

## INTRODUCTION:

The former Defense Depot Memphis, Tennessee (DDMT), is a 1995 Base Realignment and Closure (BRAC) site with a highly effective and functional BRAC Cleanup Team (BCT). The BCT successfully overcame significant challenges this year to keep the cleanup projects on schedule and within budget by identifying leading-edge approaches to expedite cleanup. The pilot testing of several innovative technologies led to refinement of remedial technologies and, in one case, pursuit of a revised remedy. The teamwork and innovative thinking of the BCT will lead to a less costly, more effective and efficient cleanup program at the former DDMT.

## BACKGROUND:

DDMT opened in 1942 in a relatively unpopulated area on the outskirts of Memphis. The Depot's mission was to receive, store and issue a range of commodities for the Army, and later the entire Department of Defense, under the auspices of the Defense Logistics Agency (DLA).

Hazardous materials were used, stored, repackaged and shipped at the Depot during its operation and some of these items were spilled or leaked at the Main Installation portion of the DDMT. Land north of the Main Installation, called Dunn Field, was used as a landfill in the 1940s and became a disposal site for chemical warfare material. In 1946 a train traveling through Memphis to Pine Bluff Arsenal was discovered to contain 29 captured German mustard bomb casings that were leaking. The bomb casings were drained, neutralized and buried on Dunn Field.

During the late 1980s residents living near the Depot became concerned about potential environmental impacts of the Depot when the local utility closed three drinking water wells that contained volatile organic compounds. The Depot was placed on the National Priorities List in 1992 and was slated for cleanup under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In 1995 the Depot was identified for closure under BRAC for eventual transfer to the City of Memphis for economic redevelopment. The installation was officially closed in 1997.

## PROGRAM SUMMARY:

In the 1990s the Depot conducted numerous environmental investigations under CERCLA and pursued through pilot testing various technologies to determine the most effective remedies for the contamination found in the soil and groundwater at the Depot. The BCT was proactive in 1998 by initiating Interim Remedial Action that consisted of groundwater extraction wells to limit further migration of contamination from Dunn Field.

The BCT's diligence in pursuing effective remedies for DDMT resulted in a Record of Decision (ROD) in 2001 for the Main Installation. This ROD approved a remedial strategy of enhanced bioremediation. Additionally, DLA signed a ROD for Dunn Field in 2004. The cost-effective remedies included excavation, transport and disposal of contaminated soils; soil-vapor extraction; zero-valent iron injection to treat soil and groundwater; and permeable reactive barrier (PRB) installation to treat groundwater west of Dunn Field.

Public participation has always been a priority for DDMT. The Depot formed a Restoration Advisory Board (RAB) in July 1994 as a discussion forum and environmental cleanup information exchange with the public and the government agencies involved in the cleanup process. The RAB continues to be a vital link between the Depot and its stakeholders.

**SITE STATISTICS:** (Former) Defense Depot Memphis, Tennessee (DDMT); National Priority List 1992; Base Closure 1995

**Size:** 642 acres – Main Installation and Dunn Field

**Environmental Contaminants:** Pentachlorophenol, Polychlorinated biphenyls, chlorinated solvents, pesticides, heavy metals, and disposed chemical warfare material

**Media Affected:** Groundwater and soil

The DDMT BCT consists of DLA, the Environmental Protection Agency (EPA) Region IV, and the Tennessee Department of Environment and Conservation (TDEC).



In a moment of what would prove to be valuable foresight, contingency plans were included in both RODs

The Depot fosters active community participation through face-to-face meetings, community briefings, regular newsletters, fact-sheets and effective media relations. Community feedback, which provides critical input to the community relations plan, is received through surveys and focus group research. The Depot's environmental team addresses the community concerns through this robust community outreach program. The team continues to renew these efforts to remain visible in the community as work at the site progresses.

Through execution of four Findings of Suitability to Transfer (FOSTs) for the Depot, a total of 422 acres of land has been transferred. While much of this land went to the Depot Redevelopment Corporation for reuse as an industrial park, other community groups benefited as well. One FOST resulted in land and housing being transferred through the city of Memphis to the local Alpha Omega Veterans Services for use by homeless veterans. A second FOST transferred nearly 47 acres of golf course to the city of Memphis. This property subsequently transferred to Memphis Athletic Ministries (MAM) who partnered with Mid South Junior Golf Association/First Tee of Memphis to reopen the former DDMT nine-hole golf course as a training facility for urban children. The facility is now known as the MAM Park Golf Course. Another transfer to the city of Memphis established the Southeast Precinct of the Memphis Police Department on former DDMT property. The last FOST was completed at the Depot in February 2005.



## **ACCOMPLISHMENTS:**

Examples of DDMT BCT's forward thinking and focus on accomplishment throughout the cleanup include installation of the Interim Remedial Action early in the process, signature of RODs with multiple remedies and contingencies, and transfers of land parcels as they are cleaned. In 2006 the BCT continued this tradition by reviewing innovative technologies and alternative installation methodologies to accomplish the remedies selected for the Main Installation and Dunn Field.

DDMT's contractor teams worked together to collaboratively expedite the cleanup timeline. Specifically, DLA included the remedial action contractor (RAC) in the cleanup process prior to remedial design completion. Through this early participation, the RAC identified remedial design constructability issues to eliminate remedy implementation delays. This early RAC participation also minimized the time between remedial design completion and remedial action execution.

The contractor teams collaboration allowed additional investigations and testing, which provided better information to define the site and refine cleanup remedies and other remediation strategies. The relationship and interaction among the DDMT BCT members has been the cornerstone of the cleanup's progress.

After completing the remedial action on the Main Installation in 2006, the BCT focused their efforts on finalizing the remedial designs for the remedies at Dunn Field. The remedies proposed in the Dunn Field ROD include excavation, transport and disposal of contaminated soils (which was completed in 2005/2006); soil-vapor extraction; zero-valent iron injection to treat soil and groundwater; and installation of a PRB to treat off-site groundwater west of Dunn Field. Because of the BCT's shared vision, DLA was able to introduce several innovative projects that resulted in cost-savings and greater effectiveness for the remedies with minimal disruption to the program schedule. Some specifics are as follows:

- Initiation of a Membrane-Interface Probe (MIP) study to reduce the footprint of soil needing treatment using zero-valent iron. The study required a minor schedule extension, but lowered the full-scale implementation cost by successfully refining the treatment area.

- Addition of thermal technologies to more effectively treat the loess aquifer. During the MIP study to refine the treatment footprint, additional information was obtained regarding the type and extent of contamination in the loess aquifer. The information suggested that while the soil vapor extraction system, initially planned for both the loess and fluvial aquifers, remained quite effective for the fluvial, an alternate technology would be more effective in the loess. The BCT reviewed thermal treatment as an option and discovered that thermal treatment would remediate the loess aquifer faster without additional cost.



- Review of alternate PRB installation technologies to identify a viable installation method. As more information became available on the geology and hydrogeology of the areas west of Dunn Field, the BCT realized that installation of an effective PRB to treat contamination to the remedial goals would be a challenge. The heterogeneous nature of the subsurface, which leads to irregular groundwater flow rates, and the physical limitations in the area of installation (i.e., overhead utilities) make the previously planned methodologies cost prohibitive for installation of an adequate PRB layer. The BCT agreed to test alternate installation technologies to determine whether a more effective technology can be found. Jet grouting, used in oil exploration but never in an environmental application, was pilot tested. Although the results were not favorable for full-scale implementation, the slight delay was nonetheless valuable for the BCT to continue to explore innovative technologies for determining the most cost-effective and successful remedies available for DDMT.

The BCT's open-mindedness to the new data allowed them to realize that there may be more effective installation methods for the off-depot groundwater reactive barrier treatment. The BCT is currently pursuing a ROD amendment to modify the remedy from a zero-valent iron PRB to a bio-barrier with fewer installation challenges, lower costs and faster cleanup.

As the DDMT team moves forward with these and other environmental management strategies, valuable information has been acquired that will increase effectiveness here and elsewhere. Knowledge gained at the Depot can be used in future environmental cleanup projects at government sites across the country.

### **PROGRESS:**

Use of new technologies has been the key to the continued success of the Depot's cleanup program. Without the shared vision and forward-thinking members of the BCT, these accomplishments would not have been possible. DDMT is a model for partnership; the entire city of Memphis will benefit from the dedication to teamwork and innovation that the BCT has demonstrated on this project.

The goal of the environmental cleanup at the Depot is to turn the land into a valuable asset for the community's future. Each step taken during this process brings us one step closer to that goal.