Use of Benign Chemical Treatment for Munitions Constituents Breakdown in Various Media (Task N.0825)

Statement of Need

Munitions constituents (MC) contamination on military lands is an on-going problem that often requires multi-decade chemical monitoring. According to the United States General Account Office, there are about 6,000 contaminated current or former Department of Defense (DoD) sites in the United States (e.g., operating and former ranges and operating or former munitions facilities). The cost to conduct long-term monitoring on these sites is a substantial drain on current and future resources. More cost effective, innovative, and improved methods of remediation are needed to address explosives MC-related contamination at many of these sites.

Technical Approach

A commercially available product called MuniRem®, produced by PLANTECO Environmental Consultants, LLC, is an environmentally benign chemical mixture that has been shown to sequester heavy metals and remediate explosive compounds, such as 1,3,5-Trinitro-1,3,5-triazacyclohexane (RDX) and 2,4,6-Trinitrotoluene (TNT). Under this task, the NDCEE will first review available literature/documentation related to past studies regarding removing explosives contamination from metal surfaces and groundwater by PLANTECO. This information will be used to develop a Field Protocol for the Application of MuniRem® to Remove Explosives from Metal Surfaces and a Field Pilot Test Plan for the Application of MuniRem® to Remove Explosives from Groundwater. Upon completion of the literature review, the Team will conduct a field validation utilizing a batch reactor to evaluate the ability of MuniRem® to treat explosives contamination on metal surfaces. The MuniRem® will be customized based on the reported test conditions, explosives types, and types of scrap metal. In addition, the Team will conduct bench-scale testing utilizing synthetic groundwater to obtain data that will be leveraged in the development of a Field Protocol for the Application of MuniRem® to Remove Explosives from Groundwater. The NDCEE Team will independently execute this Field Protocol to evaluate the effectiveness of MuniRem® as an in-situ treatment method for explosives contamination in groundwater.

Anticipated Results and Benefits

Implementation of a technology such as MuniRem® has the potential to mitigate explosives contamination hazards before they become a problem or to treat the problem in-situ. Previous studies have demonstrated MuniRem®'s ability to clean scrap metal, either from unexploded ordnance (UXO) or demilitarization at an ammunition plant, to a decontamination level of 5x, which would allow for recycling from a common scrap yard. Because the chemical has no known toxic effects, it is safe to be placed on soil or in groundwater, even after MC remediation. In addition, the very short cleanup time that is anticipated to be achieved with MuniRem® would eliminate the Operation and Maintenance (O&M) costs associated with other remediation technologies.

Government POC
Dr. Robert Kirgan, USAEC

Status
Ongoing

Technology Transfer and Outreach

If MuniRem® is shown to be effective in treating explosives contamination, it may be applicable to thousands of contaminated DoD sites. The NDCEE Team will work with the Technical Monitor to identify key stakeholders across the Services to promote collaboration and partnering opportunities. The Team plans to highlight this technology at conferences, such as the 2014 United States Army Corps of Engineers (USACE) Stand-up (Military Munitions Support Services [M2S2]). Furthermore, the Team will prepare a presentation that summarizes key project highlights and successes to be used at conferences and to be made available for other outreach events.