

# Facts from the Savannah River Site

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## Plutonium Downblend Process at SRS

### Downblend Process

Plutonium downblending, also referred to as dilute and dispose, is the method used at the Savannah River Site (SRS) to disposition surplus plutonium (Pu). This strategy utilizes an adulterant to dry blend with Pu oxide, producing a mixture that is more secure (not usable for nuclear weapons) and can be safely disposed of at a geologic repository. This strategy has been successfully demonstrated in multiple facilities.

After the material is diluted, it is placed in shipping containers called Criticality Control Overpacks (CCOs) and stored until the containers are characterized in accordance with waste acceptance criteria, packaged, and shipped to the Waste Isolation Pilot Plant (WIPP) in New Mexico.

SRS is currently using downblending to disposition 6 metric tons (MT) of surplus non-pit Pu ("Non-pit" refers to Pu that is not currently in the form of a pit – the central core of a nuclear weapon). In August 2020, the U.S. Department of Energy (DOE) and National Nuclear Security Administration (NNSA) announced plans to use the method to dispose of an additional 7.1 MT of surplus non-pit Pu. DOE and NNSA are continuing to expand operations to downblend these materials at SRS in line with the Department's commitment to continue to process and remove material from the state of South Carolina. NNSA is preparing to initiate an Environmental Impact Statement (EIS) to evaluate disposition alternatives, including downblending, for 34 MT of plutonium.



K Area Complex at the Savannah River Site

### History of Downblend Operations at SRS

In 2012, Savannah River Nuclear Solutions successfully downblended Pu using the HB Line facility. This material was sent to WIPP for final disposition.

DOE resumed downblending, now moved to K Area, in September 2016. Preparations to support shipments to WIPP included revising the facility's safety analysis, developing operational and safety procedures, training personnel, and performing a readiness assessment to demonstrate that the facility's people and equipment are prepared to begin shipping operations.

In 2020, SRS completed a process optimization outage in order to introduce efficiencies to the K Area Interim Surveillance (KIS) glovebox, where downblend operations take place. A glovebox is a stainless-steel enclosure with safety glass panels. It has fitted glove-port openings to allow radioactive materials handling, while isolating workers from associated hazards. The KIS glovebox was put into operation in 2007 and needed to be retrofitted to support the ramping up of the downblend mission.



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The Savannah River Site is owned by the U.S. Department of Energy. Savannah River Nuclear Solutions is the management and operations contractor at the Savannah River Site. Savannah River Remediation is the current liquid waste contractor at the Savannah River Site.

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Some of the improvements included installing new material entry and removal devices for the glovebox; acquiring new tools that allow for tight bag closure to minimize waste generation; designing and fabricating special carts to move the downblend containers through the glovebox; and relocating equipment inside the glovebox to improve efficiency of the downblend process flow. These improvements will support the removal of Pu from the state of South Carolina.

### **Future plans**

Downblending operations have already expanded from one to two shifts and, in the near future, will expand to four full shifts to increase the Pu downblend throughput rate.

SRS is constructing a weather-sheltered concrete pad in K Area to store CCOs of diluted Pu oxide and is installing characterization equipment that will be used to ensure acceptability for WIPP disposal. This construction is expected to be complete in early FY 2021, supporting shipments to WIPP, which are scheduled to resume in FY 2022.

In December 2019, NNSA approved Critical Decision (CD) – 1, Alternative Selection and Cost Range for the Surplus Plutonium Disposition (SPD) Project, which is a capital project that will expand the existing downblending capability in K Area at SRS. The SPD Project will install three new gloveboxes, support systems (i.e. security and safety systems, electrical, piping, active confinement ventilation, fire protection systems, etc.), and construct a HEPA/Electrical Building and ventilation stacks. Both the KIS Glovebox and SPD Project support the SPD Program to remove surplus plutonium from SRS.