



Geophysical Classification for Munitions Response

Introductory Fact Sheet | October 2012

This fact sheet was developed by the Interstate Technology & Regulatory Council (ITRC) Geophysical Classification for Munitions Response Team. It is the first of three fact sheets designed to provide basic information about geophysical classification for munitions response. For more information about this ITRC team, please visit the ITRC website at <http://www.itrcweb.org/Team/Public?teamID=9>.

Background

For decades, the Department of Defense (DoD) has produced and used military munitions for live-fire testing and training to prepare the United States military for combat operations. As a result, unexploded ordnance (UXO) and discarded military munitions (DMM) may be encountered on former ranges and former munitions operating facilities (such as production and disposal areas). DoD has identified over 4,400 sites in the United States that require a munitions response.

Limits of Existing Technology

To detect munitions for removal at these sites, DoD and its contractors have historically used various types of detection instruments that are similar to metal detectors used by the public to detect coins on beaches. Much like the metal detectors used by the public, these instruments simply detect a buried metallic object—they cannot identify the type of object present. Consequently, on munitions response sites most detected metallic items must be uncovered to determine whether they are military munitions or nonhazardous metallic items. Typically, highly-trained UXO technicians excavate hundreds of nonhazardous metallic items for each military munition recovered. Given the costs associated with this inefficiency, only limited acreage can be addressed with existing resources and budgets.

The time required for unnecessary excavations not only prolongs munitions response, but can be disruptive to communities or recreational areas because the public is prohibited from entering sites while digging is taking place. This practice can result in extended area closures and evacuations. Additionally, digging unnecessary holes can disturb the landscape and vegetation at these sites, whether they are recreational areas, habitat, farmland, or private backyards.

Advances in Technology-Geophysical Classification

DoD and its research partners in academia and private industry have developed a new approach to improve the efficiency of munitions response using geophysical classification. As before, geophysicists use electromagnetic sensors to detect metallic items beneath the ground surface. However, the use of advanced electromagnetic sensors to collect additional data allows geophysical analysts to estimate the depth, size, density, wall thickness, and shape of each buried item. For example, the photos below show the types of items typically found at munitions response sites:



Munition



Suspected
Munition



Munition
Fragment



Debris



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If the geophysical analysis shows that a metallic item is a cylindrical object with properties indicative of a possible munition, UXO technicians will remove it. If the data show that the item is flat or irregular, which indicates that it is not a munition, the item may be left in the ground. If the data are inconclusive, UXO technicians will excavate the item. In the photos above, the first item on the left would be identified as a munition and excavated, the second item would be excavated for identification, the third item would be identified as a munition fragment and left in the ground, and the horseshoe on the far right would be identified as cultural debris and left in the ground as well. This technique can accelerate munitions response efforts by focusing resources on the investigation of those metallic items identified as possible munitions or where the data are inconclusive. Other metallic items would be left in place without investigation, unless selected for quality control or assurance.

Ongoing Demonstrations

At a series of technology demonstrations at munitions response sites throughout the United States, DoD's Environmental Security Technology Certification Program (ESTCP) has shown that this method, when properly applied, will greatly reduce the number of metallic items investigated, while protecting the public and reducing the impact of munitions responses on both affected communities and the environment. For example, at the Camp Beale demonstration site, geophysical classification would have reduced the estimated number of nonhazardous debris items excavated from 1,310 to 285.

Under ESTCP, the success of the geophysical classification technology continues to be demonstrated at sites across the country. As shown in the figure below, the advanced sensors used for geophysical classification may be either hand held (left) or deployed using all-terrain vehicles (ATVs, center) or wheeled carts (right), depending upon site conditions. For further information, please see the ESTCP website at <http://serdp-estcp.org/Tools-and-Training/Munitions-Response/Classification-in-Munitions-Response>



Hand-held Unit



Sled-mounted Unit



Cart-mounted Unit

The ITRC Geophysical Classification for Munitions Response Team is reviewing the results of the ESTCP technology demonstrations as part of the process for developing supplementary fact sheets, guidance, and training on geophysical classification. The guidance will document when and where the use of the geophysical classification method is appropriate, as well as the geophysical expertise and experience necessary for the successful use of geophysical classification technologies, and recommendations for appropriate quality control and quality assurance procedures.

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