ESTCP PROJECT OF THE YEAR

GRENADE RANGE MANAGEMENT USING LIME FOR DUAL ROLE OF METALS IMMOBILIZATION AND EXPLOSIVES TRANSFORMATION

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Grenade ranges are among the most heavily used training areas in the military. They consist of large sand pits surrounded by cement walls that troops use to practice throwing live grenades. Once the grenades explode, munitions constituents such as RDX may remain in the sand. Over time, large amounts of RDX can accumulate in the soil and eventually contaminate the groundwater on the military base and potentially in surrounding communities. There is no accepted technology currently available for the management of munitions constituents in active grenade range soils using non-invasive techniques.

Dr. Steven Larson and his team from the U.S. Army Corps of Engineers, U.S. Army Environmental Command, U.S. Army RDECOM-ARDEC, U.S. Army Aberdeen Test Center, Shaw Environmental, Inc. and Applied Research Associates, Inc. have validated the long-term degradation of explosive contaminants and the immobilization of metals in grenade range soil through the in-situ application of lime, an inexpensive and readily available material. Increased alkalinity, caused by lime addition to the range soil, results in significantly decreased water solubility of heavy metals present in the soils and base-catalyzed transformation of explosives that eliminates migration of RDX- and TNT-based explosives from the range area. The effects of continued hand grenade range use and precipitation events were assessed during in-situ lime treatment through surface and leachate water monitoring. Pre- and post-treatment assessments of grenade range demonstrations at Fort Jackson, South Carolina, consisted of chemical analysis, soil characterization, contaminant leachability testing, and toxicity assessments.

The application of lime on a regular basis can be incorporated into standard range maintenance procedures at minimal cost. Proactive management of grenade ranges using this technology will help mitigate potential range closures that could impair military training and mission readiness. The potential DoD cost for soil remediation is also reduced via in-situ treatment and through elimination of contaminant migration to water sources.

For more specific information about this project, stop by Poster #135.