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BANDIT LEACHING STUDY

IDENTIFYING POTENTIAL ENVIRONMENTAL HAZARDS ASSOCIATED WITH THE LONG TERM USE OF BANDIT SOIL TREATMENT

INTRODUCTION

Bandit Soil Treatment is a single-component, low-viscosity liquid designed to bind loose soils. Once cured, the product becomes a highly cross linked polymer that forms an inert, solid mass with the soil. Bandit is often used to improve soil load-bearing capacity and also for erosion control. Due to the potential use of this product in a variety of natural environments, Geo-Tech has sought to determine any envi-ronmental hazards that may be caused by the application and long term use of this product. The fol-lowing test was performed to characterize the leaching behavior of Bandit. The term "leaching" refers to the extraction of constituents from a certain material to a liquid. More specifically, the test deter-mines the possibility that Bandit could contribute any hazardous substances to its surrounding environ-ment over time.

EXPERIMENTAL

An extensive solid waste characterization was done to identify long term disposal hazards associated with Bandit. A Toxicity Characteristic Leaching Procedure (TCLP) was followed in an effort to simulate the possible leaching that the cured product would undergo if disposed of in a landfill. A sample con-sisting of sand fully stabilized by Bandit was made and sent to the lab. Accelerated aging and landfill conditions were simulated by crushing the sample and tumbling it for 18 hours in a acidic/basic solu-tion.

The testing protocol used was the EPA's SW846, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", in accordance with the Resource Conservation and Recovery Act (RCRA). The strict testing procedure and protocol were selected for this study as a simulated landfill environment would represent the worst possible conditions Bandit could encounter in its typical geotechnical applications. The table on the reverse side shows the results from the third party TCLP testing

DISCUSSION

Of all of the analytes tested for in this study, only four were detected. Two of the analytes detected, Barium and Nickel, were detected at concentrations that were reported with a "J" data qualifier. The "J" data qualifier signifies that the concentration is so low that the result is considered to be an estimate. The concentration was between the MDL and RL thresholds, meaning that Barium and Nickel are likely present, although the concentrations are below what the method/instrument can accurately measure. Copper and Zinc were also discovered in the TCLP extract, but also at very low concentrations (under 1 mg/L). All four metals detected are commonly found in soils and are likely to have leached from the sand, and not the Bandit. Nevertheless, the concentrations of the detected analytes do not pose any environmental concerns. Copper, Nickel, and Zinc to not have a EPA regulatory level for TCLP, and the level set for Barium is almost 1300 times higher than the concentration found in this study.

Due to the natural occurrence of the detected analytes in soils, and the very low concentration in regard to EPA regulatory levels (or lack thereof), this product has been determined to be a non-hazardous ma-terial and an environmentally safe choice of material to use for soil stabilization.

TABLE DEFINITIONS

RL – Reporting Limit - lowest concentration that a laboratory may report with a set amount of accuracy and precision during routine laboratory conditions

MDL – Method Detection Limit - a statistical calculation determined by the RL. It is usually much lower than the RL and often signifies whether or not an analyte is present

EPA Regulatory Level – The minimum concentration of an analyte detected within the TCLP extract for a material to be considered as hazardous

RESULTS

Table 1: Leaching results

Method 8260B - Volatile Organic Compounds (GC/MS) - TCLP					
Analyte	**Unit**	**Result**	**MDL**	**RL**	**EPA Regulatory Level**
Benzene	mg/L	<0.010	0.010	0.020	0.5
Carbon tetrachloride	mg/L	<0.010	0.010	0.020	0.5
Chlorobenzene	mg/L	<0.010	0.010	0.020	100.0
Chloroform	mg/L	<0.020	0.020	0.040	6.0
1,2-Dichloroethane	mg/L	<0.010	0.010	0.020	0.5
1,1-Dichloroethene	mg/L	<0.010	0.010	0.020	0.7
Methyl Ethyl Ketone	mg/L	<0.050	0.050	0.10	200.0
Tetrachloroethene	mg/L	<0.010	0.010	0.020	0.7
Trichloroethene	mg/L	<0.010	0.010	0.020	0.5
Vinyl chloride	mg/L	<0.010	0.010	0.020	0.2

Method 8270D - Semivolatile Organic Compounds (GC/MS) - TCLP					
Analyte	**Unit**	**Result**	**MDL**	**RL**	**EPA Regulatory Level**
1,4-Dichlorobenzene	mg/L	<0.020	0.020	0.020	7.5
2,4-Dinitrotoluene	mg/L	<0.010	0.010	0.010	0.1
Hexachlorobenzene	mg/L	<0.0050	0.0050	0.0050	0.1
Hexachlorobutadiene	mg/L	<0.050	0.050	0.050	0.5
Hexachloroethane	mg/L	<0.050	0.050	0.050	3.0
2-Methylphenol	mg/L	<0.020	0.020	0.020	
3 & 4 Methylphenol	mg/L	<0.020	0.020	0.020	
Nitrobenzene	mg/L	<0.010	0.010	0.010	2.0
Pentachlorophenol	mg/L	<0.20	0.20	0.20	100.0
Pyridine	mg/L	<0.20	0.20	0.20	5.0
2,4,5-Trichlorophenol	mg/L	<0.10	0.10	0.10	400.0
2,4,6-Trichlorophenol	mg/L	<0.050	0.050	0.050	2.0

Method: 6010B - Metals (ICP) - TCLP					
Analyte	**Unit**	**Result**	**MDL**	**RL**	**EPA Regulatory Level**
Arsenic	mg/L	<0.010	0.010	0.050	5.0
Barium	mg/L	0.078	0.050	0.50	100.0
Cadmium	mg/L	<0.0020	0.0020	0.0050	1.0
Chromium	mg/L	<0.010	0.010	0.025	5.0
Copper	mg/L	0.049	0.010	0.025	
Lead	mg/L	<0.0075	0.0075	0.050	5.0
Nickel	mg/L	0.012	0.010	0.025	
Selenium	mg/L	<0.020	0.020	0.050	1.0
Silver	mg/L	<0.010	0.010	0.025	5.0
Zinc	mg/L	0.58	0.020	0.10	