ESTIMATING THE SURFACE LOADING OF MUNITIONS CONSTITUENTS (MEC) ON MILITARY TRAINING RANGES

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Today, an expanding body of guidance is available for site characterization activities addressing the concentration and mass of energetic and metallic residues in military training range soils. Documentation of this information can be found on the web sites of the U.S. Environmental Protection Agency, DoD Environmental Data Quality Workgroup, and the U.S. Army Corps of Engineers Environmental and Munitions Center of Expertise. As a consequence, characterization of these potentially hazardous constituents can be addressed within a consistent framework.

The ultimate goal of site characterization is to establish representative mean soil concentrations to allow for the estimation of mass loading. To address the compositional and distributional heterogeneity associated with MC particulates, the sampling strategy must strive to acquire samples that contain the constituents of concern in the same proportion as the bulk matrix present within the decision unit (sampled area, population, exposure unit). This objective can be frequently achieved for soil with 1 kg or larger samples built by combining 50 or more increments collected using a systematic-random sampling design throughout the area of concern. Moreover, to ensure that the subsample taken for analysis of MC is representative of the sample, the sample must be thoroughly ground.

Adoption of these recognized protocols will address the compositional and distributional heterogeneity of MC over military training ranges and provide military programs with a reliable means of ranking the mass loading within areas where deposition is likely. Research has shown that, in general, MC are deposited on the surface, and the highest concentrations exist at firing positions, near targets, and where demolition activities are performed. In the case of energetic residues, the greatest source is from rounds that fail to detonate as designed. For metallic residues, highest concentrations are typically found in earthen backstops where bullets accumulate as a consequence of small arms training activities. Managing the locations where MC are deposited will help sustain training range availability and help to prevent off-site migration.