



**US Army Corps
of Engineers®**

Huntington District

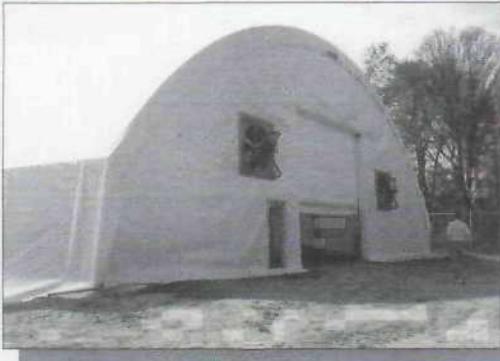
Formerly Used Defense Sites Newsletter

Summer 2003 Edition



Bioremediation of Soils On-going at West Virginia Ordnance Works

Last year, USACE, EPA, and DEP signed a consensus agreement to remove a "hot spot" of contaminated soil from the OU-5 Pond 13 and Wet Well Area. Rather than disposing of the soil in a landfill, the Corps researched the field of bioremediation of nitroaromatic compounds. Different types of bioremediation have been used at Department of Defense and other sites for several kinds of contaminants, including nitroaromatics and fuel. Windrow composting was selected by the Huntington District based on its success in treating nitroaromatic compounds such as TNT and DNT.



Soil Compost Building Exterior

For windrow composting, the soil must first be excavated and transported to the treatment area. The soil is then mixed with

amendments using a "recipe" that has been developed experimentally. The recipe is the type and proportion of amendments that have been found to best treat the soil to reduce and/or eliminate contamination. Some amendments used at other sites have included cow manure, wood chips, straw, chicken manure, alfalfa, and potato waste. The amendments selected should maximize treatment and minimize cost. Availability of the amendments is also important, so locally-available materials in sufficient quantity are preferred. The amendments provide nutrients for naturally-occurring microorganisms that will "eat" the nitroaromatic compounds and reduce them to non-toxic compounds.

After mixing, the material will be placed into windrows. The windrows will be turned regularly to ensure mixing and sampled periodically to determine how the process is working. When the contaminants are reduced below Record of Decision (ROD) levels, the soil can be disposed on-site, eliminating the cost of transportation to and disposal at a landfill. In fact, the final product will be very rich in organics. For OU-5, the West

Virginia Division of Natural Resources' McClintic Wildlife Management Area office will utilize the soil on or around the WVOW site.



Interior View of Soil "Windrows"

As an innovative demonstration project, some material previously capped in the TNT Manufacturing Area will also be windrow composted. Knowledge gained from that operation may be applied to other capped areas in the future.



Soil Turner in Operation

Additional information on West Virginia Ordnance Works and other FUDS activities can be obtained by contacting Richard Meadows, Project Manager, in the Huntington District Corps of Engineers office. Phone 304/ 529-5388, or call the FUDS information hotline at 1-800-822-8413.

Plum Brook Ordnance Works News

GIS Arrives at PBOW

The former Plum Brook Ordnance Works (PBOW) was the site where, during the 1940's, the Trojan Powder Company, under contract to the U.S. Army, manufactured 2,4,6 trinitrotoluene (TNT), dinitrotoluene (DNT), and pentolite. During manufacturing processes, contamination of the environment occurred. Beginning in the 1980's, contamination assessments and site characterizations have been conducted across the site.

The PBOW Restoration Advisory Board (RAB) plays an active role in the restoration activities at the site. The community members are one of the most valuable resources in the restoration process and USACE strives to keep the RAB members up to date on the project. In keeping with current technology, Huntington District contracted Marshall University to develop a Geographic Information System (GIS) containing the site-specific information related to PBOW. Mr. Jamie Wolfe, GIS Manager, Center for Geotechnical, Environmental, and Applied Sciences at Marshall University in Huntington, West Virginia, developed the system application and although the development at PBOW is in its infancy, it's obvious this system will be a powerful tool. Use of the GIS can allow the RAB members as well as the technical team members to "query" (ask questions in a certain format) to obtain useful information to help characterize and remediate the site. The RAB and USACE members are excited about the development of the GIS application and look forward to not only tracking current efforts on the restoration project, but preserving the history behind the environmental restoration activities for future generations.

Jamie Wolfe Explains GIS Applications to the Plum Brook RAB

USACE and the RAB will continue working to develop a strong team and an informed community to achieve the goals set for the project.



PBOW Exhibits at Local Fairs

The PBOW RAB continues to maintain a presence in the local community through Poster Sessions at the area's county fairs and shopping malls. The public is not always aware of the community's history. Through these public outreach activities, USACE is able to introduce individuals to the environmental restoration process and meet individuals who have an intimate knowledge of the past practices at the former ordnance manufacturing site.

It was a busy year on the project and the year before us promises more progress and more surprises.



PBOW Display at Erie County Fair

USACE and the RAB will continue working to develop a strong team and an informed community to achieve the goals set for the project.

Additional information on Plum Brook or other FUDS activities can be obtained by contacting Richard Meadows, Project Manager, in the Huntington District Corps of Engineers office.

Phone 304/ 529-5388, or call the FUDS information hotline at 1-800-822-8413.

Restoration Activities

PBOW located in Sandusky, Ohio was a manufacturing facility for TNT, DNT and Pentolite during WWII. Due to the manufacturing processes for these materials, there is soil contamination throughout various areas within the fenced portion of the project.

USACE Huntington and Nashville Districts have taken the lead in environmental restoration of the identified areas of concern. Huntington District conducts construction efforts during the Interim Soil Removal Phase for restoration activities based on Nashville District's investigative efforts during the Remedial Investigation/Feasibility Phase.

This time last year, Huntington was fortunate to obtain funding to conduct Interim Soil Removal Actions for both the TNT B Area as well as the Pentolite Road Red Water Pond Area. Public meetings were conducted in September and December with construction activities starting shortly

thereafter. During the initial excavation activities, several RAB members took advantage of the beautiful weather and visited the site for a tour. There were several surprises during the excavation of contaminated soil, such as identification of seams and pockets of subsurface contamination that were not



discovered during the RI/FS Phase. These types of surprises led to excavation of much more soil than originally assumed before hitting "clean" soil. Despite the surprises and based on available funding, USACE continues to conduct removal activities until "clean closure" can be reached.

Second Round of NPL Reductions Planned for WVOW

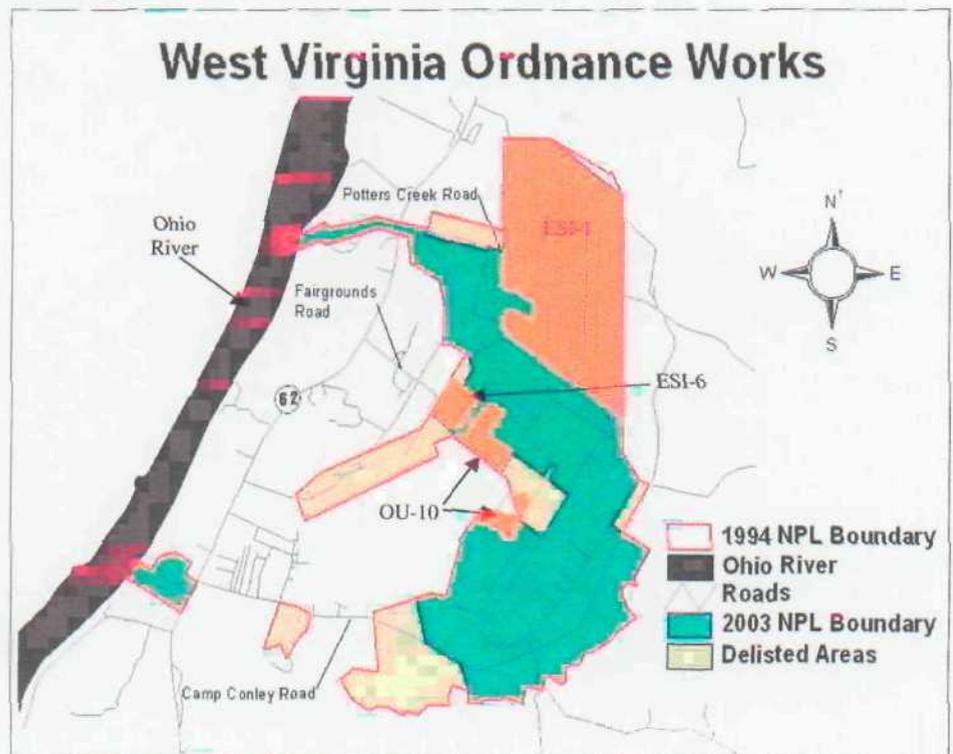
The National Priorities List (NPL) was established by the U.S. Environmental Protection Agency (EPA) to clean up the most environmentally contaminated sites in the country. Although the hazard ranking system alone did not earn West Virginia Ordnance Works (WVOW) a high ranking, it was nominated by the state for inclusion on the NPL in 1983. The original WVOW NPL site covered about 8300 acres. In 1994, the area was reduced to about 2800 remaining acres where the possibility of contamination was thought to exist. The West Virginia Division of Natural Resources (WVDNR) manages most of this land as the Clinton F. McClintic Wildlife Management Area (MWMA). The federal government and private landowners hold the remaining portions of the site.

Prior to 1995, EPA policy required that an entire site be remediated before it could be removed from the NPL. Due to the size and complexity of the WVOW site, this could have tied up the 2800 acres for many more years. Now, EPA encourages removal of portions of sites or media from the NPL boundary in order to make them available for productive use. Six WVOW areas were deleted from the NPL boundary in 2002.

Additional areas are in the beginning stages of the de-listing process. These areas include:

- ESI-1 Magazine Area
- ESI-6 Maintenance Area
- OU-10 South Acids Area

The accompanying WVOW site map displays the current NPL boundary, and includes the 2002 NPL de-listed areas and areas scheduled for de-listing. As additional No Further Action decision documents are signed or remedial actions are completed, additional areas will be de-listed.



Former National Guard Firing Range Restored

Prior to World War II, the National Guard used a small section of land near what was later the West Virginia Ordnance Works as a small arms firing range. The shooting range was located on private property. Lead-based bullets were fired at targets, many lodging into the soil backdrop. As a result, elevated levels of lead were present in the backdrop soils.

Investigations were conducted by contractors working under the direction of the U.S. Army Corps of Engineers Huntington District to determine the presence and extent of lead-impacted soils at the site. Investigations were conducted in 1997 and 1999 which determined that approximately 560 cubic yards of lead-contaminated material was present at the site, existing from the surface down approximately 2 feet below existing grade.

The Huntington District of the U.S. Army Corps of Engineers reviewed various remediation strategies and determined that excavation of the lead-contaminated soil, followed by chemical fixation, would be the most economical method for site clean-up. Chemical fixation treatment was selected to treat the soils upon excavation and render the soil non-hazardous, significantly reducing disposal costs. Soils could then be transported for disposal at a permitted landfill.

Approximately 560 cubic yards of lead-contaminated soils were excavated and chemical fixation treatment applied, followed by landfill disposal, in October of 2002. The Final Report was completed and submitted in December of 2002, with approval from the West Virginia Department of Natural Resources and Region III of the U.S. Environmental Protection Agency.

Review of Former Explosives Plant Complete at Nitro, WV

During World War I, it was determined that the United States could not produce enough propellant to supply our troops and our allies. As a result, construction of a 1,772 acre propellant plant, named Explosives Plant C, began in December of 1917 in what is now Nitro, West Virginia. Prior to construction of the facility, the site was quite rural, consisting of a store, a mill, and 2 or 3 houses, the remaining land used for farming. This site was selected based on availability of flat land that had an adequate water supply, adequate labor supply from nearby Charleston, West Virginia, accessible fuel supply from nearby coal mining operations, and available land and water transportation facilities.

The propellant facility consisted of an Industrial Plant, a Magazine Area, a Proving Ground, and a Housing Area, with extensive support buildings including a 400-bed hospital, approximately 3,200 houses, recreational centers, churches, police and fire station, and a 24-room school house. The area became known as the "Powder City Plant".



View of former target foundations from Proving Grounds Area

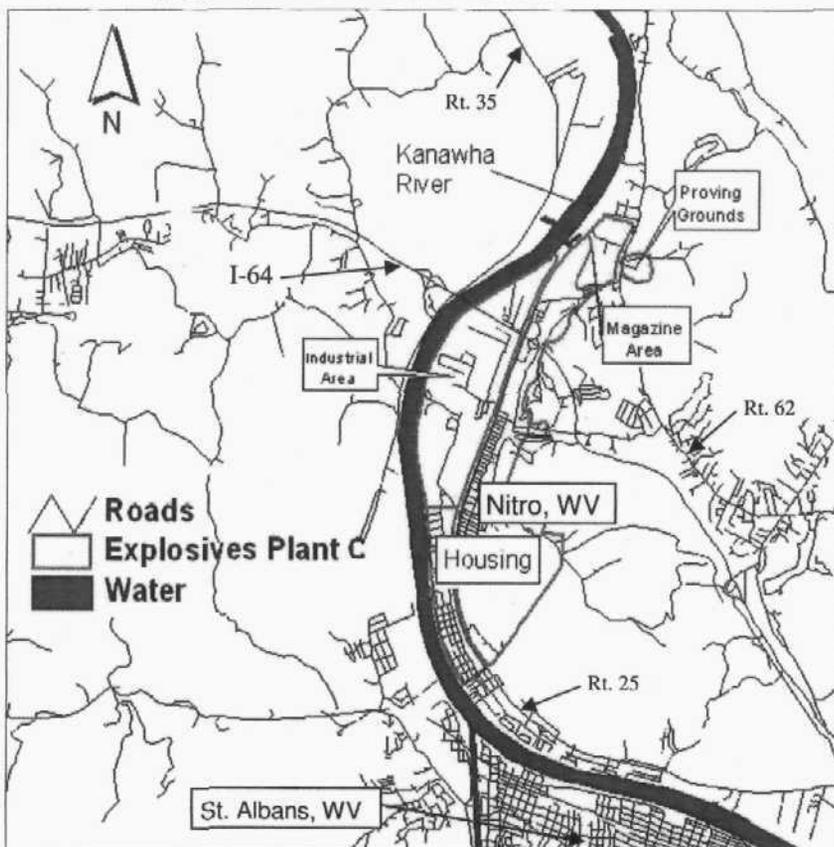
The purpose of the facility, built by the Thompson-Starrett Company of New York, was to provide approximately half of the projected daily requirement of 1.5 millions pounds of propellant needed for the war effort. The Hercules Powder Company operated the plant, and began production in September of 1918. Eleven months into construction, World War I came to a close, and the need for high volumes of propellant eliminated. Since production of propellant had begun during the construction phase, cellulose that had been nitrated but not yet converted into propellant grains continued to be processed. Production continued until January of 1919.

A large portion of the site was sold in October of 1919 to the Charleston Industrial Corporation. Other sections were later sold, or transferred, to industries, residents, and the City of Nitro (Nitro taken from the first part of the technical name of the product produced, "nitrocellulose"). The former Industrial Plant and Magazine Area are presently occupied by an industrial park. The former Proving Ground is now a residential area, and the

former Housing Area is currently owned by the City of Nitro. The former Industrial Plant location includes the Artel Chemical Facility/Fike Chemicals, Inc. site, currently listed on the U.S. Environmental Protection Agency's National Priority List.

An Archives Search Report (ASR) was prepared by the Rock Island District of the U.S. Army Corps of Engineers in October of 2001. The purpose of this investigation was to characterize the site for the potential presence of ordnance and explosives, including conventional ammunition and chemical warfare material. The ASR presents the findings of historical records search and site inspection for the presence of ordnance and explosives. As part of the ASR, the Corps reviewed numerous records at the National Archives, the Center of Military History, the Library of Congress, the Corps' Office of History, and the Washington National Records Center. Interviews with long-time area residents and Corps personnel familiar with the site were conducted, and a visual site walkover and inspection was performed.

The ASR indicated that no part of the site was considered to have any ordnance or explosives present. These findings are to be presented to the public in the coming months as part of a public meeting and poster session to allow for comments. After comments have been addressed, the ASR will be finalized.



Public Safety Main Goal at Dolly Sods

Dolly Sods is located between Canaan Valley and Seneca Rocks within the Monongahela National Forest in Grant, Randolph and Tucker counties of West Virginia. High upon the Allegheny Plateau, with elevations up to 4,100 feet, the area of more than 18,000 acres is well known for its extensive rocky plains, upland bogs, and sweeping vistas. Up to 76,000 people visit Dolly Sods annually; the remoteness, back to nature experience, and limited human influences attract adventurous hikers, mountain bikers, fishers, hunters, and berry pickers.

Many of the lands now referred to as Dolly Sods were acquired by the U.S. Federal Government between 1916 and 1939 for natural resource management purposes. During 1943 and 1944, military maneuver exercises and artillery and mortar practice were conducted in the area by the U.S. Department of the Army as training for involvement in World War II. Dolly Sods was a part of the 2,181,000 acres that were used for such training; this total acreage is known as the former West Virginia Maneuver Area.



Windswept spruce at Dolly Sods North Area

Following the conclusion of World War II, the Dolly Sods region was searched and cleared by military Explosive Ordnance Disposal teams. The actual amount of ordnance remaining in the region subsequent to this initial clearance is undetermined, but the risk is illustrated by the sporadic but continuous discovery of ordnance scraps and pieces by recreational visitors and the location of such materials by recent government clearances.

Over the past decade, several removal efforts managed by the U.S. Army Corps of Engineers (USACE) Huntington District have successfully removed ordnance from areas that see the most use in the Dolly Sods area, particularly the Red Creek Val-

ley area, higher-density campsites, and trails. Previous remedial actions conducted by the USACE (the most recent action spanned the period of 1997-1998) were the most feasible based on the influencing factors of cost, environmental impact, and reduction of public risk. Due to numerous conditions and facts, previous remedial actions could not, and were not expected to, negate ordnance-related risk entirely. However, previous actions by the USACE over the past decade have significantly reduced the amount of ordnance posing a hazard to the public in the most widely used areas.

An Ordnance and Explosives (OE) Recurring Review is currently being conducted for the Dolly Sods project in order to ensure the continued protection of human health, safety, and the environment. The Huntington District of the USACE is leading and managing the review process efforts, with the USACE OE Center of Expertise, the U.S. Forest Service, and the West Virginia Department of Environmental Protection also involved and contributing support.

The Dolly Sods Recurring Review process is authorized under the Defense Environmental Restoration Program (DERP) that was established by the Superfund Amendments and Reauthorization Act of 1986. DERP addresses the removal and remedial clean-up activities at Formerly Used Defense Sites (FUDS). The Department of Defense has delegated authority for executing OE response and Recurring Review activities at FUDS to the U.S. Army Corps of Engineers (USACE) through Headquarters, Department of the Army (HQDA). The USACE Huntington District is the Geographic District and has project management responsibilities for the Dolly Sods project.

The purpose of the Recurring Review that is in progress is to determine if a recent ordnance removal action conducted in the Dolly Sods area (see above) continues to minimize explosives safety risks and continues to be protective of human health, safety, and the environment. The recurring review will also provide an assessment of the applicability of new technology for addressing previous technical impracticability determina-

tions. The Recurring Review will answer three general questions: 1) Is the recent USACE response action functioning as intended?, 2) Are any assumptions used at the time of the response selection still valid?, and 3) Does new information indicate that the previously selected response no longer minimizes possible ordnance-related risk?.



Red Creek at Dolly Sods

To answer the general questions posed above, a multi-phased approach is being employed. An interdisciplinary team spanning several government agencies has been established, and existing project-related documents and data are being compiled and reviewed. The voluminous Administrative Record (AR) for the Dolly Sods project has been digitally scanned, and now fits onto a single compact disc; by reducing the size of the AR and by also placing it on a project website, government agencies and the public will be able to more easily access all of these documents. A Geographic Information System (GIS) for the Dolly Sods project has been developed, and is currently being updated and used as an innovative way to improve data management, decision-making, map generation, and on-site field work efforts. A community relations plan has been developed and is currently being enacted. An extensive field session is planned, during which an evaluation of institutional controls in the Dolly Sods region will be conducted, an assessment of site conditions will be made, and a meeting to inform the public of current project activities and solicit feedback will be held.

Subsequent to all research required for the Recurring Review, conclusions regarding the functional effectiveness of the recent USACE ordnance removal action will be made by the project team, and possible recommendations for further necessary actions to benefit the Dolly Sods project and the public may be presented.

Dolly Sods Restoration Going High-Tech

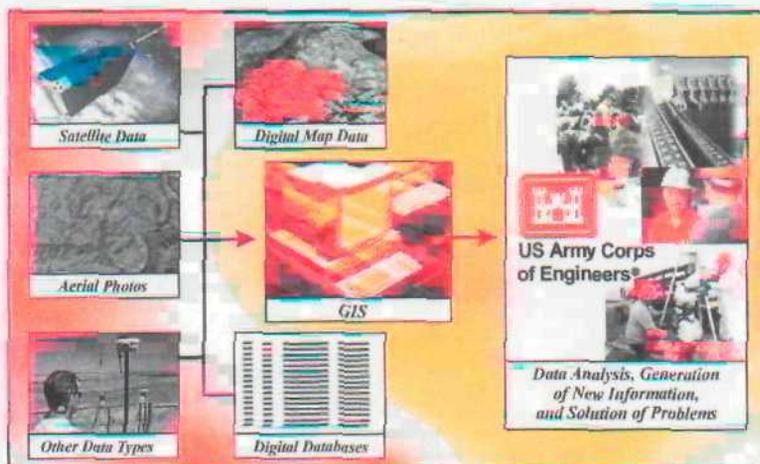
Site Background

During World War II, military maneuver exercises and artillery and mortar practice were conducted in the Dolly Sods area by the U.S. Department of the Army. During military maneuvers, live and inert 57 mm, 60 mm, 81 mm, 105 mm, and 4.2 inch mortars (including high-explosive, smoke, and phosphorus rounds) were fired. Immediately following the war, the region was searched for ordnance and cleared by military specialists. The Huntington District of the U.S. Army Corps of Engineers (USACE) has had, and currently has project management responsibilities for the Dolly Sods project. The Department of Defense has delegated authority for executing ordnance response activities to the USACE under the Defense Environmental Restoration Program.

The Dolly Sods region currently attracts numerous hikers, mountain bikers, fishers, hunters, and berry pickers; between 45,000 and 76,000 people have visited the region annually in recent years. In order to minimize potential ordnance-related risk, the USACE conducted several removal actions during the past decade that successfully removed ordnance from areas with the most use in the Wilderness and North areas of Dolly Sods, particularly the Red Creek Valley area, higher density campsites, and trails. All designated and maintained trails in these areas, plus their adjoining, known campsites were cleared of ordnance to a designated depth and width. The removal actions were concentrated in locations frequented by visitors, because the chances of injury to the public are increased by the number of persons passing over any possible ordnance.

GIS and GPS Technologies Application

The Huntington District of the USACE is utilizing Geographic Information System (GIS) and Global Positioning System (GPS) technologies in order to effectively facilitate continued



Through data management and integration a GIS facilitates problem solving

project success at Dolly Sods. A GIS is a computer system that enables the capturing, storing, analyzing, and displaying or mapping of geographically-referenced data (i.e. data that is identified based on its location). The GPS is a space-based navigation system that utilizes data obtained from a constella-

tion of earth-orbiting satellites. Using a portable receiver, signals can be recorded from the satellites, and trigonometry can be used to accurately determine the location of the receiver on the earth's surface. GIS and GPS facilitate the acquisition, management, analysis, and application of geospatial data, and these technologies can therefore be used conjunctively to greatly improve the potential for solving many types of problems.



GPS allows accurate location determination using satellites and portable receivers

GIS and GPS technologies are currently being used for the Dolly Sods project as an innovative way to improve data management, decision-making, map generation, and on-site field work efforts. The large amount of Dolly Sods project-related data is all being geo-spatially referenced in the same coordinate system and assigned numerous attributes in a GIS database. This allows data such as that regarding previously located ordnance, or previously cleared trail locations to be more easily analyzed, and mapped quickly in different ways. Because one data point within a GIS can contain different types of information, it is possible for instance, to produce multiple maps showing all locations of past ordnance that were located through USACE clearance operations – one map may show the type of ordnance that was found at each location, while another map may show the specific date that the ordnance was found at the location. Data within a GIS can also be easily overlaid onto digital aerial photography or topographic maps, allowing a quick assessment of the type of terrain (i.e. flat-lying or mountainous) that a certain trail passes over for example. GPS usage during field work at Dolly Sods allows an accurate determination of the location where photographs are taken, and also allows one to locate his or her position on a map while traversing the terrain.

The application of GIS and GPS to Dolly Sods will continue to result in numerous benefits for the project area, and will also benefit other projects elsewhere by serving as a good example of how these technologies can be employed to benefit the public.

For additional information on ordnance reporting activities in the Dolly Sods area, contact the Huntington District of the USACE at 304-529-5388, or visit USACE's Formerly Used Defense Sites (FUDS) website, located on the internet at <http://www.lrh.usace.army.mil/projects/fuds>.

Over 320 Million Gallons of Water Treated at WVOW

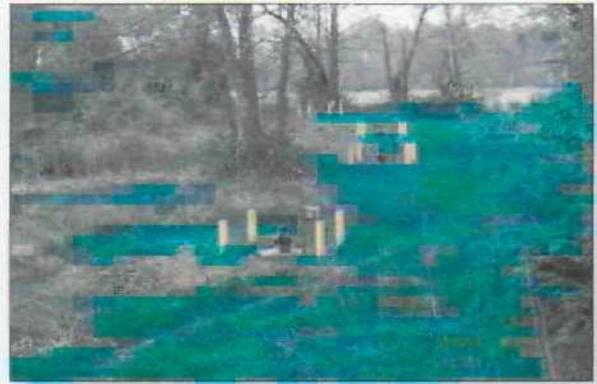
The groundwater extraction and treatment systems at Operable Unit 4, within the West Virginia Ordnance Works (WVOW), continues to effectively treat nitroaromatic impacted groundwater from the former Red Water and Yellow Water Reservoir areas. Groundwater treatment includes granular activated carbon to remove nitroaromatics, followed by wetlands discharge and subsequent treatment to remove naturally occurring metals. The metals are naturally occurring constituents in the groundwater, not associated with operations of the former ordnance works facility.

Due to the high metal content of the treated groundwater, discharge into nearby streams was not allowed under WVDEP regulations. The Huntington District of the U.S. Army Corps of Engineers determined the best treatment alternative would be to discharge to a small tributary to Mill Run Creek for the Yellow Water Reservoir treatment plant, and discharge the Sedimentation Basin below the former Red Water Reservoir for the Red Water Reservoir treatment plant. This alternative was a partnering effort between the Corps, West Virginia University, the WV Department of Environmental Protection, and the WV Division of Natural Resources. The Office of Water Resources accepted the Corps' proposal in August 1999.

After extensive work was completed to prepare the systems for operation, a 14-week pilot discharge study was performed which determined wetlands treatment was suc-

cessful in removing metals from the treated groundwater. As a result, The Red Water Reservoir Plant has operated since September of 2000, and the Yellow Water Reservoir operating since December 2000.

Since the commencement of operations in September 2000, the treatment facilities have consistently met water quality discharge criteria. System shutdown has been minimal, only due to infrequent, but severe thunderstorms and subsequent power outages. Groundwater modeling indicate that the extraction systems are successfully capturing the contaminant plumes. As of July, 2003, each treatment plant has treated and discharged more than 160,000,000 gallons of water.



Red Water Extraction Wells Next to Potters Creek Road

No Aromatics in Residents' Wells at WVOW

A multi-phased water well survey has been completed in the area of the former West Virginia Ordnance Works (WVOW). This facility produced trinitrotoluene, better known as TNT, during World War II. The primary purpose of the survey was to make certain that no water wells in the study area have been impacted by constituents associated with former WVOW activities. The Corps had no reason to suspect any contamination, but decided to conduct the survey on behalf of public interest.

The first phase of the water well survey, which began in April of 2002, was to get an estimation on the number of wells in the study area, and their general location, followed by assessing current water usage from these wells. Other information, like well depth and property owner comments, was also recorded. The survey area included the entire WVOW original boundary, and properties in close proximity to the site.

Over 300 surveys were mailed out or hand delivered to residences and businesses in the study area, and a public

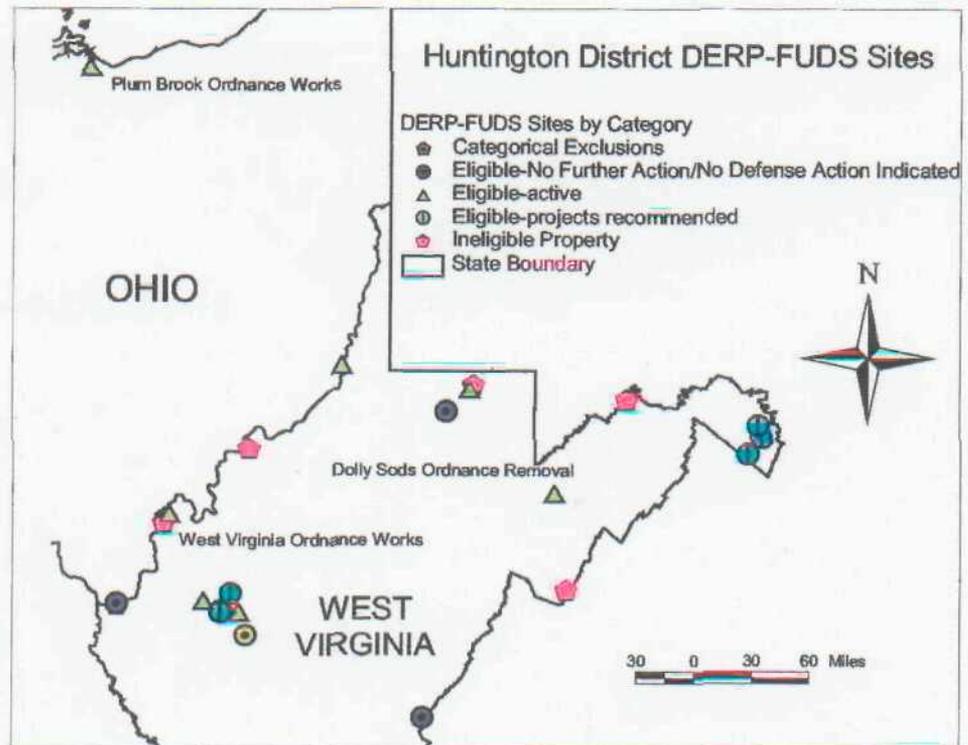
informational meeting held in Point Pleasant in July 2002 to provide the public with the opportunity to review the purpose of the water well study and ask questions to officials from the Huntington District of the U.S. Army Corps of Engineers (USACE) and from Region III of the U.S. Environmental Protection Agency (EPA). The public meeting was also used as a means to get more responses to the water well survey being conducted.

A total of 55 surveys were returned. Based on the surveys returned, a total of 21 water wells were sampled for nitroaromatics, which includes TNT. Nitroaromatics were not detected in any of the wells sampled, indicating groundwater used from private water wells in the area has not been impacted by WVOW activities.

To get more information on the well survey, contact Mr. Kenneth Woodard, Technical Coordinator, in the Huntington District of the Corps of Engineers office, Phone 304/529-5322, or Email Kenneth.L.Woodard@usace.army.mil.

Defense Environmental Restoration Program - Formerly Used Defense Sites (DERP - FUDS) with the Huntington District of the U.S. Army Corps of Engineers include the following active projects:

- Dolly Sods Wilderness and West Virginia Maneuver Area, Davis, WV
- Explosives Plant C Facility, Nitro, WV
- Marshall Army Chemical Plant, New Martinsville, WV
- Morgantown Ordnance Works, Morgantown, WV
- Plum Brook Ordnance Works, Sandusky, OH
- West Virginia Ordnance Works, Point Pleasant, WV
- Yeager Air National Guard, Charleston, WV



For more information on any of these projects, contact:
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USACE Preparing Electronic Public Repository

In keeping with technology, the technical documents required for public display, officially known as the "Public Repository (PR)", for the Dolly Sods, Plum Brook Ordnance Works and West Virginia Ordnance Works projects are growing so fast that shelf space at the libraries is at a minimum. To eliminate this problem, USACE is in the process of developing an "electronic" PR, which consists of the technical documents on CD. This would replace the numerous volumes of information shelved at the library. With this completed, the public can spend hours perusing the technical documents at their leisure with just a click of a mouse. For those with Internet access, plans are currently underway to include the PR on the Dolly Sods, PBOW and WVOW web sites.

