



### 2012 PROJECT UPDATE: TNT C SOIL REMEDIATION AT PBOW

The Summer 2011 Edition of the Formerly Used Defense Site Newsletter highlighted the TNT C Soil Remediation project being implemented at the former Plum Brook Ordnance Works (PBOW) located in Sandusky, Ohio. Under this project, there were 15 areas of concern from which contaminated soil was excavated and remediated. The soil was contaminated with residuals (nitroaromatics, semi-volatile compounds, metals and polychlorinated biphenyls [PCBs]) from the manufacturing of ordnance during World War II. The excavated soil was remediated using the alkaline hydrolysis process.

In late 2011, USACE issued a follow-on contract to the original effort to do additional remediation on 6 of the 15 areas that could not be closed out because the soil continued to exceed the site's risk criteria. The remediation required additional sampling, excavation and remediation through alkaline hydrolysis (AH) treatment. Figures 1 and 2 show test pits and additional sampling effort beyond the footprint of the original excavation.

The soil obtained from each of the test pits was analyzed for the contaminant of concern (COC) (in this case the COCs were nitroaromatics and semi-volatile organic compounds) that caused the excavation to exceed the risk criteria. Test pit data was used to calculate preliminary risk. Subsequently, if the test pit samples were below the risk criteria, confirmation samples were collected. Upon receipt of the laboratory results, the risk calculations were performed. If the risk was below the Hazard Index (HI)  $\leq 1$  and the Incremental Lifetime Cancer Risk (ILCR)  $1 \times 10^{-5}$ , the soil was excavated and transported to the remediation pad for subsequent remediation using the alkaline hydrolysis process (Figure 3). After several rounds of test pits, clean closure was achieved and excavation was initiated.



Figure 1. Worker verifies the depth of a test pit.



Figure 3. Placing the TNT C soil on the remediation pad

Approximately 2,650 cubic yards was excavated from the 6 areas that remained from the original effort. These 6 areas were successfully excavated to clean closure (below risk criteria) and the soil is currently undergoing AH remediation on the dedicated soil remediation pad at the former PBOW (Figures 4-11).



Figure 2. Decontaminating the equipment after digging a test pit

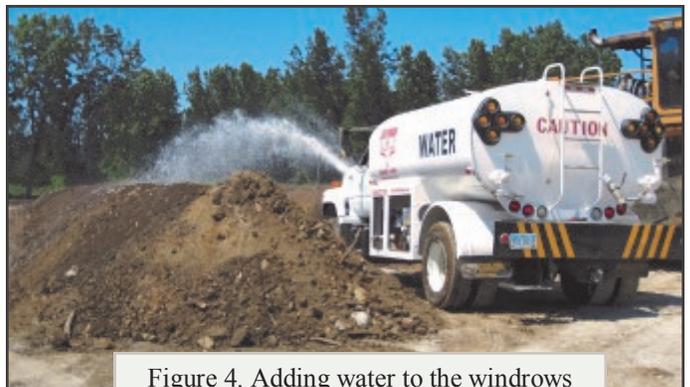


Figure 4. Adding water to the windrows

## 2012 PROJECT UPDATE: TNT C SOIL REMEDIATION AT PBOW continued



Figure 5. Chemical addition to a windrow

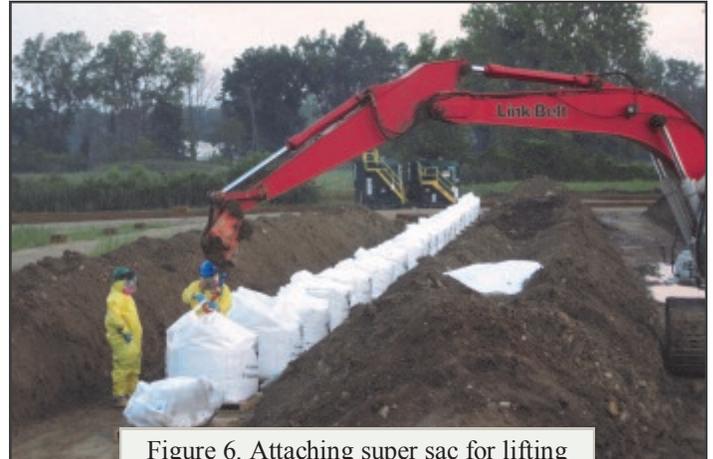


Figure 6. Attaching super sac for lifting



Figure 7. Lifting super sac with excavator



Figure 8. Teeth of windrow turner



Figure 9. Windrow turner in operation



Figure 10. Spraying chemical on a windrow



Figure 11. Decontamination of equipment

Currently, the AH process is in full swing. Preliminary monitoring is indicating that the AH process is being successfully implemented. Upon completion of the AH process, the soil will be returned to the TNT Area C and used to backfill the open excavations. The six areas will be graded to allow for drainage and then ultimately seeded with native prairie grasses such as Indiangrass and Little Bluestem.

## USACE BEGINS REMEDIATION IN TNT AREA A AT THE FORMER PLUM BROOK ORDNANCE WORKS IN SANDUSKY, OHIO

The US Army Corps of Engineers (USACE) Huntington District began environmental restoration activities in TNT Area A at the former Plum Brook Ordnance Works (PBOW) in mid-January 2012. This is the third and last of the three manufacturing areas at the former ordnance works facility to receive remediation efforts. The project will be accomplished under two phases, Phase I - Excavation and Phase II - Remediation.

At PBOW, TNT Area A is situated south of Patrol Road, along both sides of Columbus Avenue and just to the south of Maintenance Road (Figure 1). There are 18 former building areas from which approximately 17,000 cubic yards of soil is being excavated. Under Phase I, the soil is being excavated because it is either hazardous and/or it presents a risk to human health. The contaminants of concern (COCs) include nitroaromatics (2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, 2,4-dinitrotoluene, 2,6-dinitrotoluene, 2-nitrotoluene, 4-nitrotoluene, and 2,4,6-trinitrotoluene), polychlorinated biphenyls (PCBs) and lead (Pb). The areas of concern, COCs and selected remediation were outlined in the RI/FS phase completed around 2005.

As of this summer (2012), all building areas have been excavated. (Figure 2) The excavated soil from each building area was stockpiled and is undergoing characterization to determine if the soil is hazardous or non-hazardous (Figure 3). If the soil is hazardous it will be transported to the remediation pad where it will be staged in windrows for subsequent remediation under Phase II. The non-hazardous soil will be transported to the Erie County Landfill (ECL) where it will be used for daily cover.



Figure 2. Measuring depth of excavation

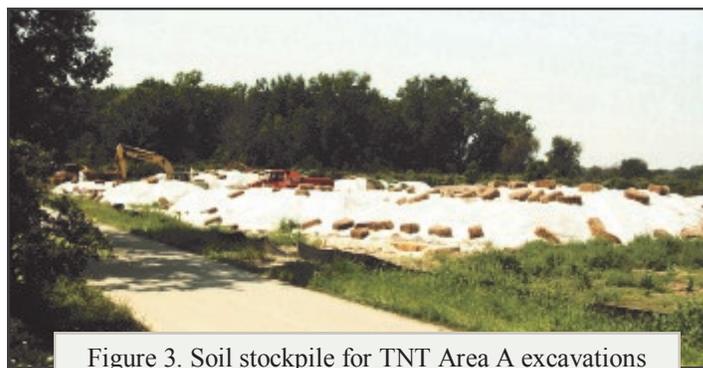


Figure 3. Soil stockpile for TNT Area A excavations

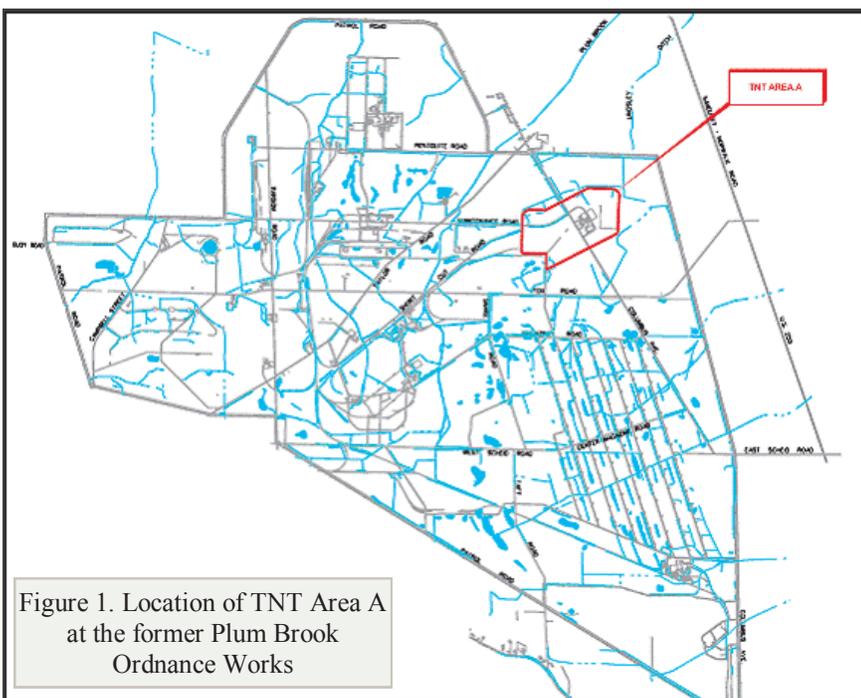


Figure 1. Location of TNT Area A at the former Plum Brook Ordnance Works

With the contaminated soil excavated, soil samples from the floor and walls of the excavation were collected and submitted to the laboratory for analysis to determine if the pit was clean, or was below the risk criteria. The open excavations that met the clean closure criteria or are below the risk criteria would be backfilled using clean soil acquired locally. Excavations that exceeded the risk criteria would require additional excavation to get to "clean closure" with the excavations eventually backfilled. That additional effort (i.e., investigation and excavation) would be performed under Phase II and under separate contract in FY13.

Remediation of TNT A is very similar to the process implemented in TNT C. The process has proven successful in remediating contaminated soils and allowing the reuse of those soils on-site as backfill.

## USACE REMEDIATION PAD EXPANDED AND UPGRADED PRIOR TO REMEDIATION ACTIVITIES

USACE has been using the area adjacent to the Pentolite Road Red Water Ponds for a dedicated soil remediation pad. The pad was constructed in 2008 and had the capacity for 10 windrows (rows of soil that measured approximately 250 ft long × 12 ft wide) and 2 sumps with a combined capacity of approximately 100,000 gallons. In 2012, with two soils remediation projects underway, the remediation pad underwent upgrades to increase the volume of soil that could be placed on it and increased sump capacity.

The upgrades included constructing the area for 4 additional windrows, extending the existing windrows to the maximum length (250-300 ft), constructing access roads between each windrow, and expanding the perimeter road around the pad. In addition to the pad expansion and upgrades, the sumps were also expanded and new liners installed. The sump capacity was increased to approximately 280,000 gallons (combined).

The runoff from the windrows is collected in each of the sumps. The sump water is used to maintain the moisture in the windrows during remediation. At the end of soil remediation, the soil is placed back on-site and the water is analyzed and disposed or recycled as appropriate. The remediation pad will be maintained and used for future soil remediation projects at the former ordnance works.



Figure 3. Building an access road between two windrows



Figure 1. The remediation pad prior to expansion



Figure 4. Road construction on the pad



Figure 2. Beginning excavation to expand the remediation pad



Figure 5. Building roads and extending windrows on the pad

## USACE REMEDIATION PAD EXPANDED AND UPGRADED PRIOR TO REMEDIATION ACTIVITIES continued



Figure 6. Remediation pad expansion, mission accomplished and ready for soil



Figure 8. Putting down gravel to facilitate drainage from pad into the sump



Figure 7. Replacing the liner in the south sump



Figure 9. The north sump, mission accomplished

## HOT SUMMER AND VIOLENT STORMS BRING ADDITIONAL SAFETY CONCERNS TO REMEDIATION PROJECTS

We all know that working outside in the summer brings the risk of heat-related illnesses, including heat stress and heat stroke. Addressing how work will be conducted in the heat is a primary component of the Health and Safety Plans that USACE requires of their contractors performing construction projects. The environmental projects underway at the former Plum Brook Ordnance Works located in Sandusky Ohio were in full swing during the unseasonal hot temps of the spring and the violent storms of the summer.

This summer we experienced extreme heat conditions and violent storms with extreme winds, rain, lightening and a few threats of tornadoes. When conditions are extreme extra precautions are required to keep the workplace safe. Watching the weather forecasts aids in planning the day's activities but the best indicator is keeping an "eye on the sky." It doesn't take long for violent storms to roll into the area, so it is important to watch the sky for threatening conditions as they approach and appropriate measures can be taken.

During high heat conditions, whether working in Level D or Level C protective clothing, it is important to stay hydrated. Always keep plenty of cool water on hand, hydrate before beginning work activities, take frequent breaks in shaded areas, watch out for co-workers who may be affected by heat, and limit the sports drinks to 1 bottle for every 3-4 bottles of water.

These practices are not only effective in the workplace, but are effective guidelines for the "weekend landscapers" at home and anytime your activities take you into the heat of the day.



Figure 1. Worker in Level C PPE preparing to treat soil

# NITRO, WEST VIRGINIA: A WORLD WAR I TOWN “EXPLODED” INTO EXISTENCE

The City of Nitro, West Virginia evolved entirely due to the need to manufacture materials critical for the World War I (WWI) effort. The industrial facility constructed by the U.S. in 1918 was built to manufacture propellant (smokeless powder) and the industrial city which was constructed adjacent to the plant housed workers and their families while also providing a local government infrastructure for the new city.

The plant was called U.S. Explosives Plant C (USEPC) and consisted of approximately 1,772.10 acres of land in Kanawha and Putnam Counties, WV, with 1,155.50 acres in Putnam County and 616.52 acres in Kanawha County. The former propellant plant was situated between Charleston and Huntington, WV where Interstate 64 intersects the city today.

The name “Nitro” was selected for the new city from the manufacture of nitrocellulose powder at the facility. Thousands of workers (at one point, over 18,000) came to Nitro from all over the country to assist in constructing the plant and city including a young Clark Gable. In less than one year, the 1,772 acres had been transformed into a manufacturing complex that sprawled along the east bank of the Kanawha River. While construction equipment was used for some of the construction, much of the work was accomplished by use of oxen, mules and horses.

During 1918, as the manufacturing units were completed, the operator, Hercules Powder, began using the units for the manufacturing processes. Not all construction was completed prior to signing the armistice in November 1918 when the plant was shut down. Shortly after the war ended, workers began leaving Nitro in large numbers. The Government, after considering future use of the plant, declared the entire reservation surplus and prepared for disposal of the property.

After the entire plant was sold in 1919, other companies began moving into the Nitro area to manufacture a variety of products. Companies well known throughout the Kanawha Valley such as American Viscose, Monsanto, Great Lakes Chemical, FMC, Rubber Services Laboratories and many more operated at the location of the former USEPC. The former explosives’ plant area has reverted from extensive chemical manufacturing use from 1919 to the 1970s, to less manufacturing and more service type industries such as warehouse distributors.

Today, there are few remnants or buildings left from the former USEPC manufacturing facility but many of the houses

and structures built for the industrial City of Nitro are still being used today.

The USACE Huntington District is in the process of completing a Formerly Used Defense Site (FUDS) Preliminary Assessment for the former USEPC. The Preliminary Assessment Report is currently in the review stage and will be complete in 2013.

Photos taken in 1918 (Figures 1-9), courtesy of Rich Hively, Nitro Historian.

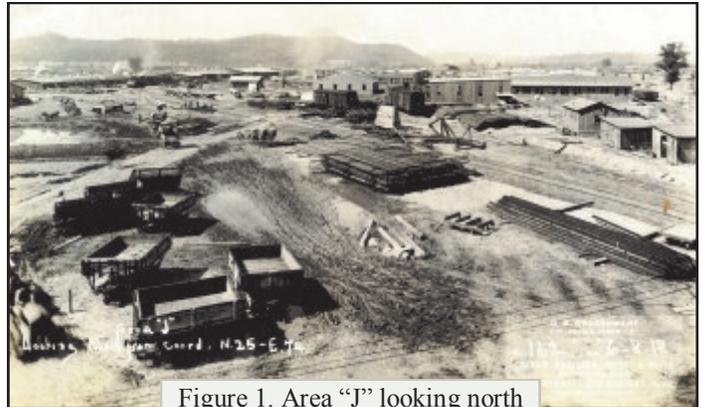


Figure 1. Area “J” looking north



Figure 2. Area “K”



Figure 3. View with Area “H” in foreground

**NITRO, WEST VIRGINIA: A WORLD WAR I TOWN**  
**“EXPLODED” INTO EXISTENCE continued**

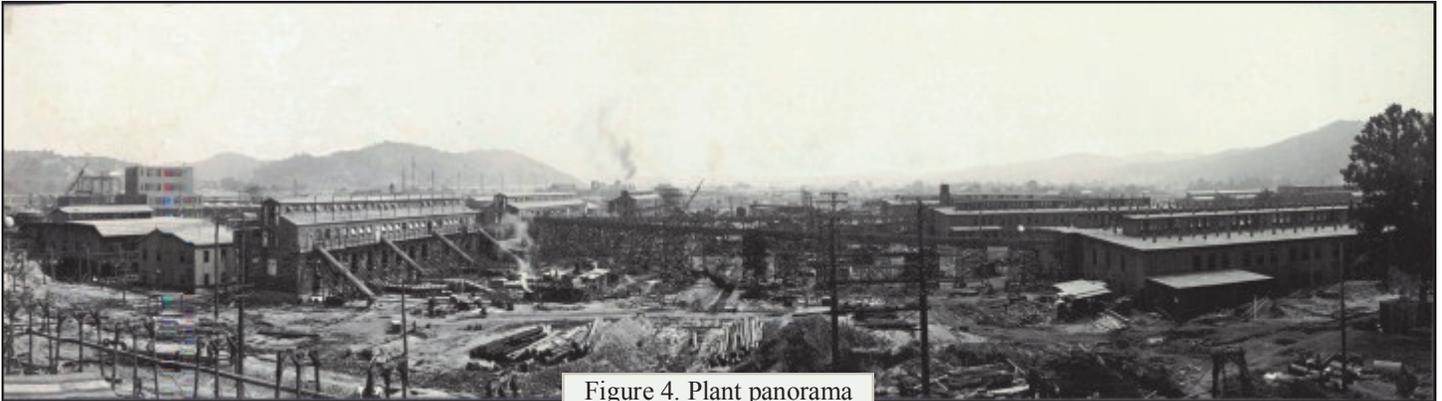


Figure 4. Plant panorama



Figure 5. Area “M” blending towers

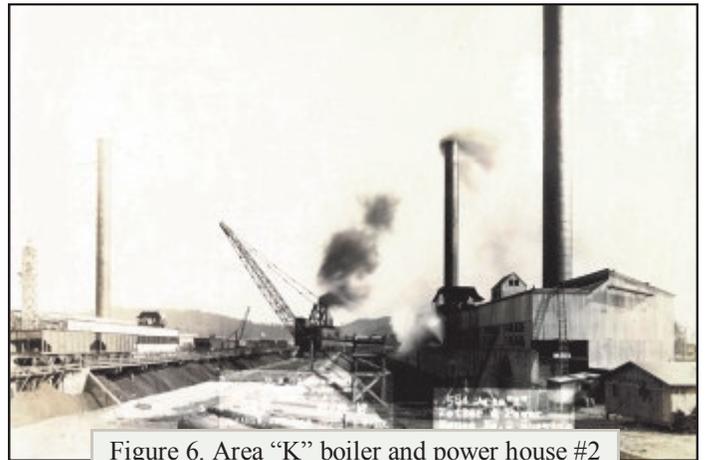


Figure 6. Area “K” boiler and power house #2



Figure 7. Area “M” natural air dryers



Figure 8. Oxen teams

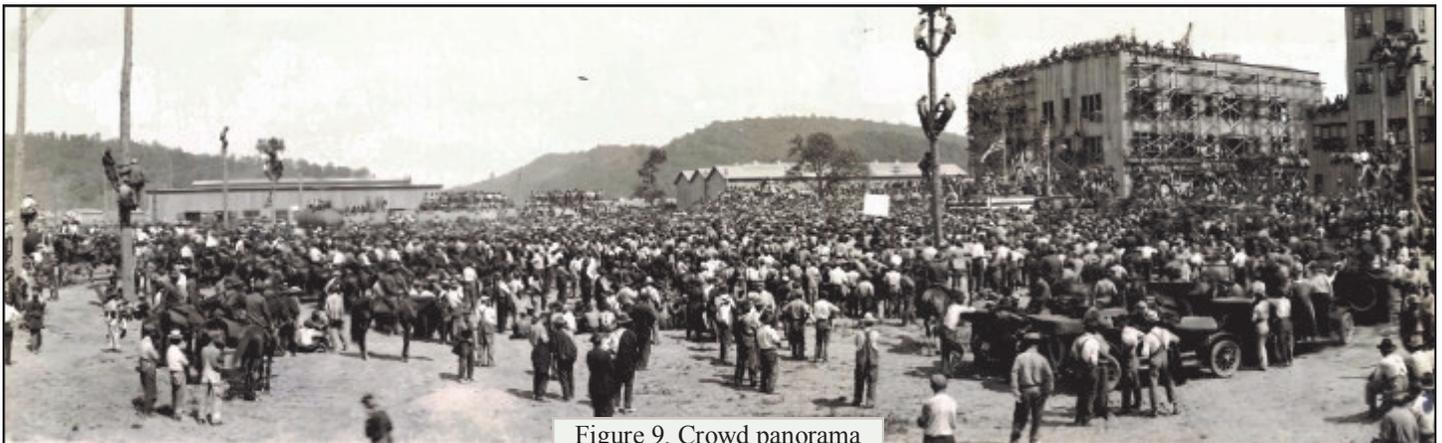


Figure 9. Crowd panorama

## WVOW: DISMANTLING THE COMPOST BUILDING

Dismantling a 300-foot long Cover-All® Building sounds a bit intimidating but not for the USACE contractor taking the building apart. Within a week the building was dismantled, frame sections bound together, hardware in bags marked and sections labeled for reassemble (Figures 1-9). TAB Construction dismantled the building as part of the 2012 Operations and Maintenance (O&M) Repair contract at the West Virginia Ordnance Works Site.

The 300-foot building was utilized by the Huntington District for several years beginning in 2003 to remediate (i.e., cleanup) TNT-contaminated soil via windrow composting. The soil was placed in two windrows within the building, with straw, cow manure and water added to stimulate biological activity. The soil was turned daily with a windrow composter and temperature and moisture were checked to assure optimum composting conditions.

The windrow composting project biodegraded the TNT contaminants below cleanup levels, leaving a final product of 'compost'. When soil analyses confirmed that contaminants had been reduced to non-hazardous levels, the compost was applied to a field in the former TNT Manufacturing Area.

Once the TNT-contaminated soil at the site had been remediated, there was no longer a need for the building. However, the building had sat unused since 2005 and the area could not be utilized by the WV Division of Natural Resources, which owns and operates the McClintic Wildlife Management Area (MWMA) at the site.

The Huntington District secured funds in April 2012 to award a contract to restore the former composting site. The area where the building once stood is currently being restored and reseeded with native grasses and will then be returned to productive use and maintenance by MWMA personnel. The dismantled building will be transported to the RC Byrd Locks and Dam, where the Huntington District's Operations and Readiness Division will reassemble the structure and utilize the building for storage.

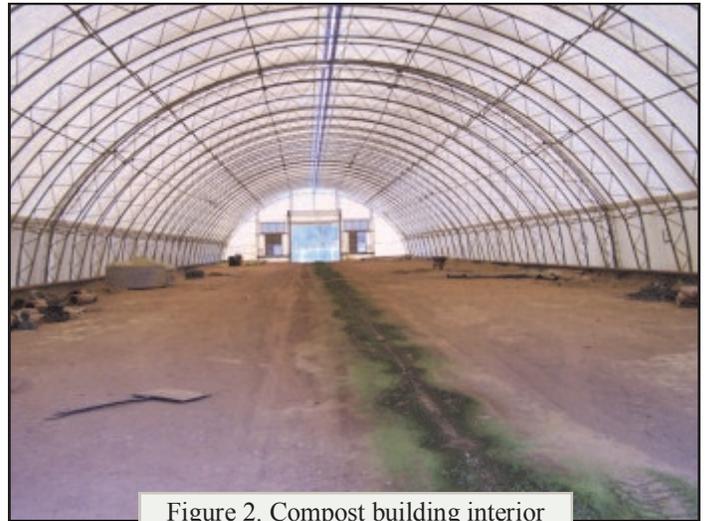


Figure 2. Compost building interior



Figure 3. Area where building once stood

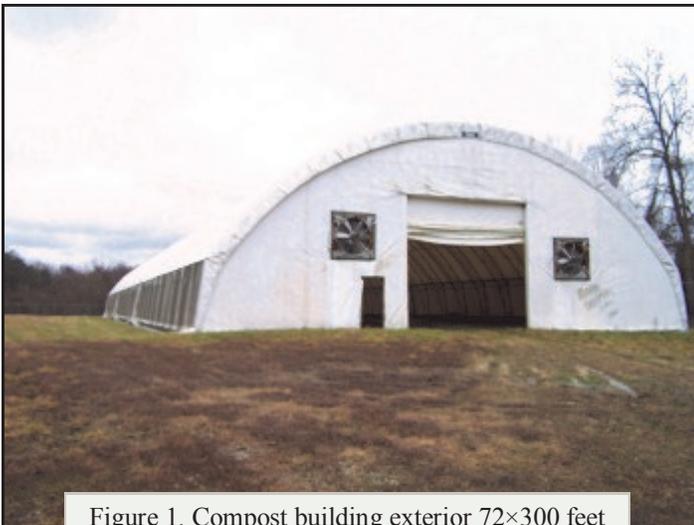


Figure 1. Compost building exterior 72×300 feet



Figure 4. Building supports bound together for easier shipping and handling

**WVOW: DISMANTLING THE COMPOST BUILDING continued**

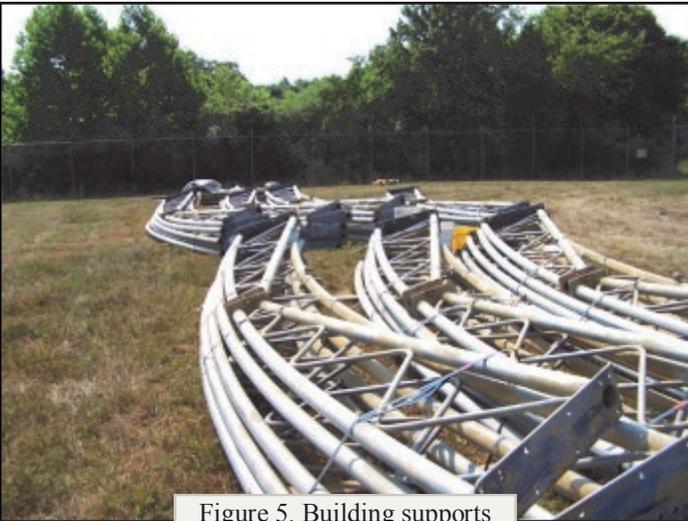


Figure 5. Building supports



Figure 6. Building supports were labeled for reassembly



Figure 7. Building hardware



Figure 8. One section of the building cover

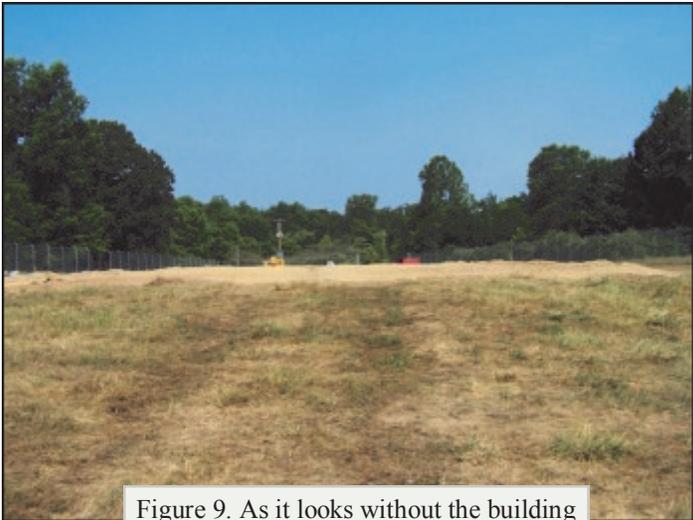


Figure 9. As it looks without the building

## 2012 PROJECT UPDATE: WEST VIRGINIA MANEUVER AREA/DOLLY SODS FUDS

The West Virginia Maneuver Area (WVMA)/Dolly Sods FUDS covers an area of more than two million acres in the Allegheny Mountain Province of the Potomac Highlands Region and includes parts of Preston, Tucker, Grant, Randolph and Pendleton Counties of West Virginia. Sites in the general area were used to introduce World War II troops to various aspects of mountain warfare. Since the terrain was similar to that of the Apennines and lower ranges of the Alps in Italy, training here allowed the troops to simulate conditions that could be encountered during the invasion of Italy and other mountainous regions in the wartime theater.

Currently the majority of the area is owned by both private and public entities including the Monongahela National Forest (MNF), The Nature Conservancy, Canaan Valley Institute, the U.S. Fish and Wildlife Service (operating the Canaan Valley National Wildlife Refuge), hunting clubs and private residents. A Preliminary Assessment (PA) report was completed in 2009 by the Huntington District and identified a total of seven Munitions Response Sites (MRS) warranting further investigation. Louisville District and higher HQ agreed and approved the new Military Munitions Response Programs (MMRP). The seven sites are listed below.

Dailey Infiltration Camp (MRS01, Figure 1) is approximately 200-acres and is located 1.3 miles southeast of the town of Dailey, WV, and was the location of an obstacle course, small arms range (SAR) and a possible hand grenade range used to train troops. It is currently owned by the U.S. Department of Agriculture and managed by the U.S. Forest Service (USFS) as part of the Monongahela National Forest.

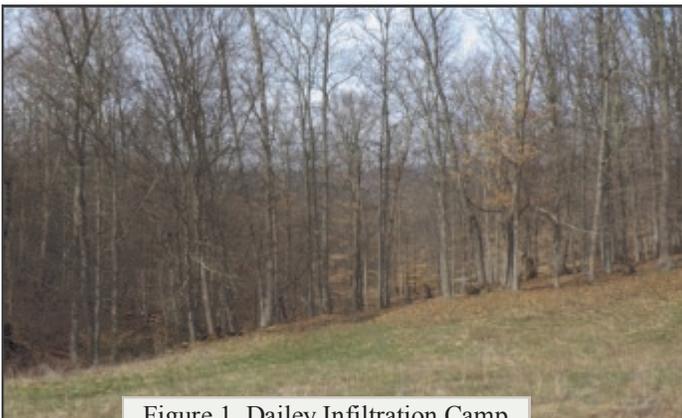


Figure 1. Dailey Infiltration Camp

WVMA Ammunition Depot (MRS02, Figure 2) is a 4-acre site located along U.S. Route 219 north of Elkins, WV. Currently the site is part of a vacant parcel recently used for agriculture. This may have been the main storage area for all of the ordnance and munitions used during the operational period of WVMA. There has been

some question as to whether this is the correct location since the railroad tracks are located on the opposite side of Leading Creek and the area is prone to repeated flooding. Further deed searches are planned for the near future.

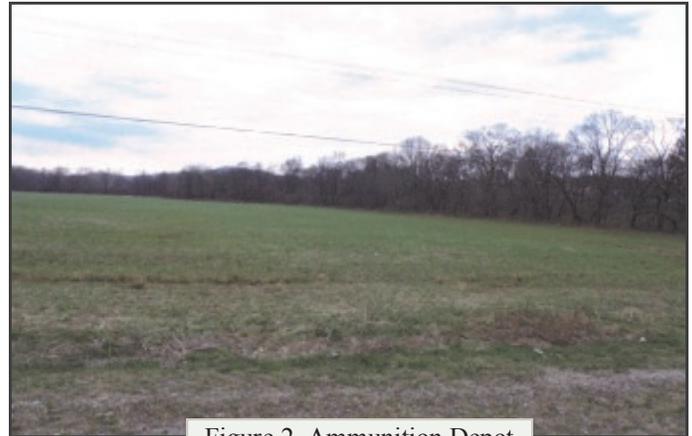


Figure 2. Ammunition Depot

Jenningston Training Area (MRS03, Figure 3) is a 40,000-acre area located in Tucker and Randolph Counties, WV. Activities conducted in the area included rock climbing exercises, troop maneuver problems and potential mortar firing. Most of the area is managed by the U.S. Forest Service, the western part is within the Otter Creek Wilderness, and the eastern part is farmland with residences.

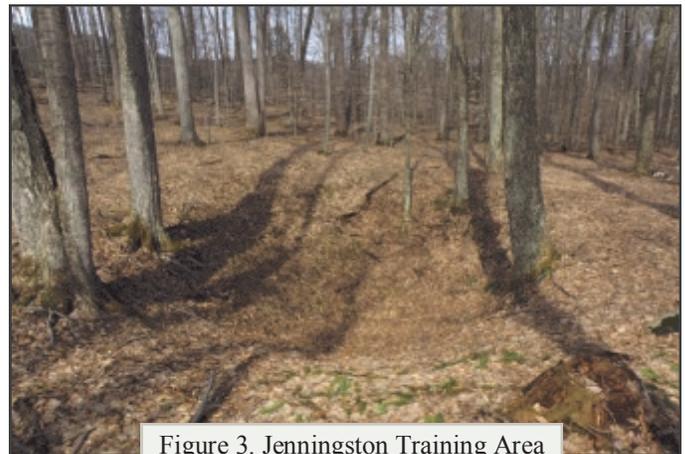


Figure 3. Jennings Training Area

Fore Knobs/Bear Rocks Firing Range (MRS04, Figure 4) is a 42,000-acre site located near the community of Petersburg, WV. It was used for firing points and target locations for 105mm and 155mm High Explosive (HE) howitzer rounds. The area is currently part of the Monongahela National Forest, part of the Nature Conservancy's Bear Rocks Preserve, and forested land and farmland with residences. Unexploded Ordnance (UXO) have been found in proximity to this site.

## 2012 PROJECT UPDATE: WEST VIRGINIA MANEUVER AREA/DOLLY SODS FUDS continued



Figure 4. Fore Knobs/Bear Rocks Firing Range

Bearden Knob Firing Range (MRS05, Figure 5) is an 8,000-acre site located in Tucker and Grant Counties, WV. The Firing Range was used as firing points for 105mm and 155mm howitzer rounds and possibly as an antitank firing range. The range was also utilized by the 628<sup>th</sup> Tank Destroyer Battalion. Radio control targets were fired on by .30 caliber and .50 caliber machine guns on tank destroyers. M-10's were also utilized on the range. The area is currently a combination of private property and public lands, the latter being owned by the U.S. Fish and Wildlife Service and managed as the Canaan Valley National Wildlife Refuge. There have been rocket finds near Yellow Creek and a UXO find on Cabin Mountain.

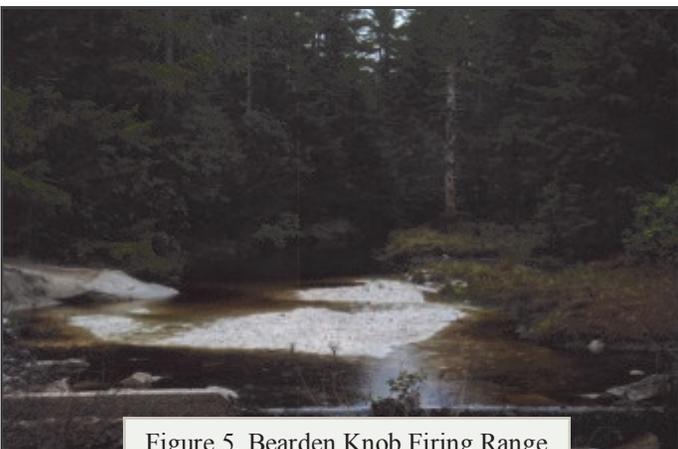


Figure 5. Bearden Knob Firing Range

Brown/Cabin Mountain Firing Ranges (MRS06, Figure 6) is a 16,000-acre site located near the community of Davis, WV. The areas around Beaver and Yellow Creeks were used as firing points for 155mm howitzer rounds, firing points for 60mm and 81mm mortars, and possible rocket firing ranges. Brown Mountain was used as the target area for the 60mm and 81mm mortar rounds fired from Yellow Creek. The Cabin Mountain Firing Range

was used as a target for 105mm and 155mm howitzer rounds. Also, .30 caliber machine gun fire was reported in these areas. A 105mm howitzer round was found on Cabin Mountain and 3.25-inch rockets were found in and near Yellow Creek. The area is currently part of a preserve owned by the Canaan Valley Institute and part of the U.S. Fish and Wildlife Service's Canaan Valley National Wildlife Refuge.



Figure 6. Brown/Cabin Mountain Firing Ranges

Buena Small Arms Firing Range (MRS07, Figure 7) is a 50-acre site located near the community of Courtland, WV, and was used as a small arms range and possibly as a grenade range. The land is currently owned by the U.S. Fish and Wildlife Service and managed as the Canaan Valley National Wildlife Refuge. Remnants of berms have been found at the small arms range.

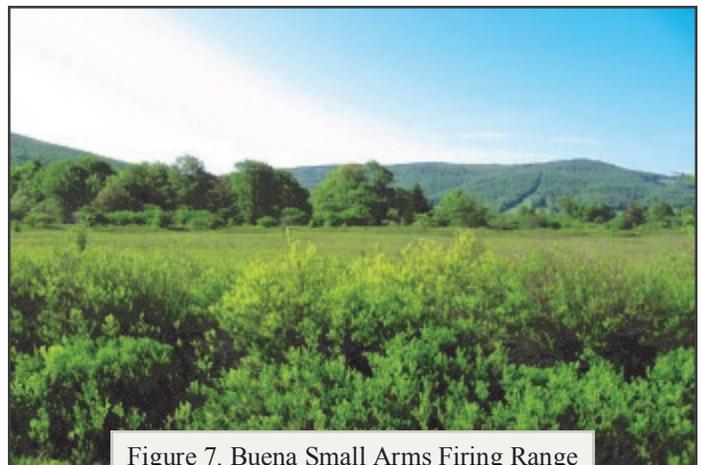


Figure 7. Buena Small Arms Firing Range

The site investigations of these seven MRSs were conducted in the fall of 2011 and the spring of 2012. Although rights-of-entry (ROEs) were not hard to obtain for the publicly owned lands, they were more difficult from the private residence owners. A total of 70 ROE requests were sent, 19 of the requests were granted, 6 were re-

## 2012 PROJECT UPDATE: WEST VIRGINIA MANEUVER AREA/DOLLY SODS FUDS continued

fused and the rest were unanswered. The site visit team was composed of three persons. The field team leader was a geologist, and the other two team members were technicians. One of these was charged with the implementation of the approved munitions constituents sampling protocol and the techniques of the qualitative reconnaissance. The second was a UXO technician tasked with ensuring all aspects of field safety as well as identification of munitions and explosives of concern (MEC) and other munitions debris encountered.

The fall site visit concentrated on MRS04 (Figure 8), MRS05 and MRS06 but progress was hampered by lack of ROEs. A renewed effort was made to get those during the winter months, but again there were more refusals or 'no-responses' than there were signed rights of entry.



Figure 8. Field team collecting ambient water and sediment samples at MRS04

The spring site visit completed the remaining MRS areas and also did return visits to the three MRSs visited in the fall. Soil, water and sediment samples were collected and, using a metal detector, subsurface anomalies were noted. No UXO was found. The final reports from these site investigations should be available by September 2012.

In other WVMA/Dolly Sods work, the Public Involvement Plan (PIP) and the Public Awareness and Organizational Plan (PAP) underwent their annual revisions in the spring and both electronic and hard copies are now at the project's repository which is located at the Potomac Ranger District of the U.S. Forest Service, 2499 N. Fork Highway, Petersburg, WV 26847. Also new trailhead signs were designed and printed featuring the 3 R's: Recognize, Retreat, Report (Figure 9). These were also sent to the Potomac Ranger District for placement on the nineteen trails in the Dolly Sods Wilderness.

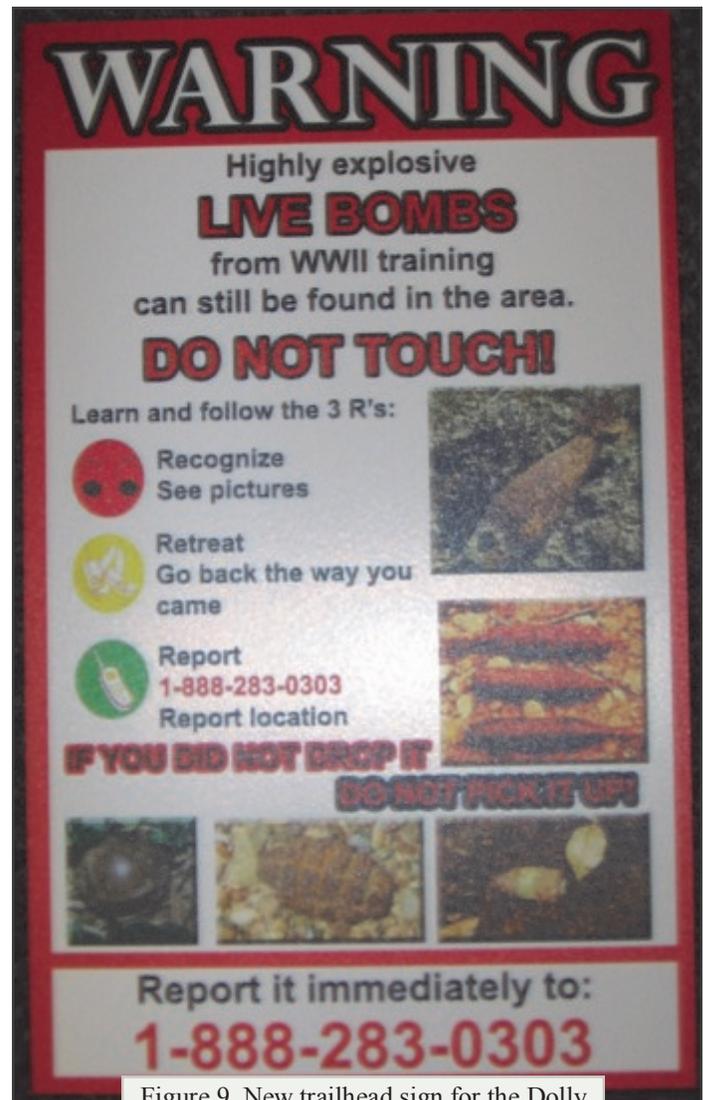


Figure 9. New trailhead sign for the Dolly Sods Wilderness Area



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