

# STARxpress™ for On-Site Treatment of PFAS-Impacted Soil

JOINT BASE ELMENDORF-RICHARDSON, ALASKA



## OVERVIEW

A mobile, rapidly deployable ex situ treatment system (STARxpress) was fabricated in partnership with the Defense Innovation Unit (DIU) and the Environmental Security Technology Certification Program (ESTCP). This system will be mobilized to Joint Base Elmendorf-Richardson (JBER) in Anchorage, Alaska, to treat stockpiled soil impacted with per- and polyfluoroalkyl substances (PFAS) via smoldering combustion.



**IMAGE 1:** STARxpress plant at Savron's Boxwood facility consisting of a control/equipment container (foreground), two 35 m<sup>3</sup> vessels with retractable roofs (one vessel shown to the right, with the roof of other visible behind the control container), and associated connections.

## SYSTEM DESCRIPTION

The STARxpress system consists of two treatment vessels, each with a batch capacity of 35 m<sup>3</sup> (F35s). The F35s contain the heater and air distribution infrastructure required to support smoldering and are designed to fit on a standard tractor trailer (IMAGE 2). Associated auxiliary components (e.g., blowers, system controls, instrumentation) are housed within a standard shipping container for ease of transport and rapid setup on site.



**IMAGE 2:** F35 vessel being offloaded from a truck

## PROJECT OVERVIEW

Stockpiled PFAS-impacted soil (IMAGE 3) will be mixed with small quantities of anthracite and calcium oxide (CaO) and loaded as batches into the two F35s for treatment. Previous work has demonstrated that when smoldering is applied with these amendments, PFAS concentrations are reduced to near or below detection limits and fluorine mass is retained in post-treatment soil as inert calcium fluoride (CaF<sub>2</sub>). Emissions treatment at JBER will include vapor-phase granular activated carbon (GAC) to capture any volatilize fluorinated compounds (PFAS concentrations in the emissions typically <0.2% of initial PFAS mass in soil), which when spent, can be recycled back into the process as an amendment to help treat subsequent batches.

**IMAGES 3:** Stockpiled soil at JBER

Characterization of pre- and post-treatment soil, emissions, and liquid condensate will be completed as part of the initial demonstration phase at JBER. Treatment time is anticipated to be approximately one week per cycle. Each cycle comprises roughly 70 m<sup>3</sup> of soil (using two vessels). Multiple STARxpress systems can be deployed where higher processing rates are required.

## SUMMARY

A STARxpress system will be deployed to JBER in Spring 2024 to demonstrate treatment of stockpiled PFAS-impacted soil. The STARxpress system is designed to meet the following parameters:

- Be mobile and rapidly deployable
- Comprise an energy-efficient, on-site, treatment option for PFAS-impacted soil and spent media
- Destroy PFAS, leaving minimal residuals after treatment

