Abstract for ASEG Conference 2003 – Forensic and Military Geophysics Section

Dramatic Improvements in UXO Detection Using Discrimination and Dual-Mode Sensor Technology

John M Stanley, PhD
Stephen D Billings, PhD
Geophysical Technology Limited (G-tek)
P O Box U9
Armidale NSW 2351
e-mail: jstanley@g-tek.com.au

Regulators in Australia will need to take note of new technologies being introduced into the USA that are achieving significant improvements to the detection of Unexploded Ordnance (UXO) with fewer false alarms due to geological or metallic fragmentation sources. In a litigation conscious environment, US regulators are beginning to demand that two sensor types (typically magnetic and electromagnetic) be used because this increases the probability of UXO detection. While this adds to the data acquisition cost when two conventional detector systems are used, the principal cost in UXO remediation is the excavation of targets that prove not to be UXO.

Research conducted in the USA and Australia by Australian scientists is being recognised as capable of dramatically reducing the incidence of false alarms while at the same time, improving detection performance. The result is better performance at lower cost.

Significant advances in discrimination (identification of UXO from other targets) have been achieved under the auspices of the Montana Army National Guard using advanced magnetometer and data processing technologies. In two case studies at large UXO contaminated sites in Montana, false alarm rates of between 3 and 5 (false alarms per UXO) were achieved - compared to the 50:1 average obtained across the US industry. Key to the success of this discrimination is our understanding of the effect that entering the ground ballistically has upon the remanent magnetization properties of the UXO.

G-tek has also been developing its patented Sub-Audio Magnetics (SAM) technology originally developed and currently used for high definition mineral exploration. SAM simultaneously provides co-registered Total Field Magnetic Intensity (TMI) and Total Field Electromagnetic (TFEM) data at little more cost than performing conventional magnetic detection. It detects ferrous as well as non-ferrous metals and meets the requirements of a dual-mode sensor. SAM is soon to be deployed by the US Army Corps of Engineers for full-scale evaluation.

These results have the potential to dramatically reduce the costs of UXO decontamination and remediation while also improving the detection performance. However, in order for owners of contaminated property, especially the Government, to benefit from the advances, regulators will need to fully acquaint themselves with these new technologies so that they can be included in their approval methodologies.

[This paper is a condensation of 3 landmark papers to be presented at the UXO Forum at Orlando, Florida in September 2002.]