

# It's a dirty job...

## Districts dig up success in soil cleanup

TNT Area C, a former TNT manufacturing area at Plum Brook Ordnance Works, is currently undergoing soil remediation by the USACE Huntington District using alkaline hydrolysis.

By Jenn Domashevich, public affairs

From cost-savings to community partnership, the multi-district U.S. Army Corps of Engineers (USACE) remediation project at Plum Brook Ordnance Works (PBO) 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 PBO 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 PBO, 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 as 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," said Humphreys. "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 it was dug out of, instead of having to be replaced with clean fill.

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," said Humphreys. "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."

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," said Meadows. "In case dealing with the

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A windrow turner is used to mix the treatment chemicals and the contaminated soil together during the alkaline hydrolysis process at Plum Brook Ordnance Works.

Lisa Humphreys

Lisa Humphreys

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,” said Meadows. “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,” said Humphreys. “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 PBOW, 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,” said Meadows. “So, we’re all working together

as one team to achieve the FUDS mission.”



Lisa Humphreys

The USACE Huntington District used liquid ferric sulfate and sodium hydroxide pellets to remove the contaminants of concern in 3,000 tons of excavated soil at Plum Brook.

## Native grasses help restore former defense site

By Jenn Domashevich, public affairs

Green plants have many purposes in the environment, they serve as a habitat for small animals, provide food for others and for the U.S Army Corps of Engineers (USACE), they serve as a mechanism to protect remediated sites. At the former Kentucky Ordnance Works (KOW) in McCracken County, Ky., vegetation is being used to protect a soil cover, while also providing a habitat for birds and small animals that call the grassland community home.

The former Kentucky Ordnance Works served as an explosives manufacturing facility during World War II, producing approximately 196,490 tons of trinitrotoluene, more commonly known as TNT. The site was decommissioned soon after the end of the war and the buildings were removed. During the operations and demolition of the site, waste material, including coal ash and construction debris, was disposed of in a 2.5-acre area known as the West Gravel Pits.

During the Louisville District’s environmental investigation of KOW, it was determined that most of the waste material in the West Gravel Pits had been covered with native soils, but some of the material was open to the environment.

“Sampling of the West Gravel Pits

showed concentrations of metals in the surface soils that represented a threat to wildlife,” said Louisville District technical manager Doug Meadors.

The selected remedial action was to construct a soil cover over the area and re-route surface drainage. Site work was performed in 2009. A soil cover acts as a barrier between the buried waste and the surface, preventing the public and environment from being exposed to the waste.

“Key to maintaining the soil cover is having plants living on the cover material,” said Meadors. “If the soil cover was not covered in vegetation, water from storms could erode the cover away over time.”

The vegetative cover was established by seeding the area with native warm season grasses, including Indian Grass, Big Bluestem, Little Bluestem and Prairie Switchgrass. Native warm season grasses are tolerant of dry weather and other environmental challenges. Erosion-resistant mats were also placed on various slopes of the site to provide a stable base for the grasses to take root. Vehicle traffic is prohibited from the site to prevent erosion of the installed cover.

The grasses continue to flourish on the

West Gravel Pits, and plant growth will eventually contribute to the creation of soil structure and wildlife habitat.

“Kentucky was once covered by about three million acres of grasslands, and much of the Kentucky grasslands were populated with bison,” said Meadors. “This planting harkens back to how Kentucky looked in those pre-settlement days.”



Douglas Meadors

The selected remedial action at Kentucky Ordnance Works was to construct a soil cover over the West Gravel Pits, which would act as a barrier between buried waste and the surface, preventing the public and environment from being exposed to the waste.