



Districts dig up success in soil cleanup

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Louisville District

From cost-savings to community partnership, the multi-district U.S. Army Corps of Engineers remediation project at Plum Brook Ordnance Works in Sandusky, Ohio, demonstrates what teamwork is all about.

The formerly used defense site (FUDS) manufactured explosives in support of the war effort during World War II. TNT Area C was one of three TNT manufacturing areas at PBOW and is currently undergoing soil remediation by the USACE Huntington District using alkaline hydrolysis.

"The work being executed at Plum Brook Ordnance Works is a great example of how our districts work together to complete FUDS projects," said David Dierken, Louisville District FUDS program manager. "Even though Huntington, Nashville and Louisville districts each play a different role in this project, our collaborative effort has allowed remediation work at Plum Brook to move forward with great results."

The alkaline hydrolysis process uses a caustic material and an iron catalyst. At Plum Brook, the Huntington District used liquid ferric sulfate and sodium hydroxide pellets to remove the contaminants of concern in 3,000 tons of excavated soil. Using a windrow turner, the treatment chemicals and the contaminated soil were mixed together. This is a variation on a common practice for soil remediation (known as composting) where chicken manure and other natural products are mixed into contaminated soil using a windrow turner.

"Once the chemicals are mixed into the soil, they start breaking down the nitroaromatics [industrial chemicals such as explosives]," said Lisa Humphreys, USACE Huntington District project technical coordinator. "It even goes so far as to break down the amino levels, which are at the bottom of the nitrochain. That's one thing that the alkaline hydrolysis process does that the composting doesn't do - break down the aminos quickly."

At different sites in the past, an excavator bucket was used to mix the chemicals into the soil.

"We felt that by using the windrow turner, we'd get a much better mix of the chemicals in the soil," Humphreys said. "And if the process didn't work, we were already set up to do the composting, so we wouldn't have to double-handle material. So far, it's working out great."

By not using the chicken manure for the windrow composting, the soil does not have straw and other materials blended into it, creating more stable soil that could actually be used for structural backfill. Because of this, once remediated, the soil will be placed back in the trenches they were dug out of, instead of having to buy clean fill to replace it.

Only the hazardous soil is being remediated. The additional soil that was determined to be non-hazardous is being used by the local landfill as daily cover. This allows the Corps to dispose of the non-hazardous soil at a reduced rate and helps the landfill.

The alkaline hydrolysis process is fairly simple. The hardest part is actually putting the caustic chemicals on the windrows. Workers have to wear chemical-resistant suits, goggles, respirators, hard hats with face shields, and layers of gloves.

"This is the first time we've done the alkaline hydrolysis," Humphreys said. "The field guys have it down to a science. We haven't had any wind concerns because we're using pellets for the sodium hydroxide and by being so close to Sandusky Bay of Lake Erie, we do get some significant wind at the site. It's been good."



A windrow turner is used to mix treatment chemicals and the contaminated soil together during the alkaline hydrolysis process at Plum Brook Ordnance Works, Sandusky, Ohio. (Photo by Lisa Humphreys)

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The USACE Nashville District serves as the project design team and developed the remediation alternatives for TNT Area C, one of which was alkaline hydrolysis. The Huntington District performs the actual remediation work, but they also worked with the Nashville District throughout the design process.

"This relationship has been in place since the early 1990s, and the team works very well together," said Huntington District project manager Rick Meadows.

The selected remedy provided the option to use alkaline hydrolysis and/or windrow composting. This remedy was written into the final plan of action, known as the Decision Document.

"We know that windrow composting works well, and we wanted to leave that flexibility in the Decision Document," Meadows said. "In case dealing with the caustic sodium hydroxide came to be too big of a safety concern or problem, we had another option already built in that gave the contractor some flexibility on how he was going to do the remedial work."

An added advantage to using the windrows for the alkaline hydrolysis process was that they could reuse a previous remediation area.

"We already had this remediation area developed and laid out to do the windrows on, so it was the perfect fit," Meadows said. "Being able to use the remediation area gave us a cost-savings from not having to develop new remediation areas each time. That's a big part of the cost."

In addition to reducing remediation costs, Huntington District has also provided work for local businesses.

"For the actual labor and equipment, everything is purchased or rented up in the Sandusky, Cleveland area," Humphreys said. "We're trying to keep it local and keep the money in the economy."

The FUDS program for the Great Lakes and Ohio River Division is managed by the USACE Louisville District, which is responsible for all projects within Kentucky, Indiana, Illinois, Ohio, West Virginia and Michigan. Because of the Huntington District's existing involvement with Plum Brook, they continue to manage this project and use Nashville as their design district.

"Even though the Louisville District is the program manager, you're getting the project technical management services from Huntington District and the design services from Nashville District," Meadows said. "So, we're all working together as one team to achieve the FUDS mission."

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