US Army Corps of Engineers ®

Huntington District

Formerly Used Defense Sites Newsletter

Summer 2014 Edition

USACE HUNTINGTON DISTRICT COMPLETES SOIL REMEDIATION IN TNT AREA A AT THE FORMER PLUM BROOK ORDNANCE WORKS IN SANDUSKY, OHIO

The US Army Corps of Engineers (USACE) Huntington District continues the environmental restoration at the former Plum Brook Ordnance Works (PBOW) located in Sandusky, Ohio. The Formerly Used Defense Site (FUDS) Program environmental restoration conducted from January 2012 through May 2014 consisted of the Remedial Action-Construction (RA-C) effort in TNT Area A (TNT A). TNT A was one of three explosives manufacturing lines at PBOW. Figure 1 depicts Building 195, which was one of the buildings in TNT A. The date of the picture is unknown but it was well after the cessation of manufacturing operations as evidenced by the heavy vegetation. Most of the manufacturing buildings have been demolished and the only evidence the buildings existed is their buried foundations (Figure 2).

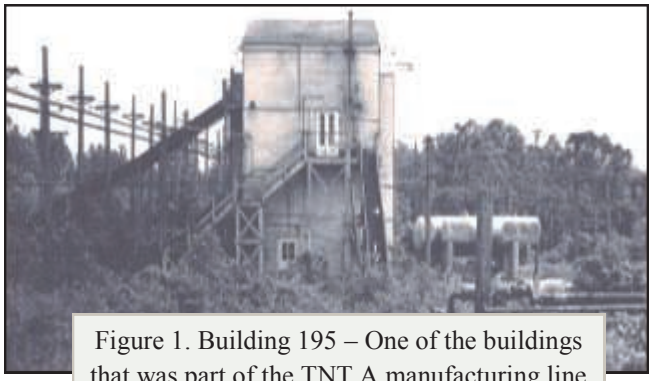

Figure 1. Building 195 – One of the buildings that was part of the TNT A manufacturing line

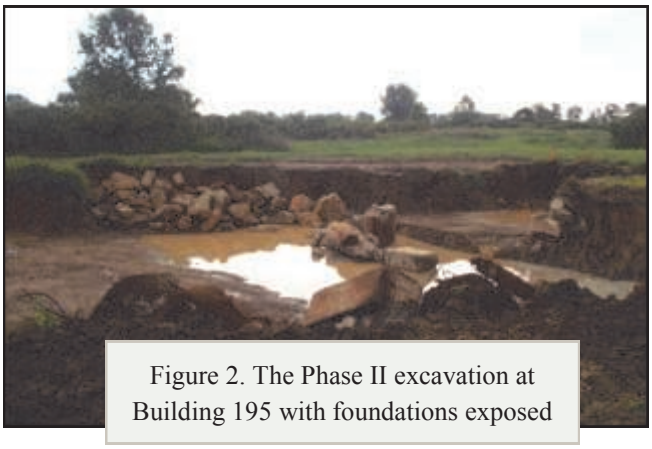

Figure 2. The Phase II excavation at Building 195 with foundations exposed

The remediation in TNT A was completed in two phases. USACE initiated Phase I remediation in January 2012. The scope of Phase I consisted of excavation of contaminated soil, confirmation sampling of the excavation, backfill of the excavation, soil characterization, staging hazardous soil for remediation, and off-site disposal of non-hazardous soil at the Erie County Landfill where it was used for daily cover.

The remediation project began with excavating soil contaminated with nitroaromatics, polychlorinated biphenyls (PCB) and lead in 18 areas of concern (AOCs). These areas were identified in a Remedial Investigation conducted in 2004, and the AOCs were primarily around the footprint of former building locations throughout TNT A.

Figure 3. Test pitting at AOC 192

Figure 4. Stockpiling soil during test pitting at AOC 143II

The soil excavated from each AOC was characterized to determine if it was hazardous or if it was non-hazardous and could be transported directly to the landfill for use as daily cover. If the soil was characteristically hazardous, it was transported to the soil remediation pad located on the PBOW site. There the soil was staged in windrows for alkaline hydrolysis remediation under the next phase. At the completion of Phase I activities, twelve AOCs achieved clean closure and were backfilled but there were six AOCs where closure could not be achieved because contaminated soil was still present in the walls and/or floors of the open excavations. This would require additional investigation to further delineate the extent of the contamination in each of these AOCs.

In May 2013, USACE initiated field efforts to excavate the remaining six AOCs in TNT A. Phase II efforts consisted of test pitting (Figure 3 and Figure 4), confirmation sampling, excavation of contaminated soil, backfilling the AOC with clean soil, soil characterization, transporting hazardous soil to the remediation pad, and transporting the non-hazardous soil to the Erie County Landfill for use as daily cover.

200-1e

G03WV0013--_08.11_0503_a

USACE HUNTINGTON DISTRICT COMPLETES SOIL REMEDIATION IN TNT AREA A AT THE FORMER PLUM BROOK ORDNANCE WORKS (CONTINUED)

Test pitting began by collecting samples from the walls and/or floors of each of the six AOCs where contaminant concentrations exceeded the Remedial Goals (RG), resulted in an exceedance of the risk criteria or contaminant "Not-to-Exceed (NTE)" concentrations. The test pits were placed at a location on the wall and/or floor that was "hot" and moved in an outward direction (or deeper if the hot spot was on the floor). Test pit samples were analyzed to determine if the contamination was below the RG, compliant with risk criteria and no NTE exceedances. Once the extent of the contamination was delineated, confirmation samples were collected and analyzed to "confirm" the extent of the contamination had been identified. With the contamination delineated, the extended areas of each open excavation were surveyed and staked, and the contaminated soil was excavated and stockpiled for characterization.

Figure 5. Constructing the windrows for alkaline hydrolysis

Figure 6. Adding alkaline material to the windrow

The Phase II stockpile soils were characterized to determine if the soil was non-hazardous or hazardous. The non-hazardous soil was transported to the Erie County Landfill for use as daily cover. The soil that was characteristically hazardous was transported (Figure 5) to the remediation pad to undergo alkaline hydrolysis remediation along with the hazardous soil from Phase I.

The alkaline hydrolysis process has been used at PBOW in remediating nitroaromatic-contaminated soil on past projects. During remediation of the TNT A soil, the alkaline hydrolysis (Figure 6) process reduced the nitroaromatics to levels where a portion of it could be placed back in the open excavation as backfill. Clean soil was purchased locally to complete backfilling each AOC.

Figure 7. Road repair completed along a section of Fox Road

All of the field efforts for TNT A Phase II were completed by the end of the December 2013. This included backfilling all of the AOCs, restoring the remediation pad as well as planting native prairie grass in each of the 6 AOCs. Part of the restoration included repairing the roads impacted from the heavy equipment and trucks hauling soil to the landfill. Road repair (Figure 7) was delayed due to the weather conditions but it was completed before the end of the contract. The final report on the TNT Area A Remedial Action-Construction was completed in late May 2014. With the completion of the TNT Area A RA-C, the USACE has completed the soil remediation in all three manufacturing areas at PBOW.

Figure 8. Wild turkeys call PBOW home

Although our primary focus was the soil remediation project, the field crew and visitors to the site had opportunities to enjoy what nature had to offer. The PBOW site is a place abundant with wildlife. Over the course of the project, we observed Bald Eagles, Red-Tailed Hawks, owls, White-Tailed Deer, coyotes, wild turkeys (Figure 8), migrating birds, frogs, turtles (Figure 9), and in the spring, a nesting pair of Canada Geese returned to raise their family close to the project site.

The USACE conducts quarterly Restoration Advisory Board (RAB) meetings to discuss the status of various projects at PBOW. The USACE also hosts a RAB Site Visit, at least one time per year to the active project areas at PBOW. The RAB Meetings and RAB Site Visits are open to the public, so if you have an interest in finding out more about the USACE's environmental restoration at the former Plum Brook Ordnance Works, please contact USACE Huntington District at 800.822.8413.

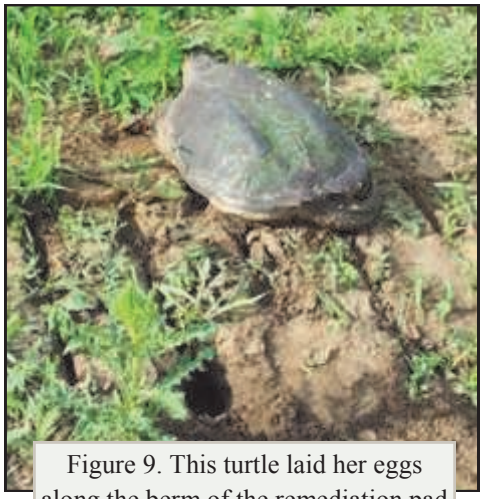
Figure 9. This turtle laid her eggs along the berm of the remediation pad

USACE BEGINS GROUNDWATER MONITORING WELL ABANDONMENT PROGRAM AT PLUM BROOK ORDNANCE WORKS

As part of the site investigations completed to date, over 150 monitoring wells have been installed on the site. Based on the groundwater Proposed Plan and no-action Decision Document, the USACE is planning to abandon the existing groundwater monitoring wells that are no longer needed. In the fall of 2014, USACE will initiate a well abandonment program beginning with the abandonment of 53 of the total 150 groundwater monitoring wells at PBOW. The remaining wells will be abandoned when the remaining projects are closed out. The abandonment program will follow Ohio EPA and Ohio Department of Natural Resources (ODNR) protocol. The 53 wells targeted for abandonment are located in areas where investigations have been completed and the project required no further action or where the project has been remediated and closed out.

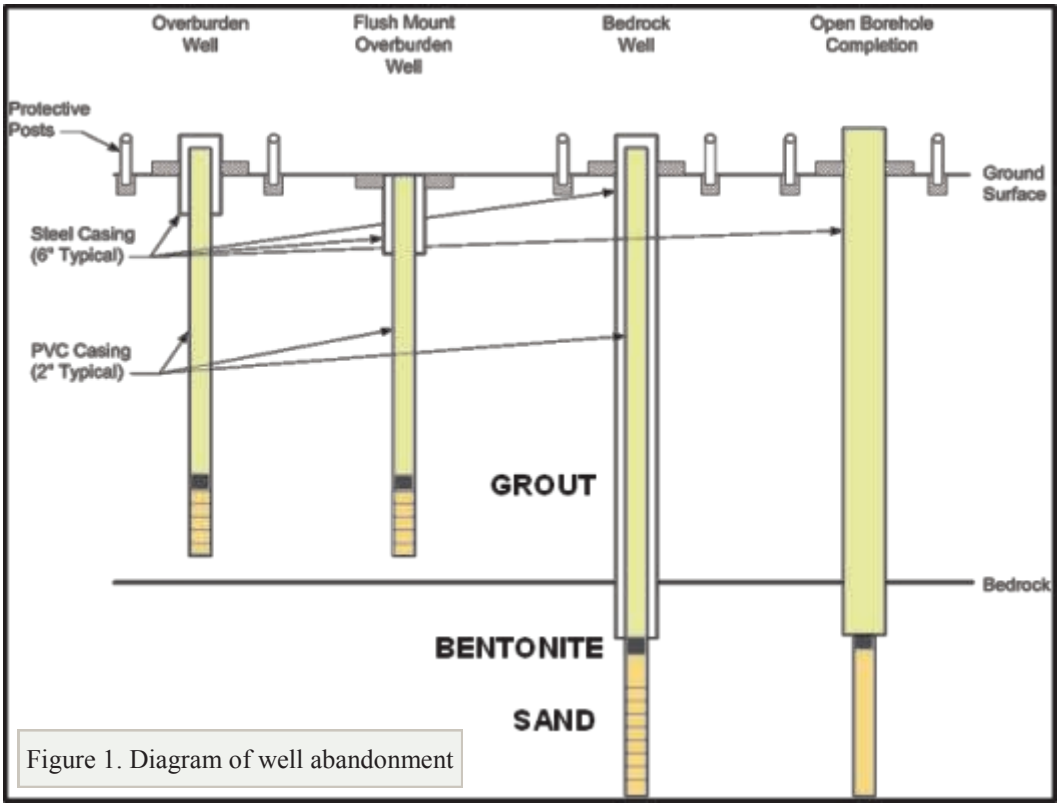

Figure 1. Diagram of well abandonment

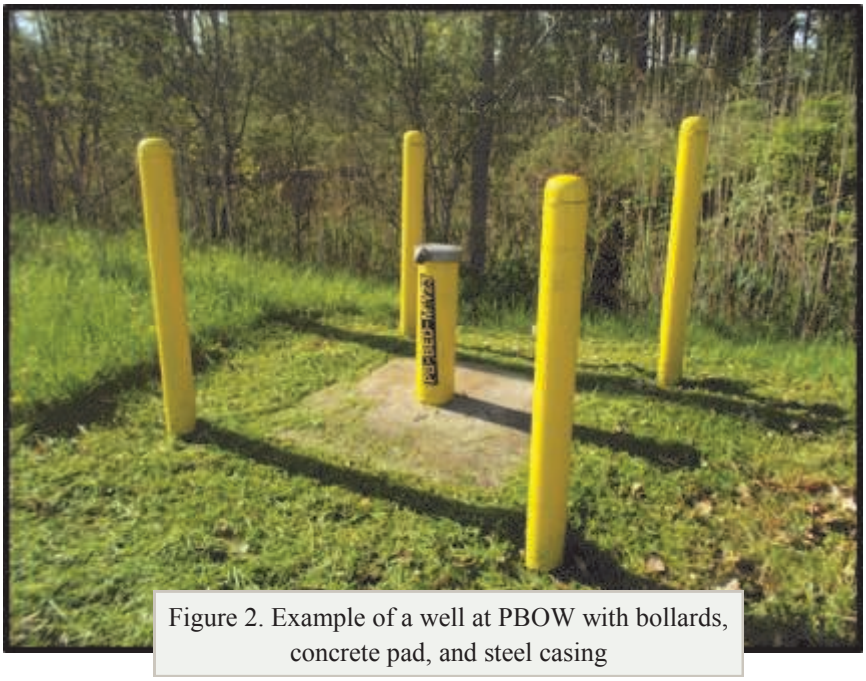
Figure 2. Example of a well at PBOW with bollards, concrete pad, and steel casing

The USACE's groundwater monitoring wells at the PBOW site includes bedrock wells to monitor the deep groundwater and overburden wells to monitor the shallow groundwater. Abandoning the bedrock wells in-place will consist of filling the casing with sand, and then a foot of bentonite (Figure 1) will be placed on top of the sand. Bentonite is a natural clay material that will swell with moisture and seal the well from the inside. Then each well will be topped off with grout to approximately four feet below the ground surface. Once the well is sealed, a crew will remove the bollards and pad (Figure 2), then excavate to 3-4 feet below ground surface, cut the casing and remove it from the well. All of the overburden wells will be abandoned by removing the entire casing, simply by pulling them out. If the casing cannot be removed, they will be abandoned in-place, the same as the bedrock wells. The debris (concrete, well casings, bollards) generated from the well abandonment will be decontaminated and disposed off-site. The abandoned well locations will be restored by placing clean soil in the excavation, grading and planting grass. The work plans are currently being drafted and USACE is anticipating to begin the work in the early fall 2014.

USACE HUNTINGTON DISTRICT AWARDS CONTRACT FOR REMEIATION IN RESERVOIR NO. 2 BURNING GROUNDS, AT PLUM BROOK ORDNANCE WORKS

Figure 1. Aerial of R2BG (Google Earth, 2014)

In late June 2014, the US Army Corps of Engineers (USACE) awarded a contract for a Remedial Action-Construction (RA-C) project at the Reservoir No. 2 Burning Ground (R2BG) at the former Plum Brook Ordnance Works located in Sandusky, Ohio. R2BG is located in the northwestern portion of PBOW and is located west of Ransom Road and is bounded by Fox Road on the south. The site was used during demolition activities as a burning ground. There are no buildings or other man-made features at R2BG, only trees and grass on the approximate 4-acre site as depicted in Figure 1.

The R2BG site consists of an area designated as the "burn area" (Figure 2) which was the primary area where burning took place. The burn area was identified by a layer of burned material about 1 foot thick and approximately 1 foot below the surface. The burn area is approximately 0.4 acres. The area adjacent to the burn area was also impacted by the burning activities most likely from moving the burned materials away from the burn pile. The total volume of soil to be excavated is 7,395 cubic yards. The burn area will be excavated to a depth of 8 feet and the area outside the burn area will be excavated to a depth of 2 feet.

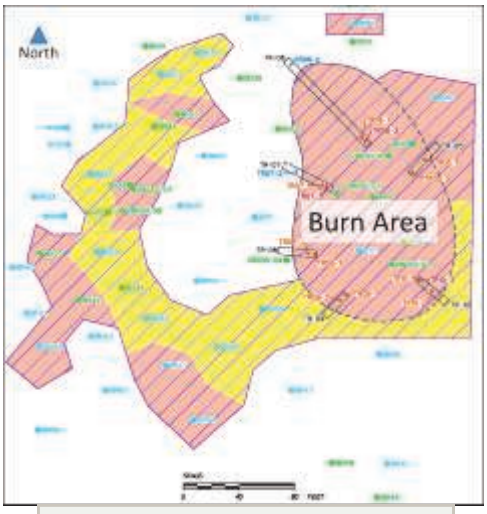

Figure 2. R2BG excavation area

The contaminants of concern (COCs) at R2BG consist of nitroaromatics, PCBs, lead, and dioxin/furans. Currently the work plans are under development and must be approved by USACE before remediation activity will take place. Fall 2014 is the anticipated date for field activities to begin and the entire project is schedule for two years.

Once the USACE issues the Notice to Proceed, the field activities will begin with locating utilities, mobilizing equipment to the site, and construction of the stockpile pad in R2BG on which the excavated soil will be placed. The project will progress with characterization of the stockpiled soil, and transporting the non-hazardous soil to the Erie County Landfill for use as daily cover. The hazardous soil will be transported to the remediation pad located on the PBOW site. Once the hazardous soil is placed on the remediation pad, it will be treated using alkaline hydrolysis to reduce nitroaromatic contamination, and if required, stabilize the lead-contaminated soil using a patented process, MAECTITE® from Sevenson Environmental Services, Inc. Based on the Remedial Investigation (RI), the PCB concentration is not anticipated to exceed 50 milligrams/kilogram (mg/kg), which would require disposal in a Toxic Substances Control Act (TSCA) permitted landfill. The dioxin are present in very low concentrations and will not pose an off-site disposal issue since they are not characteristically hazardous.

Due to the capacity of the remediation pad, the soil excavation, remediation and stabilization will be completed in two rounds. The first round will be in the spring 2015 and the second round during the spring of 2016.

As with the previous PBOW RA-C projects, the R2BG project not only includes soil remediation and stabilization of the COCs, but site restoration is a major effort. The AOC will be backfilled with clean soil and grass will be planted to restore the site to its "pre-RA-C" condition, or better (Figure 3). Roads that were impacted by the construction traffic will be repaired and the remediation pad will be restored to pre-remediation conditions. The final report for the R2BG RA-C is scheduled for March 2017.

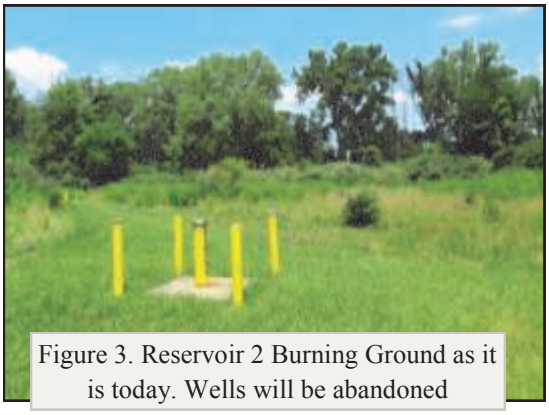
Figure 3. Reservoir 2 Burning Ground as it is today. Wells will be abandoned

Once underway, the Reservoir No. 2 Burning Ground will be an agenda item for the Restoration Advisory Board (RAB) meetings or RAB Site Visits. The RAB activities are open to the public. If you are interested in learning more about the R2BG remediation, or other USACE projects at PBOW, please contact the Huntington District of the US Army Corps of Engineers at 800.822.8413.

USACE HUNTINGTON DISTRICT PREPARES FOR REMEDIATION IN ACID AREAS AT PLUM BROOK ORDNANCE WORKS IN SANDUSKY, OHIO

USACE is preparing for remedial activities in 2 of the 3 former Acid Areas at Plum Brook Ordnance Works (PBOW) located in Sandusky, Ohio. Acid Area 2 (AA2) is located in the western portion of PBOW and Acid Area 3 (AA3) is located east of AA2 along Ransom Road (Figure 1). The AA2 Remedial Action -Construction award is anticipated in late FY2014 or in early FY2015. The award for AA3 Remedial Action-Construction (RA-C) is planned for FY2015.

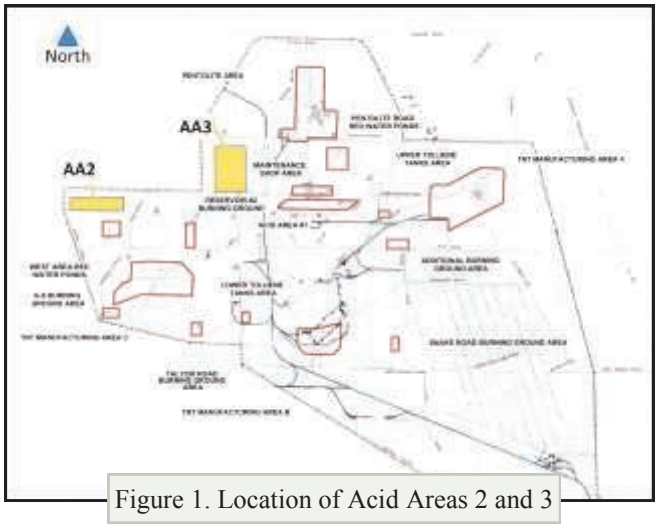

Figure 1. Location of Acid Areas 2 and 3

During the operational days at PBOW, there were three "acid areas" at PBOW designated as AA1, AA2 and AA3. The acid areas were used to produce oleum, sulfuric acid, nitric acid, and mixed acids for the manufacture of TNT. This article covers activities for only AA2 and AA3. AA1 is still in the investigative stages and will be remediated at a later time.

There were eight process buildings in AA2, 24 above-ground storage tanks, and a rail line. In AA3 there were ten process buildings, 46 above-ground storage tanks and a rail line (Figure 2).

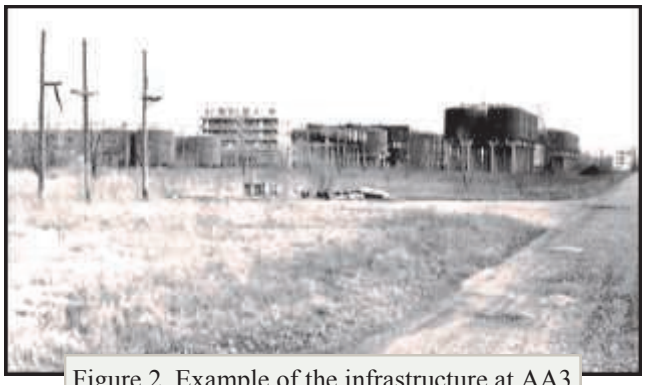
Figure 2. Example of the infrastructure at AA3

The contaminants of concern in AA2 and AA3 consist of polychlorinated biphenyls (PCBs) (Aroclor 1254 and Aroclor 1260). The source of PCB contamination is believed to be from PCB-containing paints and/or oils used for dust suppression and weed control along roadways, in parking areas, and around tank cradles and/or building foundations.

The remediation of the contaminated soil will consist of excavating an estimated 14,189 cubic yards (cy) of contaminated soil from AA2. The volume of contaminated soil to be excavated from AA3 is 16,806 cy.

Figure 3. Acid Area 2 as it exists today

During the RA-C in each acid area, the contaminated soil will be excavated and placed in 300 CY stockpiles and sampled to determine the PCB concentration in the soil. PCBs are regulated substances and may require disposal of the contaminated soil in a Toxic Substances Control Act (TSCA) regulated landfill, depending on the concentration. Soil with a PCB concentration of less than 50 milligrams per kilogram (mg/kg) will be transported to the Erie County Landfill for use as daily cover. Soil with a PCB concentration over 50 mg/kg must be transported to a TSCA-regulated facility. The closest TSCA facility is located in Michigan.

Upon completion of the excavation and disposal of the contaminated soil, the excavation areas will be sampled to confirm that each excavation is below the remedial goal for PCBs. Subsequently, the open excavations will be backfilled with clean soil. The access roads to each of the sites will be repaired to pre-remediation conditions, and the backfilled excavation will be graded and reseeded with native prairie grass.

Today, the acid areas are quiet, peaceful and overgrown with vegetation (Figures 3 and 4), including mature trees and an abundance of wicked, thorny trees and multiflora rose. The dense coverage provides safe shelter for small mammals seeking refuge from the local birds of prey.

Figure 4. Acid Area 3 as it exists today

Once underway, the AA2 remediation will be an agenda item for the Restoration Advisory Board (RAB) meetings or RAB Site Visits. The discussion will include an update on the progress of the remediation project and a review of activities. The USACE will also provide updates on the plans for remediation in AA3 as well as the status of AA1. The RAB activities are open to the public. If you are interested in learning more about the AA2 remediation, the schedule for AA3, or other USACE projects at PBOW, please contact the Huntington District of the US Army Corps of Engineers at 800.822.8413.

WEST VIRGINIA MANEUVER AREA (WVMA) FUDS PROPERTY

Site Investigations (SI) completed for seven (7) WVMA projects. A site investigation has been completed for the following projects at WVMA:

- Ammunition Depot.
- Jenningston Training Area.
- Bearden Knob Firing Range.
- Buena Small Arms Firing Range.
- Dailey Infiltration Camp.
- Brown/Cabin Mountain Firing Ranges.
- Fore Knobs/Bear Rocks Firing Ranges.

Figure 1. UXO find during Memorial Day Weekend 2014. Identified as a 4.2" mortar, white phosphorus, M2A1

The primary task of the SI was to assess the presence of MEC (munitions and explosives of concern), MD (munitions debris), and elevated metals contamination. To assess the presence of MEC and MD, the Site Visit Team (SVT) conducted Qualitative Reconnaissance (QR) by walking 23.59 miles at the sites. No MEC or MD was encountered by the SVT. The QR consisted of visual reconnaissance of the site surface to identify indicators of suspect areas, including earthen berms, distressed vegetation, stained soil, ground scars or craters, target remnants, and visible metallic debris. Key elements of the technical approach included the conceptual site model (CSM) to help determine types of samples and their locations, data quality objectives (DQOs) to ensure that the data acquired is sufficient to characterize MEC and metals contamination at the FUDS sites, and QR to confirm known target locations and to evaluate the potential presence of MEC or elevated metals in those target locations. Soil, sediment, and water sampling and analysis was performed at designated locations.

The SI Reports included a recommendation of "No Defense Action Indicated (NDAI)" for the Ammunition Depot, Jenningston Training Area, Bearden Knob Firing Range, and the Buena Small Arms Firing Range projects. Project Close-out (PCO) Reports for site close-out were prepared for each of these projects.

The SI Reports for the following projects included a recommendation for further site investigation: Dailey Infiltration Camp, Brown/Cabin Mountain Firing Ranges, and Fore Knobs/Bear Rocks Firing Ranges.

Corps acts quickly to remove mortar found along Dolly Sods trails. Over Memorial Day Weekend 2014, an Unexploded Ordnance (UXO)—a 4.2" mortar containing white phosphorous—was found in the Dolly Sods Wilderness Area (DSWA) of West Virginia by Boy Scouts who were backpacking and camping in the area (Figure 1).

Dolly Sods, which is a popular area for outdoor activities such as hiking, backpacking, camping, and for viewing wildlife, plants, and birds native to the area is part of the West Virginia Maneuver Area (WVMA), a Formerly Used Defense Site (FUDS), which was used by the Army for live fire training and maneuvers during World War II. The U.S. Army Corps of Engineers (USACE) Huntington District has performed two removal actions along the trails and campsites in the past and immediately began coordinating for a safe removal of the unexploded ordnance.

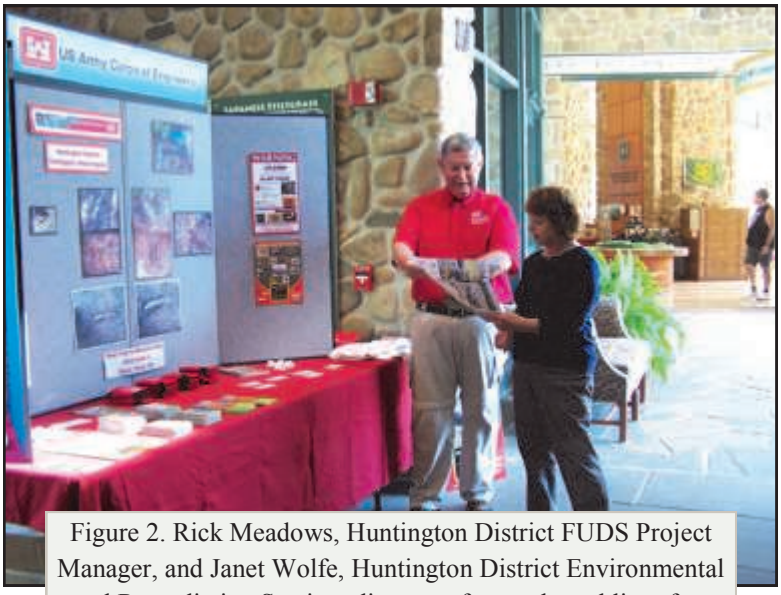

Figure 2. Rick Meadows, Huntington District FUDS Project Manager, and Janet Wolfe, Huntington District Environmental and Remediation Section, discuss safety at the public safety session held June 7, 2014

"Janet Wolfe in our Environmental Remediation Section was instrumental in coordinating the response actions to ensure safe disposal of the ordnance," said Rick Meadows, USACE Project Manager.

Boy Scout Troop 1997 visiting from Ellicott City, Maryland ran across the UXO on May 25 near the intersection of Dobbin Grade and Beaver Dam trails. The Boy Scouts photographed the UXO, sketched the location of the UXO find and called the U.S. Forest Service hotline number. "They followed the process outlined in our program to avoid the hazard and properly report it," said Meadows (Figure 2).

The U.S. Forest Service then notified the U.S. Army Corps of Engineers, Huntington District. The Huntington District Environmental and Remediation Section, after coordination with the Baltimore and Huntsville Districts and personnel at Aberdeen Proving Grounds, contacted the Army 52nd Ordnance Command of Fort Campbell, KY, which is the Army

Explosive Ordnance Disposal (EOD) command center for this part of the country. The EOD Group quickly responded and expeditiously disposed of the UXO in place.

Timely coordination among the Boy Scouts, U.S. Forest Service, Huntington District, and the 52nd EOD Group resulted in the prompt disposal of the UXO on May 27, 2014.

Historically, UXO removal was performed at WVMA immediately after WWII and again in 1997-1998. The 1997-1998 removal focused on the existing trails and campsites of DSWA (see Figure 3 for current map of trails cleared). Subsequently, warning signs were posted at the trailheads to warn the public of UXO dangers outside the cleared areas. Outdoor activities at DSWA outside of the cleared areas include an increased level of risk of encountering UXO.

The Corps emphasizes the 3 R's of Munitions safety: Recognize, Retreat and Report:

- **Recognize** – There is no way to describe UXO. UXO can come in many shapes and sizes. It can be rusty or look like new. It can be out in the open, hidden in bushes or partially buried. The important thing to remember is that if you see what you think is UXO then you should retreat from the area and report it to authorities.
- **Retreat** – Make sure to never touch UXO, as they can be extremely dangerous. If you see UXO, immediately leave the area and do not disturb the item.
- **Report** – If you come across what might be UXO, you should leave it be and report it to your local law enforcement by calling 911. They will be able to take care of the item. Do not use your cell phone near the item. Call 911 after retreating from the UXO.

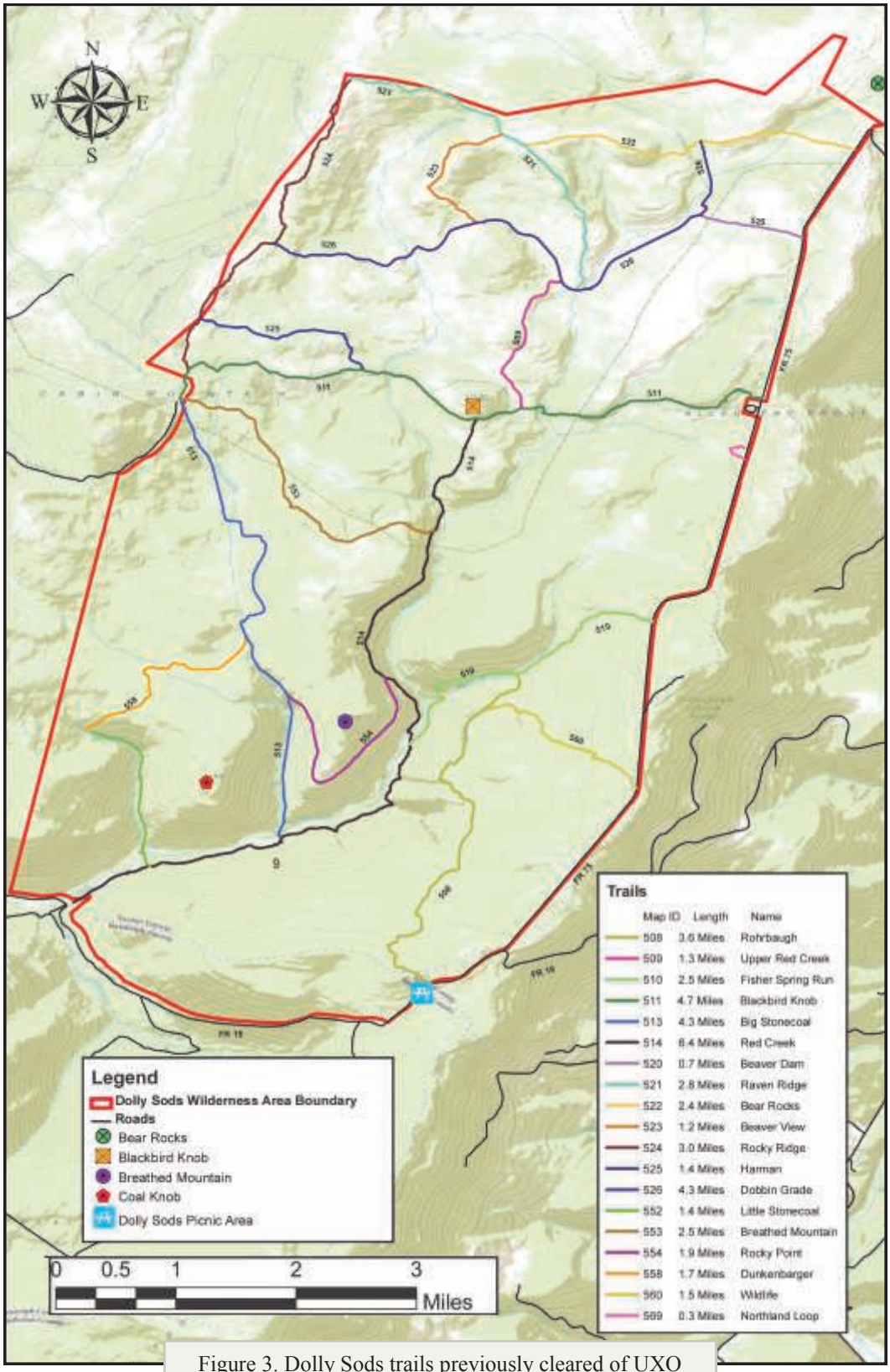

Figure 3. Dolly Sods trails previously cleared of UXO

WEST VIRGINIA MANEUVER AREA (WVMA) FUDS PROPERTY (continued)

Also, semi-annual inspections of the warnings signs posted at the heads of the cleared trails and at the cleared campsites are made to help ensure the public is aware of UXO dangers that may exist in areas of Dolly Sods not cleared of UXO. Figures 4-5 are photos from the June 6, 2014 trailhead inspection .

Figure 4. Kiosk at the trailhead for the Red Creek Trail. The warning sign, missing at the time of the June 6, 2014 inspection, was replaced with a duplicate sign

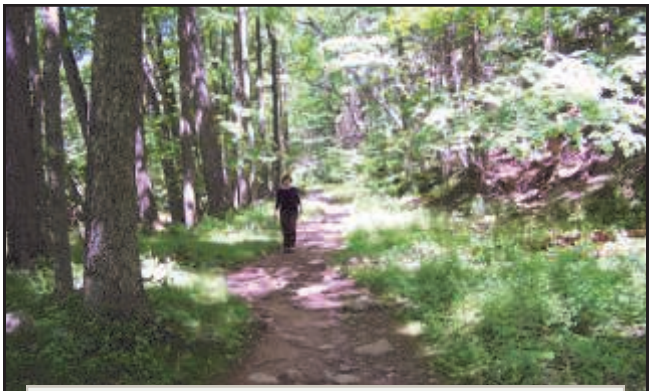

Figure 5. Janet Wolfe of the Huntington District at one of the Dolly Sods trails during the June 6, 2014 trailhead inspection. Jo Huff of the Huntington District (not shown in photo) assisted in the inspection

BASELINE ECOLOGICAL RISK ASSESSMENT PROPOSED FOR WWTP2, PBOW

Figure 1. Mouse, wren, and shrew prey on earthworms

A Baseline Ecological Risk Assessment (BERA) study is being proposed by the USACE to investigate potential ecological effects associated with lead in soil at the former Waste Water Treatment Plant No. 2 (WWTP2) facility. The WWTP2 site, located in the western portion of the former Plum Brook Ordnance Works in Sandusky Ohio just south of Patrol Road and west of Campbell Street, was a treatment plant used to treat waste water generated from the TNT manufacturing areas. Currently, WWTP2 consists of building rubble and secondary forest that has overgrown the site.

During the remedial investigation (RI), concentrations of lead up to 350-times the naturally occurring (or "background") levels commonly found in the area were detected in soil at the WWTP2. A screening-level ecological risk assessment (SLERA) performed as part of the RI used a food chain model to determine the potential hazards for bird and mammal ecological receptors. The SLERA food chain model determined that hazards were elevated for species that consume terrestrial invertebrates as part of their diet.

Because the SLERA intentionally uses conservative assumptions in its food chain model, the SLERA results are not definitive. Therefore, a BERA was recommended at WWTP2 to better understand the potential for ecological risk at the site. The most critical exposure pathway in the food chain model was uptake of lead from site soil into earthworms, which were then ingested as prey items for other species such as mice, wrens, and shrews (Figure 1). The goal of the BERA is to perform a bioaccumulation study to provide much more accurate information on the uptake of lead into earthworms, using soil actually collected from WWTP2. Soil samples will be collected at WWTP2, sent to a laboratory, and earthworms will be introduced in a controlled setting. The uptake of lead into the earthworm tissue will be measured over a 28-day period. The data obtained from this study will provide much more exact estimates of the soil-to-invertebrate uptake of lead that is occurring at WWTP2. The food chain model will be re-run using the new data obtained in the BERA. The results will then be used to make a more informed decision about future actions at the site to remediate lead.

US Army Corps of Engineers ®

Toll-Free: 800-822-8413
http://www.lrh.usace.army.mil/