

## UXO Detection/Discrimination Enhanced Capabilities

The ERDC Environmental Laboratory and R&D partners in the Geotechnical and Structures and Cold Regions Research Engineering Laboratories are addressing the Army's highest priority environmental restoration problem by developing technologies for the rapid, cost-effective detection and discrimination of unexploded ordnance (UXO). This work is being conducted under the umbrella of the U.S. Army Environmental Quality Technology (EQT) Program.

**Problem:** There are estimated to be over 2,000 closed or transferred ranges that may require UXO characterization activities. Current site screening methods involve an operator using magnetometers, gradiometers, or metal detectors to manually identify anomalies (i.e., UXO, man-made clutter, natural metallic substances) for interrogation. This method is generally referred to as "mag and Flag" and has demonstrated minimal capabilities to distinguish UXO targets from non-UXO anomalies. The major technology shortfall of these systems is the inability to discriminate UXO targets from natural and man-made clutter.



UXO and anomalies flagged for removal



Geonics EM-63 with GPS positioning

Approximately 76 percent of current costs associated with UXO remediation involve the removal of non-UXO anomalies with only 9 percent attributed to UXO removal (15 percent goes for vegetation removal and other related activities). Estimates by various DoD agencies have placed the total cost for remediation of UXO on U.S. ranges as high as \$391 billion in 2002 dollars. In general, UXO remediation costs currently range from \$5000 to \$8,000 per acre.

**Objective:** During FY03-FY05, the ERDC plans to develop, demonstrate, and transition improved UXO target detection and discrimination algorithms applicable to vehicle towed, man portable, and handheld UXO detection systems. The planned enhancements to UXO detection/discrimination systems will derive cost savings by providing greater detection and discrimination capabilities. Objectives are to increase detection of ordnance items to 95-98 percent, to increase discrimination/rejection of non-UXO targets to 75-90 percent, and to decrease the maximum false negative rate to between 0.5 and 5.0 percent.

**Benefits:** The enhanced UXO detection/discrimination systems are expected to provide: (1) an 80-percent reduction in UXO remediation costs associated with UXO removal; (2) a high probability of UXO detection and anomaly (clutter) rejection while minimizing false negatives (e.g., non-detection of UXO targets; UXO misidentified as clutter) in a wide variety of environmental conditions; and (3) a safer working environment for explosive ordnance clearing teams. In addition, enhanced UXO detection/discrimination technology will contribute to regulatory and public sector acceptance of UXO range remediation programs.



MTADS vehicle mounted UXO Detection System



UXO range remediation