





# Cleanup and Closure at Camp Navajo

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*After assuming the lead role in conducting the Resource Conservation and Recovery Act closure of munitions detonation operations at Camp Navajo in 2000, the Army National Guard is set to implement post-closure care in spring 2011.*

Camp Navajo, Ariz., built by the U.S. Army in 1942, served as an active munitions depot until 1994. As part of the installation's storage mission, disposal of military munitions by open burn/open detonation (OB/OD) had been conducted from 1942 through 1994. In 1982, Camp Navajo applied through the *Resource Conservation and Recovery Act* (RCRA) to continue the active OB/OD disposal mission. The Arizona Army National Guard (AZ-ARNG), through an agreement with Army Materiel Command, was responsible for active depot operations from 1982 until 1993. As a result of the *1988 Base Realignment and Closure Act* (BRAC), Camp Navajo was licensed to the Arizona National Guard in 1994 for industrial and military training use.

Although Army Environmental Command conducted initial RCRA closure activities from 1993 to 2000 under BRAC, the National Guard Bureau (Guard) in 2000 assumed responsibility for conducting the OD/OB closure operations. The Guard and the AZ-ARNG have successfully executed risk-based characterization and cleanup actions following the *Comprehensive Environmental Response Compensation and Liability Act* (CERCLA) process. The Camp Navajo RCRA closure has been well received by the Arizona Department of Environmental Quality (ADEQ), and the Guard has identified several valuable lessons learned associated with responsive stakeholder communications, outlining a clear closure strategy, and applying innovative technical approaches.

## COMMUNICATIONS

In all projects, an understanding of the various stakeholders, lines of communication and key decision makers is critical. Identifying and defining the role of key stakeholders can be very complicated with multiple Army cleanup programs and multiple regulatory stakeholders, each with different regulatory enforcement authorities, goals and objectives.

Prior to 2000, none of the Camp Navajo closure project stakeholders had a clear understanding of the decision makers and process, and a consensus closure approach and process was not defined. In an attempt to resolve the stakeholder's communication issue, the Guard developed a management action plan to identify the stakeholders in the two cleanup programs and their roles and lines of authority. The plan outlined a tiered conflict resolution process between the Guard and ADEQ, the two primary decision makers. The resolution process played a signifi-

PHOTO COURTESY CH2M HILL

A white phosphorous 81-mm mortar is disposed of by open detonation at Camp Navajo, Ariz., in spring 2010. A total of 11,178 munitions and explosives of concern were destroyed as part of the RCRA closure project.

cant role in resolving communication issues, primarily because it identified—by organization and title—the person responsible for resolving the issue. The process comprised three tiers: ADEQ's Federal Projects Unit Manager and the Guard's Remedial Program Manager; then the ADEQ Waste Programs Division Director and the ARNG Cleanup and Restoration Branch Chief; and finally the ADEQ Director and the Director of the ARNG Environmental Division.

The resolution process proved effective on both the RCRA closure project and the Installation Restoration Program (IRP). The management action plan played a significant role in the development and approval of the closure strategy as well as other investigation, remediation and closure processes. The plan demonstrated to all stakeholders that the Guard was committed to open communications and involvement of the key stakeholders in decision making.

### RCRA CLOSURE STRATEGY

Initial discussions with ADEQ on the closure process for IRP and RCRA sites in the OB/OD area focused on how munitions and explosives of concern would be addressed and ADEQ's requirement to address them within each site's boundary as defined in the conceptual site model. In the OB/OD area there were two sites that generated the munitions. One OD site consisted of more than 265 detonations pits used to destroy conventional munitions ranging. Another site was located within the floor of a canyon adjacent to the 265 pits and was primarily used to demilitarize 81-mm mortar white phosphorous munitions. The munitions kick-out from the two sites was distributed laterally across adjacent RCRA and IRP sites within the boundaries of the OB/OD area.

In February 2004, the Guard proposed a unique closure strategy—consisting of three components—to address the munitions for the sites in the OB/OD area.

1. Use the CERCLA risk-based cleanup process to investigate, remediate and closeout all sites (both IRP and RCRA) under the direction of ADEQ and in coordination with the ADEQ Hazardous Waste Permit Unit.
2. Separately address munitions and explosives of concern contamination generated from detonation activities

and chemical contamination generated from historical activities such as propellant burning.

3. Focus and condition closure of the RCRA interim status permit based upon the sites identified in the initial RCRA permit application.

This allowed the individual chemical contamination sites to be addressed quickly by familiar and traditional methods, while munitions were addressed on a site-wide basis. Upon closing out or implementing the final remedy under CERCLA, the RCRA sites requiring long-term care will transition to an RCRA post-closure permit. The key to success of this approach was receiving regulatory approval of the munitions closure strategy for the detonation sites. The Guard was able to accelerate the closure of six RCRA sites and 12 IRP sites for chemical contamination in the OB/OD area.

### INNOVATIVE TECHNICAL APPROACHES

As the Guard completes the CERCLA process for the RCRA and IRP sites in the OB/OD area and prepares to transition into the RCRA post-closure permitting process, two concerns remained between ADEQ and the Guard. The first concern was the munitions characterization approach for the detonation sites and defining a zero-line (no munitions present). The Guard proposed the following characterization approach to ADEQ:

- Create 200-ft by 200-ft grids across the study area and characterize a select number of randomly-chosen grid cells.
- Evaluate munitions distribution against the conceptual site model.
- Generate statistical confidence of munitions spatial distribution.
- Develop estimated quantities of munitions remaining.

The munitions characterization data were used to determine the munitions density and zero-line in support of a risk assessment to evaluate potential future land uses and support remedial decisions for the detonation sites. The characterization process allowed stakeholders to agree on the location of the zero-line, which in turn focused the remedy decisions for the proposed AZ-ARNG future land use of military training. The zero-line reduced the study area from 5,000 acres to 2,500 acres. The detonation kick-out areas were surface-cleared, reducing the restricted

area by another 1,800 acres. The characterization and cleanup effort resulted in more than 4,300 acres being returned to military training use. Munitions remain in the remaining 700 acres due to the presence of highly sensitive and dangerous sub-munitions.

The second concern was groundwater monitoring beneath the OB/OD area. It is technically impracticable to conduct a groundwater investigation in the primary sources areas due to the depth of the groundwater, which is 1,500-ft below land surface, and complex hydrogeology. The cost of such an investigation, coupled with the technical complexity of interpreting physical groundwater data, was not considered feasible or effective by the Army or ADEQ. However, ADEQ required some type of groundwater monitoring for the remaining sub-munitions area to comply with the RCRA post-closure regulations. To meet the groundwater monitoring data requirements, the Guard proposed installing vadose zone monitoring wells within the sub-munitions area. In spring 2009, the Guard installed twenty wells with screens at the soil-bedrock interface 2-ft to 30-ft below the surface. The wells are capturing the spring snow melt and surface water runoff as it infiltrates the unsaturated zone where munitions remain. The wells are providing adequate and representative data at a significantly reduced cost that will comply with post-closure requirements.

### CONCLUSION

Involving key stakeholders in the decision-making process and developing innovative closure strategies and technical approaches has been the key to a successful RCRA closure project. The Guard is scheduled to submit the RCRA post-closure permit and implement the post-closure care in spring 2011. More than 4,300 acres have been returned to the AZ-ARNG for training use. The CERCLA remediation activities resulted in 11,718 munitions and explosives of concern items recovered and destroyed; 384,640-lbs of munitions debris recycled; and 731,030-lbs of range-related debris recycled.

TIME

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