



U.S. DEPARTMENT OF
ENERGY



Overview and Status Update of the Savannah River Site Building 235-F Risk Reduction Project

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Purpose

- Provide an overview of Building 235-F and the ongoing Risk Reduction Activities



Building 235-F

- Building 235-F was part of the original construction at the Savannah River Site (SRS) in the early 1950s.
- The facility is a blast-resistant, windowless, two-story, reinforced concrete structure about 222 feet long, 109 feet wide, and 28 feet high with walls 14 inches thick. It is located in SRS's F Area, near F Canyon.



Early Construction



Aerial Photograph

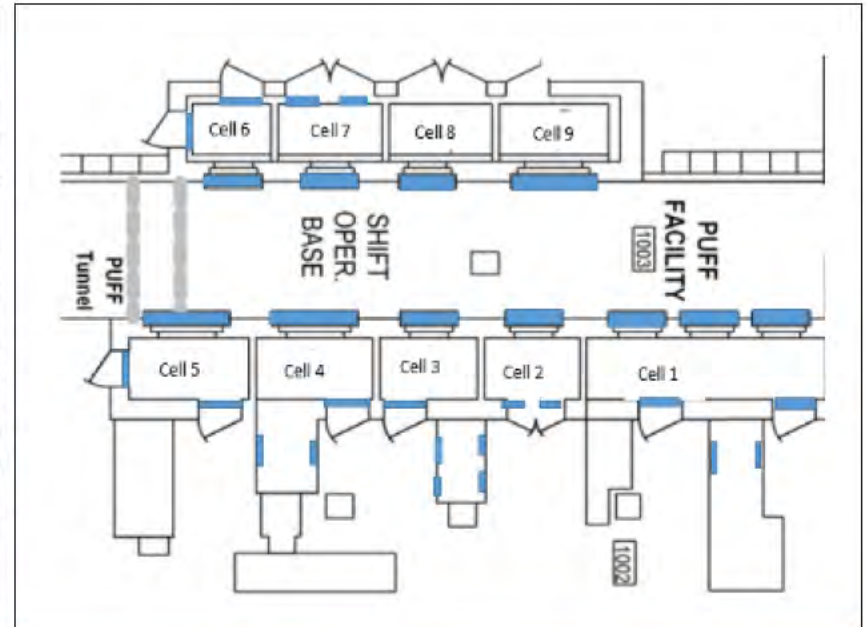
Missions

It has had several production missions throughout its operational life:

- **Original mission was “C-Line”.** C-Line was to take Pu 239 metal and make triggers. However, the mission was cancelled before any equipment was installed. Following cancellation, the building was reconfigured for other missions.
- The first mission was the Actinide Billet Line (ABL). This line produced special billets containing Np-237 for irradiation in SRS reactors.
- The next mission was the Plutonium Experimental Facility (PEF) and the Plutonium Fuel Form (PuFF) Facility including the Metallography Laboratory (ML)
- **In the mid 1970’s the building was again reconfigured. ABL was truncated and** what is present day PuFF was built to include Cells 1 – 5 (east line), Cells 6 – 9 (west line), as well as, east and west maintenance rooms.
- All metallurgical processes within the building were shut down by 1990.
- The final mission was receipt, storage and disbursement of plutonium-bearing materials in support of SRS and the DOE complex. In 2006, the storage vaults for nuclear materials were emptied and the building was placed in a surveillance and maintenance mode.

PuFF

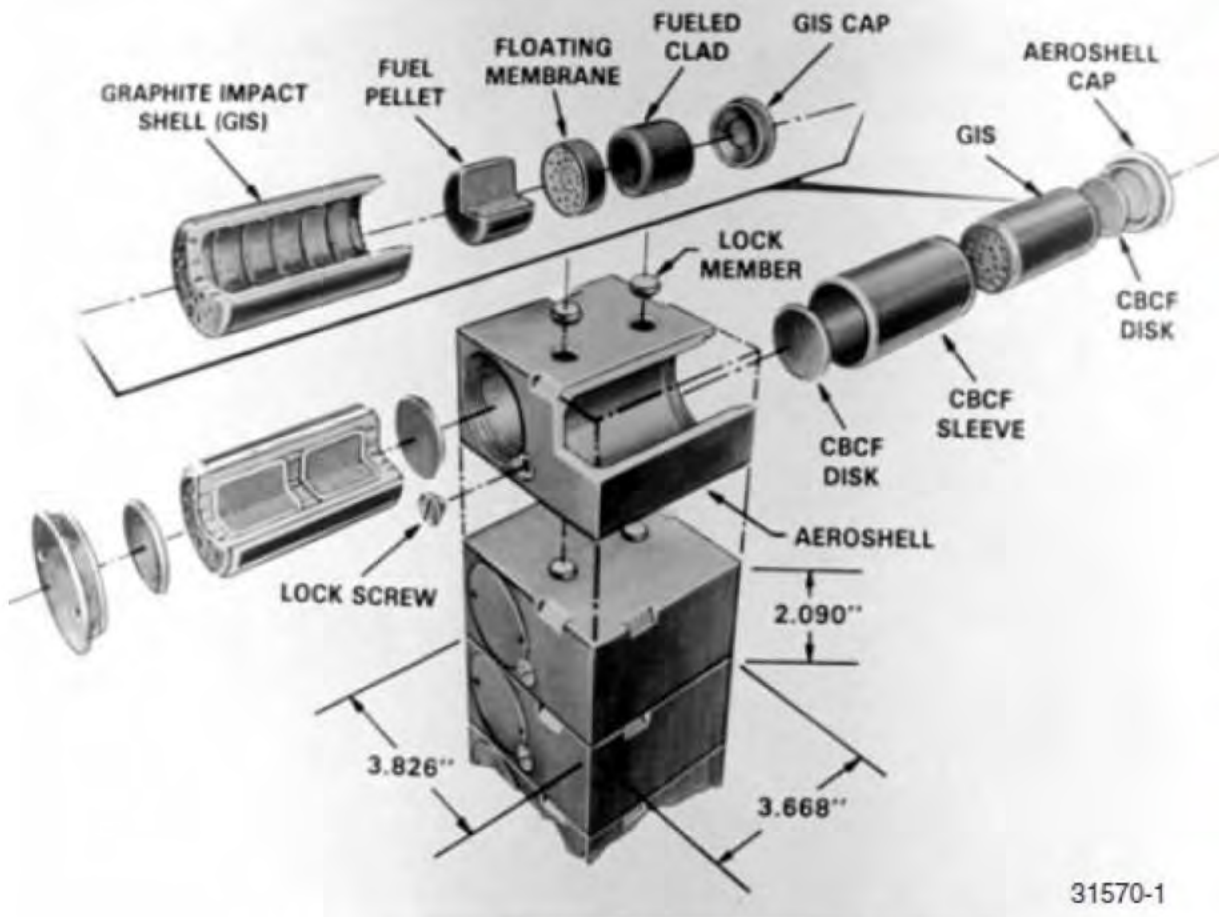
- The Np-237 billets from ABL were irradiated in SRS reactors to produce Pu-238. The reactor products were processed in H-Canyon/HB-Line and the Pu-238 separated, packaged and sent to PuFF.
- The Pu-238 was introduced into PuFF through the Cell 1 Wing Cabinet
- Processed through PuFF from Cell 1 to Cell 9. Emerged as an encapsulated pellet of Pu-238 for use in construction of Radioisotope Thermoelectric Generators (RTG).



Products



Products - continued



Assembly of SRS $^{238}\text{PuO}_2$ pellets into
General Purpose Heat Source module



Space Mission



Pu-238 Pellet

Risk Reduction

- **At the conclusion of the PuFF Mission, work just stopped.**
 - Facility deactivation did not occur
- **Residual material in the nine PuFF Cells was last measured in 2006.**
- **About 1.5 kilograms of Pu-238 material remains in the cells.**
- **In a seismically induced full facility fire accident scenario the calculated unmitigated dose is about 11,900 rem onsite and 14.3 rem offsite.**
- **The 235-F Building is currently maintained safely in surveillance and maintenance mode.**
- **The project objective is to reduce the unmitigated onsite dose to less than 100 rem by reducing Pu-238 levels within PuFF.**



Shift Operation Base - Before



Shift Operation Base - Current

Cells 1 and 2

- **Cells Function**

- Introduced Pu 238 into PuFF Cell Line
- Used Oxygen Exchange Furnace to enrich O-16 content
- Material ball milled to extremely fine particles
- Cold pressed to resize oxide particles
- Cells 1 through 5 maintained in Argon atmosphere



Cell 3

- **Cell Function**
 - No processing occurred in this cell



Cell 4

- **Cell Function**

- Oxide particles high fired (1600°C) or low fired (1200°C)
- Mixed 60/40 (low fire/high fire) and pressed into spheres/pellets
- 1978 to 1980, 250g spheres; 1980 forward, 150g pellet



Cell 5

- **Cell Function**

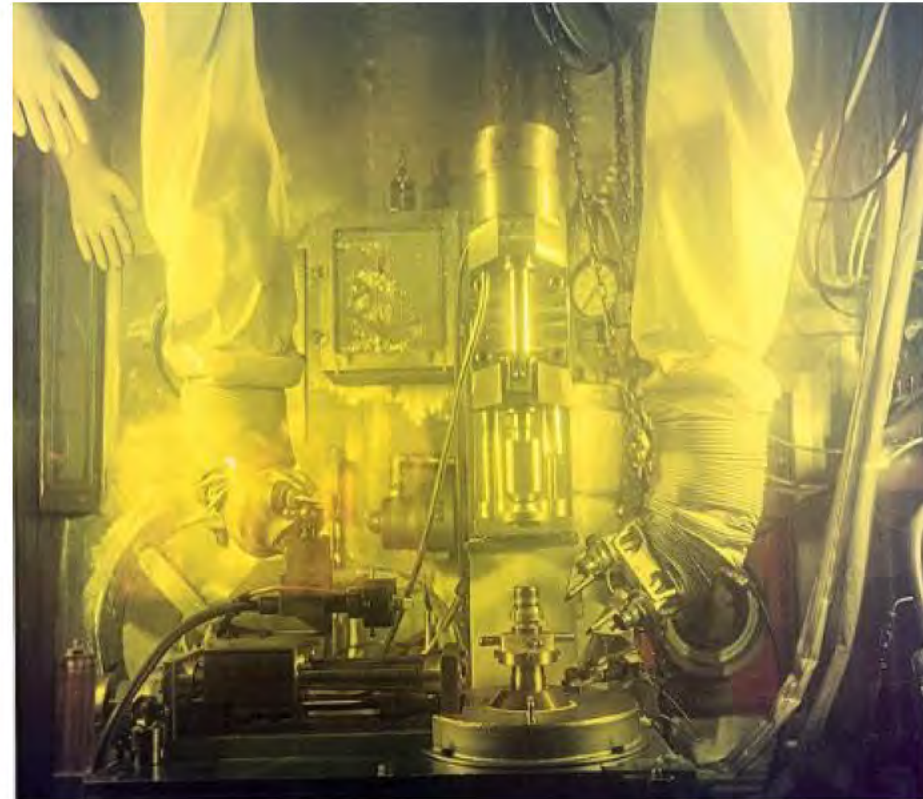
- Spheres/pellets transported to Cell 6 using an under-floor belt transfer device



Cell 6

- **Cell Function**

- Operated with a Helium atmosphere during Tungsten Inert Gas welding
- Sphere/pellet was placed into an iridium metal shell and welded



Cell 7

- **Cell Function**

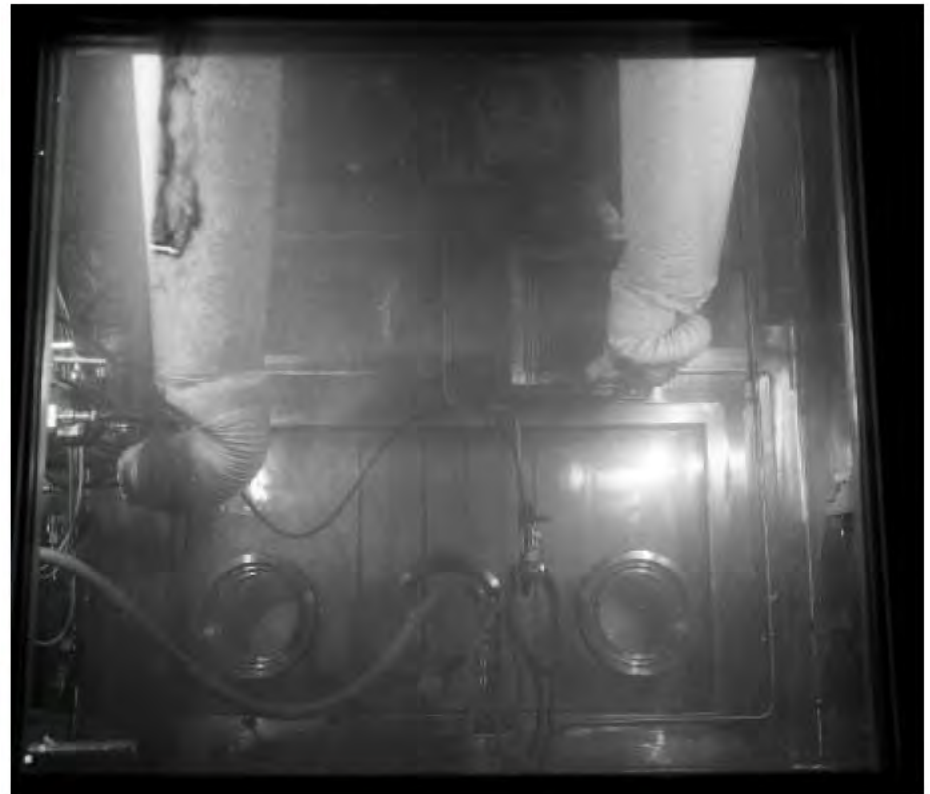
- Primarily used to decontaminate encapsulated sphere/pellet



Cell 8

- **Cell Function**

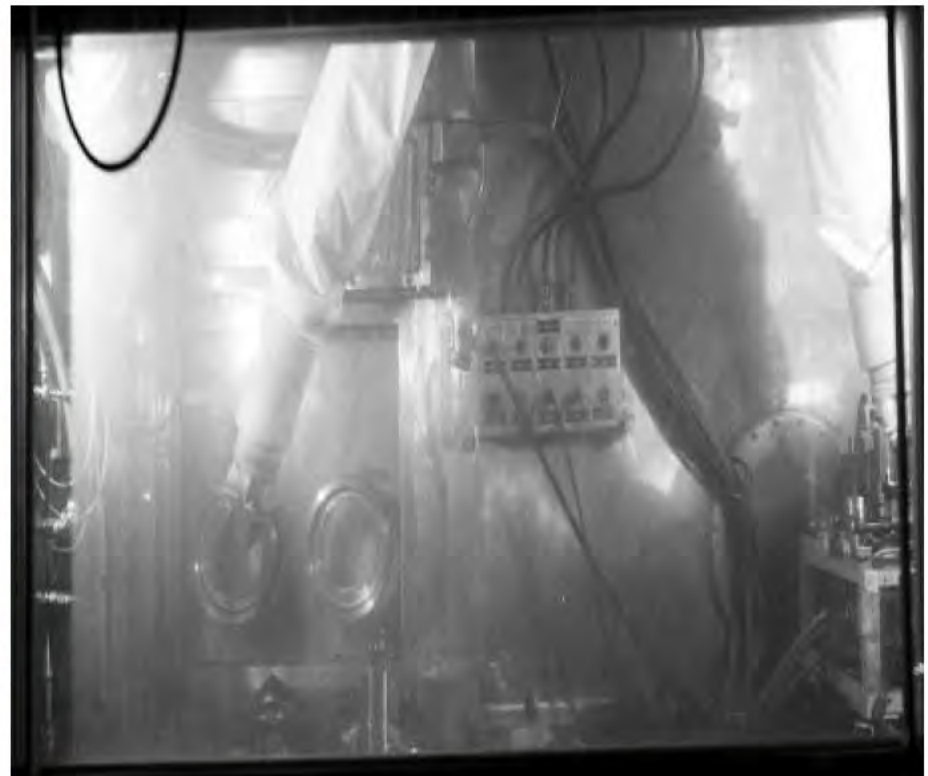
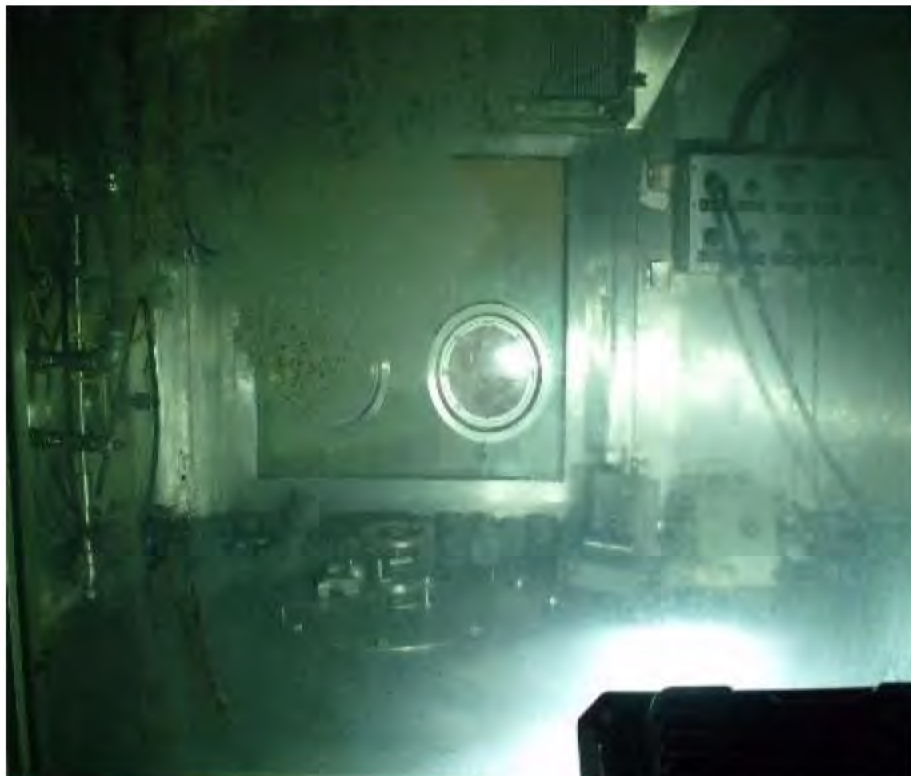
- Primarily used to decontaminate encapsulated sphere/pellet



Cell 9

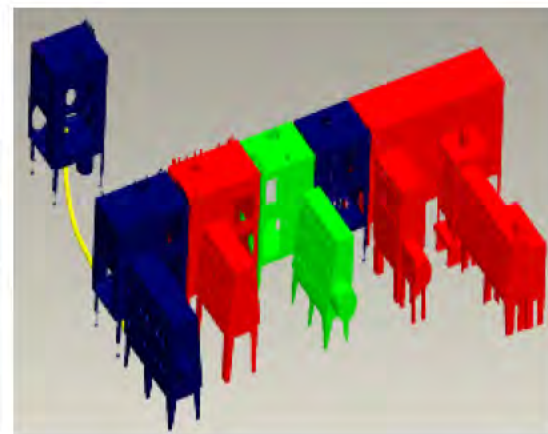
- **Cell Function**

- Leak testing of encapsulated sphere/pellet
- Material exited PuFF process cell line via an air lock
- Subsequently placed into shipping containers



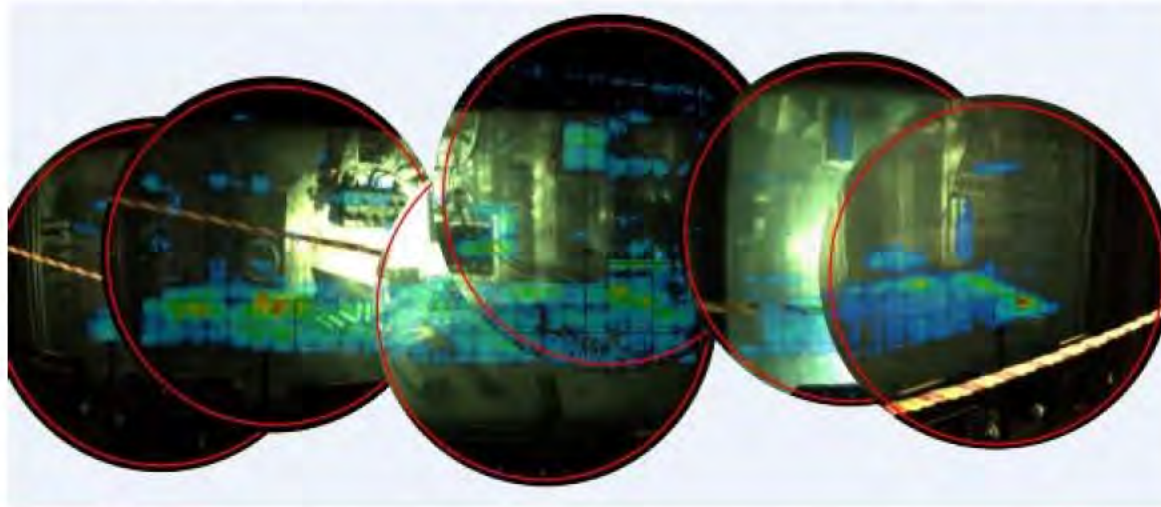
Work Completed to Date

- Transient combustibles removed from the building and control program established.
- Fixed combustibles encapsulated or isolated
- De-energized electrical circuits not needed for deactivation
- Fire Detection and Alarm System installed
- Selected deactivation team based on past experience working in high hazard environments
- Developed procedures and training to support material removal from PuFF cells and wing cabinets



Work Completed to Date - continued

- Revised and implemented Safety Basis Documents to allow work in cells 1-9
- Removed outer windows on cells 1-9 to provide visibility into the PuFF cells and allow characterization to be performed from outside of the cells.
- Performed Enhanced Characterization of PuFF cells and wing cabinets.
- Developed and tested tools to be used for MAR removal including a vacuum that will be used in the cells
- Replaced 235-F process HEPA filters
- Electrically and mechanically isolated cells 1-9 and wing cabinets



Work Planned for FY 2019

- Apply an incombustible fixative inside a PuFF cell for testing and evaluation by SRNL
- Remove material and components from cells 1-5 including the wing cabinets.
- Package and characterize waste for shipment to Solid Waste
- Initiate vacuuming PuFF cells to remove remaining MAR

QUESTIONS???

