,500 square feet over three main floors and an extensive yard with multiple vessels and extensive piping systems.

A-Line was built in the early 50’s and operated more or less continuously through the early 1990’s when it was shut down. A-Line then entered a period of surveillance and maintenance until approximately 2002, when it was initially deactivated concurrent with F-Canyon deactivation.
During the initial deactivation (Phase 1) from 2002 to 2005, typical deactivation activities were completed including the de-inventory of chemicals and solutions and the flushing of piping and process vessels. Based on the Phase 1 deactivation, piping was believed to be flushed and drained. During subsequent deactivation initiated in 2006 (Phase II), SRS expected to encounter only minor quantities of fluid. For piping formerly containing nitric acid, SRS expected only mildly acidic fluids. The intent of the Phase II deactivation was to further reduce hazards in the facility. Phase II deactivation included the following example deactivation end points:

- Formal mechanical isolation of A-Line that included draining of piping and local air gapping of the piping
- Extensive equipment dismantlement and removal (further de-inventory of piping and vessels that would result in a facility downgrade (“nuclear” reduced to “radiological” or “other industrial”).

The facilities associated with this project have been surplus to the mission for a number of years, being maintained under a nuclear facility surveillance and maintenance/non-operational condition. The hazards classifications of the facilities covered by the BIO are as follows: Metallurgical Bldg (235-F) and its associated Sandfilter are HAZCAT II Facilities. Stack (293-F) and Fan House are HAZCAT III Facilities. Although these facilities, if D&D’d, would be considered ECAS Type 3 facilities (i.e., nuclear facilities) and still contain significant inventory, because the actual work performed under this ARRA activity does not perform significant dismantlement of contaminated equipment typically associated with the D&D of nuclear facilities the ECAS Project is considered Type 2.

Processes causing contamination:
See above.

Contaminants of concern (including extent of contamination by major contaminant):

<table>
<thead>
<tr>
<th>Building</th>
<th>Chemical Hazard</th>
<th>Location/Extent</th>
<th>Radiological Hazard</th>
<th>Location/Extent</th>
</tr>
</thead>
<tbody>
<tr>
<td>235-F</td>
<td>Asbestos, Lead, hydraulic oils, and PCBs</td>
<td>Multiple, including roofing material, and insulation for piping elbows and a furnace</td>
<td>Substantial quantities of Pu-238</td>
<td>Hot cell areas, general area contamination, HVAC systems</td>
</tr>
<tr>
<td>221-1F</td>
<td>Asbestos, Nitric and other acids, hydraulic oils, and PCBs</td>
<td>Multiple, including roofing material, and insulation for piping elbows and a furnace</td>
<td>Substantial contamination, principally uranium with some fission products</td>
<td>Vault areas, process areas</td>
</tr>
</tbody>
</table>

D&D Project Execution
Site WBS Organization within the ECAS Project Scope:
Major facilities slated for deactivation in the F-Area were the F-Area Materials storage (FAMS) Facility, 235-F (Metallurgical Building), the 221-1F A-Line Facility, 293-F (Metallurgical Building Stack), and Building 607-1F (Sewage Treatment Plant). A new safety basis entitled the Deactivation Basis for Interim Operation (DBIO) is required to perform deactivation. This document was drafted and then placed on hold. The 221-1F A-Line Facility was removed from the American Reinvestment and Recovery Act (ARRA) scope; however, the area was cleaned up and demobilized. The 293-F stack is located within thirty feet of the 235-F facility. The stack was not seismically qualified and posed a nuclear risk to the 235-F Facility. Through ARRA
funding, the 293-F stack height was reduced from 75 feet high to less than 30 feet (SRNS 2010a). Additionally, funding was utilized for initial planning documentation, field walkdowns, and for monitoring and surveillance of the abandoned 607-1F Sewage Treatment Plant.

Methods of execution:
Management: The scope was planned, managed, and executed as a single element. Management included technical and project oversight, planning, project controls, and quality assurance.

Regulatory: The project was performed in accordance with the requirements of the SRS Federal Facility Agreement.

Physical Approach: The project activities were as follows:
- One principal effort was to develop the decommissioning BIO (risk assessment documentation) that would allow the remaining deactivation/decommissioning of the two nuclear facilities
- Significant effort was spent for deactivation of various areas, specifically for removing liquids from 221-1F
- Certain ancillary facilities and structures were removed

Technologies: Standard hot tapping of lines and demolition of small facilities and structures

Activities self-performed:
- All management and key technical positions along with a portion of the technical staff
- Waste management and disposal
- Used significant professional services contracted (i.e., seconded) labor inter-mixed with prime contractor staff
- Deactivation of liquid lines

Activities subcontracted:
- Demolition of ancillary facilities

Issues that impacted the project:
- During the draining of contaminated nitric acid a hot tap failed and spilled nitric acid on several workers shutting down the operation and causing significant loss of productivity.

Scope Growth:
No identified scope growth

Notes Regarding Use of Data
- This project is an amalgam of minor D&D activities and the safety basis documentation for a major nuclear facility; it will be difficult to compare it to other projects.