Reduction of Leachable Dinitrotoluene Using Cement and Fly Ash.

Jason M. Leibbert and William B. Empson, U.S. Army Corps of Engineers Kansas City District, David Hixson, Jacobs Engineering Group, Raymond E. Bailey and Marjorie Wesley, MK-Ferguson Company.

The former Weldon Spring Ordnance Works produced Trinitrotoluene (TNT) and Dinitrotoluene (DNT) explosives in the early 1940s. As a result of the manufacturing, significant levels of explosives were present in site soils. Efforts between 1945 and the 1960s to clean up these explosives led to the co-mingling of explosives, lead, and asbestos wastes. A portion of the site was used by the Atomic Energy Commission (AEC) in the 1950s and 1960s for the processing of Uranium and Thorium. As a result, some site soils contained both explosives and radionuclides. The levels of 2,4 DNT in the soils were determined to be greater than the regulatory limit of 130 μg/l under the Resource Conservation and Recovery Act (RCRA). In order to facilitate disposal under the Land Disposal Restrictions (LDRs), an innovative treatment method was required since thermal treatment of soils containing explosives and radionuclides or asbestos would be exceptionally complicated. In a coordinated effort, the Department of Energy (DOE) (Formerly AEC) was responsible for any soils containing explosives and radionuclides while the U.S. Army was responsible for any soils containing explosives and lead or asbestos. Through bench testing and strictly controlled field implementation, the DOE determined that the addition of 20 percent by weight cement and fly ash could reduce the leachable 2,4-DNT from over 1000 μg/l to below the LDR limit of 130 μg/l. In cooperation with the DOE, the U.S. Army Corps of Engineers then expanded on the bench scale testing to include the use of granular activated carbon and implemented a similar and equally successful field treatment operation that demonstrated consistent compliance with the LDRs using less rigorous field controls. The results of these efforts indicate that the process is time dependent and that temperature and water content affect the rate at which the treatment process progressed. The process is cost competitive with thermal treatment.

Presenting Author: Jason M. Leibbert
U.S. Army Corps of Engineers
Kansas City District
CENWK-EC-ED
Jason.m.leibbert@usace.army.mil
Tel: 816-983-3556
Fax: 816-426-5550