

UTAH ARMY NATIONAL GUARD



ENVIRONMENTAL RESTORATION, INSTALLATION

INTRODUCTION AND BACKGROUND

The Wood Hollow Training Area (WHTA) lies adjacent to the Utah Army National Guard's (UTARNG's) Camp Williams. Transferred into private ownership in the 1990s, WHTA had previously been in use for artillery training since the WWI era. The WHTA encompasses present day mining and quarry operations by the Staker-Parson Company and portions have been annexed by the City of Herriman with plans for future residential and commercial development. However, when a wildfire impacted the area about a decade ago, UTARNG became aware of artillery shells and other munitions and explosives of concern (MEC) prompting WHTA's enrollment into the Military Munitions Response Program as a legacy MEC-impacted site.

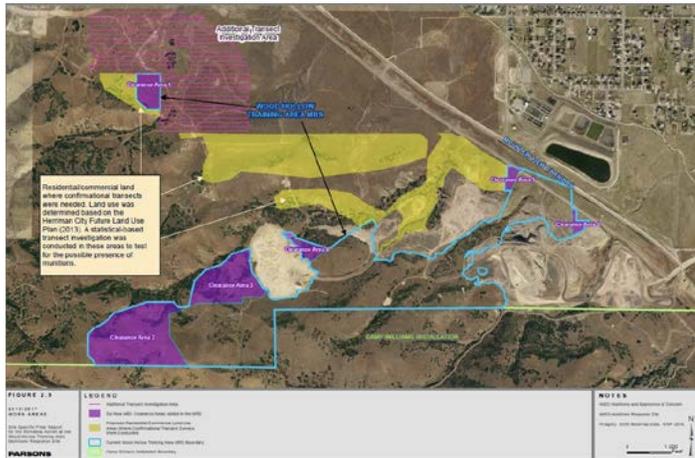
WHTA was found to have a predominance of shrapnel-type 75mm projectiles from the 1920s, along with some 75mm high explosive and 37mm projectiles; in addition to artillery use, the site was used for light

infantry training. Since 2010, UTARNG has been working with its contractors and stakeholders to remediate WHTA, continuously assessing the project's footprint and responding accordingly to restore the site for its proposed future use. Fieldwork commenced in FY14, and by the beginning of FY16, MEC clearance had been completed on 258 acres designated as the Munitions Response Site (MRS), with more than 100,000 points investigated and 65 MEC items 70,000 munitions debris (MD) items recovered. Depths of these materials ranged from 3 to 20 inches below ground, with the bulk of materials recovered from depths of less than 4 inches.

During FY16 and FY17, the MRS was revised to include five high-density target areas for treatment, while Visual Sample Plan (VSP) modeling identified lower density parcels where MEC is less likely to be found, allowing those areas to be clipped from further



investigation with approval from the Utah Department of Environmental Quality (DEQ). Around 656 acres with low probability of MEC continued to be reviewed and treated as necessary, along with the high-probability sites. In the spring 2017, UTARNG completed the remediation of WHTA, with final reports generated over the summer.



2016-2017 Work Areas: Figure shows areas that were cleared of MEC in purple and areas that were subjected to DGM transects in yellow during the 2016 and 2017 field seasons. The MRS is located adjacent to installation active range. Encroaching development includes mining, highway construction and residential development.

While the most important milestone of this project is obviously its completion this year, there were several key accomplishments along the way that stand out. The first round of fieldwork targeting 230 acres was completed by the end of FY15, but in the process, UTARNG and its contractors recognized that the MRS margins would need to be reshaped; there were MEC and MD at significant density at the original site boundary. The rolling hills of the site suggested that hilltops were being used as natural targets, but the project coordinators reassessed the landscape with mining operators, ultimately expanding the area of interest to approximately 1200 acres. During FY15-FY16, the project team surveyed these additional parcels, isolating areas where MEC was present but also confirming its absence in any significant quantities on about half of this 1200-acre site. With an accurate scope identified, the project team was able to implement the final site solution plan in FY16-FY17



using statistical methods to delineate a risk-based strategic approach. In FY16, UTARNG coordinated extensively with the DEQ and the Restoration Advisory Board (RAB) to approve the risk-based approach. Approval of this strategy was the key to the project's success, allowing UTARNG to close out the site without a 100 percent guarantee of full clearance. Rather, using commonly employed commercial standards and with DEQ concurrence, UTARNG's remediation achieved a 95 percent confidence level that there is less than 0.1 MEC per acre in areas zoned for residential use; in undeveloped areas, the 95 percent confidence level applied to a rate of 1 MEC per acre. The project also pioneered an alternative detection methodology. The WHTA MRS is characterized by the presence of volcanic minerals, including magnesium and other metals and rough terrain. This combination meant that conventional digital geophysical mapping (DGM) technology using magnetic imaging was unworkable—the magnetic sensing could not distinguish between soil and MEC or MD. The terrain also meant that the typical cart transport was impossible to deploy. The project team developed a modified mining detection unit as a handheld unit; this tool allowed for more nuanced control of background mineral levels at the site and offered continuous data processing.



Regulator visit on site with steep slopes and flagged anomalies. State regulators are on site to monitor removal activities. UXO detonation took place at the graded pad in the background during this visit.

The project was overseen by UTARNG Environmental Program Manager Robert Price, working in close collaboration with Parsons, a company specializing in munitions and ordnance remediation. Price consulted continuously with the DEQ and presented regularly to the RAB on project progress. He also consulted with the State Historic Preservation Office (SHPO), as there was some consideration of designating the MEC items themselves as having historic significance from the WWI period. Several rounds were ultimately retained and certified as safe so that they can be displayed as military artifacts.

With fieldwork completed in May 2017 and final reports currently being submitted, the DEQ has already provided verbal concurrence that UTARNG has met the terms of the remediation plan for WHTA. During this effort, UTARNG maintained consistent contracting assistance with Parsons, minimizing costs and time loss associated with onboarding multiple firms. The project was contracted through state channels, which offered lower administrative costs. Because of the detection techniques Parsons employed, the completion of the project actually achieved great cost savings compared to the investigation and excavation of countless false positives using conventional detection equipment.

Site Delineation and Treatment Standards

One of the most critical tasks of this project in FY16 was redefining the boundaries of the MRS and establishing standards for the extent of the cleanup effort. When the site expanded to 1200 acres in FY15-FY16, this was understandably a setback, particularly after successful remediation of the original 230 targeted acres. The project team, however, approached this expanse with the intent of systematically isolating actual impacted areas within the broadest potential range. Additional surveys confirmed no indications of MEC or MD on roughly 600 of these acres, permitting the field crews to focus on more probable sites. By mid-FY16, this reassessment was complete, and

UTARNG returned to the DEQ with a final site solution plan employing risk-based prioritization for cleanup. The entire site was mapped to reflect (1) Areas with high density MEC/MD that required cleanup; (2) Areas with no MEC/MD that required no further action; and (3) Areas with moderate densities of MEC/MD that do not warrant 100% cleanup but would be assessed based on the risk criteria of the parcel's future proposed use as commercial, industrial, residential or undeveloped land.

UTARNG presented the risk-based proposal, developed with VSP modeling of the MRS, to DEQ in November FY16. Per this plan, UTARNG statistically determined the probability of MEC in the non-remediated 600 acres. In this statistical risk analysis, the target of acceptable MEC cannot be zero because there is never 100% confidence that every MEC and MD item has been found—but UTARNG would get very close to zero. Using industry standards, the UTARNG set its target of 0.1 MEC per acre (95 percent confidence) in commercial and residential areas and 1 MEC per acre (95 percent confidence) in undeveloped tracts. Based on the modeling completed, these target levels were achievable based on the low probability of MEC over the non-remediated area. DEQ concurred with the risk-based statistical approach based on the current land-use plan for the WHTA. In the event that statistical tests performed to verify levels found additional MEC or MD or determined greater densities of these materials, UTARNG would reevaluate the remediation standards. To achieve a 95 percent confidence level that no more than 1.0 MEC per acre was present, the field crews were required to investigate 3 acres with no MEC found. In fact, based on past and continued transect work, the project determined MEC absence on an average 7.26 acres in these areas, suggesting that actual MEC presence is no more than 0.4 MEC per acre in the undeveloped areas. For residential and commercial zoned areas, the project crews were required to investigate 26.53-acre surrounding parcels with no additional MEC found following identification of a MEC item.

Technological Innovation

Survey of the WHTA MRS was initially undertaken with standard magnetic imaging equipment, but metals in the soil created a staggering rate of false positives. The rough terrain meant that the cart-mounted DGM equipment could not access many areas. Parsons modified sensing equipment used in Australian mining operations, employing the instrument as a solution for accurately identifying MEC or MD presence as subsurface anomalies. The instrument allowed field crews to adjust the background interference for magnetic sensing based on the soil composition, thus avoiding huge volumes of false positives and futile excavations.

The instrument was also handheld, greatly enhancing its functionality in evaluating steep, rocky areas. While conventional DGM equipment captures magnetic data and GPS for subsequent data processing, the modified device also has the advantage of continuous data processing, dramatically speeding up the procedure for identifying sites of concern. Designed similarly to a metal detector, the device was easy to use and provided far more accurate results, allowing one person to cover large stretches of ground rather than requiring two operators to carry or roll the cart-mounted detector over transects.



Field crews use the “Parsons Digital Mapper.” The hand-held digital geophysical mapping (DGM) device allowed technicians to perform DGM surveys in rugged terrain and with high magnetic interference. Rocky terrain and slopes are representative of the site.

Munitions Recovery

Any MEC recovered was detonated onsite; the 75mm French rounds primarily recovered have a fairly small blast radius, allowing for use of project site detonation pits. Any recovered MD was removed from the site for recycling. Most of these materials were shrapnel rounds about the size of a marble. Over the course of the remediation, the field crews recovered over 70,000 MD items and 81 MEC items. For FY16-FY17, 600 of a total 1906 site grids were cleared and 17 MEC items were recovered.

The treatment of the WHTA through the MMRP was essential to addressing the UTARNG’s liabilities and responsibilities for training lands past and present. The UTARNG’s negotiations with DEQ and the stakeholders represented in the RAB (property developers, municipal representatives, landowners, and the mining company) helped to ensure the project’s success on a relatively short timeline, with fieldwork commencing in FY14 and complete in FY17.

One of the important aspects of the land use plan for WHTA MRS is establishment of parts of the area for an Army Compatible Use Buffer (ACUB). The area around Camp Williams has been characterized by rapid growth in recent years, and encroachment is widely recognized as an issue of concern, not only for UTARNG, but also for its neighbors and community. The goal of the ACUB program is to implement conservation measures to assist with natural resource protection fire management protection, and preserving the lands adjacent to the military training facility. The stakeholders of the remediation and the RAB have been proponents for the Camp Williams ACUB, which will also help to establish some valuable recreation areas and fire response trails near the installation.

Throughout this project, the contracted firm provided daily updates on site activities and overall progress.

These records helped to establish not only a project archive, but also a completely transparent record for the DEQ and RAB. This commitment to comprehensive documentation served the project's continuity and compliance. The project's use of modified magnetic detection devices is an innovation that could serve other sites with highly metallic soils or difficult terrain.

Parsons continues to explore its efficacy with other sites, including a restoration being initiated in Hawaii. One of the most transferable aspects of this restoration, however, is the UTARNG's risk-based approach to remediation and the metrics established for achieving MEC recovery in accordance with land use. This strategy would be valuable to any military installation faced with large tracts of land impacted by legacy operations.

The UTARNG conducted regular presentations for the RAB to apprise stakeholders and interested parties in the community about the restoration's progress and the strategies for continued work. This outreach and the coordination with the City of Herriman, Staker-Parson mining company, DEQ and property developers was essential to building the trust and cooperation that made this restoration a success. The RAB associated with MRS areas around Camp Williams was established around 9 years ago when the discovery of MEC beyond Camp Williams's boundaries was initially made, and these stakeholders have been continually integrated into the decision-making process for the WHTA MRS.

Most of the MEC and MD recovered in this project posed at least some risk to human health; high explosive MEC were of concern, of course, more than MD items. Provided that people do not attempt to tamper with or ignite any MEC they encounter, the risk is minimized. To that end, UTARNG's restoration incorporated public education and awareness campaigns to explain the risks of these materials and their proper handling. These campaigns stressed the importance of leaving items in place and contacting UTARNG to address the

hazard. These education efforts will be ongoing for at least the next 5 years, at which point UTARNG will conduct a review of outreach efficacy and future education needs. Distribution of community awareness materials and public meetings have consistently been a priority during this WHTA restoration.