



610 S. Jennings Avenue • Fort Worth, TX 76104
TEL 817-335-1186 • FAX 817-335-9830
Web: www.TALEM.com

November 28, 2008

C.S.S. Technology, Inc.
P.O. Box 1618
Granbury, Texas 76048

Attn: Mr. Ervin Merritt

Re: Roadbond EN 1 Testing

Gentlemen:

Enclosed are the results of analytical tests performed on treated and untreated soil samples that C.S.S. Technology, Inc. submitted to TALEM, Inc. on October 24, 2008. As requested, TALEM, Inc. prepared and tested untreated road base soil, road base soil treated with 6% w/w lime, road base soil treated with 6% w/w cement, and road base soil treated with 0.33% v/v Roadbond EN 1 (one part Roadbond EN 1 to 300 parts of de-ionized water).

The samples were prepared in accordance to procedures discussed during our meetings in October. The materials included a five gallon plastic bucket of road base soil, a small bag of agricultural grade hydrated lime, a small bag of commercial grade Portland cement and a 250 ml plastic bottle of concentrated Roadbond EN 1. Approximately 2000 grams of soil was retrieved from the center of the five gallon container with a hand scoop and placed into a large stainless steel container for blending. After the soil was thoroughly mixed by hand with a stainless steel spatula the soil was then split into four approximately equal sized portions. Each portion was then weighed into a clean 1 L glass beaker for further handling. The 6% lime and 6% cement treated samples were prepared by adding 30 grams of lime and 30 grams of cement to separate 470 gram portions of soils. After thorough mixing de-ionized water was added to the 6% lime and 6% cement treated soils to achieve soil moistures of 15-20% for each sample. These samples were placed in clean glass containers and labeled "6% Lime & Soil" and "6% Cement & Soil" respectively. The containers were then capped with Teflon lined lids. The Roadbond EN 1 treated soil sample was prepared by slowly adding and mixing 0.33% approximately 100 ml of Roadbond EN 1 solution to 500 grams soils of sample until optimum soil moisture was obtained. This sample was then placed into a clean glass container labeled "EN 1 Roadbond & Soil" and capped with a Teflon lined lid. De-ionized water was then added to the remaining portion of approximately 500 grams of untreated soil until optimum soil moisture was achieved. This sample was then placed in a clean glass container labeled "Road Base Soil" and capped with a Teflon lined lid. All samples were then submitted to the laboratory for analysis.

Each sample was analyzed for total heavy metals (Texas RCRA 10 List), total petroleum hydrocarbon (TX1005), moisture, pH, total volatile organic compounds (RCRA SW8260 list) and SPLP RCRA 10

Metals List). None of the analytical results for total metals, total petroleum hydrocarbons, or total volatile organic compounds were above regulatory levels of concern and there was no regulatory basis for analyzing leachable metals utilizing the EPA Method 1312, the Synthetic Precipitation Leaching Procedure (SPLP). This was done in order to evaluate whether Roadbond EN 1 could effectively prevent heavy metals from leaching into the environment. However the information gained from the leachate testing was rather limited due to the fact that background concentration of total metals in the soil was so low. While none of the samples had metals concentrations above regulatory levels of concern, it is noteworthy that barium, chromium, and nickel concentrations measurably increased in the 6% cement sample relative to the road base soil levels while the levels in the 6% lime and 0.33 Roadbond EN 1 samples remained essentially the same as the road base soil sample. Only a few metals had even detectable levels of metals in the SPLP leachates and none were even close to a level of concern. Although data are too limited to be conclusive, the only detectable metal found in the Roadbond EN 1 SPLP sample was barium (0.072 mg/L) while the road base SPLP had detectable levels of barium (0.121 mg/L) and cadmium (0.001 mg/L), the 6% cement SPLP sample had detectable levels of barium (0.525 mg/L), chromium (0.117 mg/L), and nickel (0.007 mg/L), and 6% Lime SPLP sample had detectable levels of barium (0.533 mg/L) and chromium (0.005 mg/L).

There were no detectable levels of petroleum hydrocarbons found in any of the samples. There were trace levels of several volatile organic compounds found in all of the samples, but none were above regulatory levels of concern. Acetone was most probably a laboratory air contaminant since acetone was found in the laboratory quality assurance blank. Although there were detectable levels of several other volatile organic in all the samples, none were above levels of concern, and the relative difference between the four samples was insignificant.

Cement and lime treatment elevated the road base soil pH from 7.88 to 12.33 and 12.51 respectively while the Roadbond EN 1 treatment lowered the pH slightly to 7.47 standard units. The Roadbond EN 1 treated soil pH of 7.47 is significantly less corrosive than the cement and lime treatment that elevated the soil pH above 12 standard units.

While the metals test results are somewhat inconclusive, Roadbond EN 1 treatment appears to be more environmentally friendly than either the cement treatment or the lime treatment in that Roadbond EN 1 does not increase soil metals concentration and may even tie up existing metals. It is our recommendation that the effectiveness of the Roadbond EN 1 to bind the heavy metals be tested by salting a soil sample with nitrate or sulfate salts of the various heavy metals (all or some depending on cost sensitivity) prior to treating with Roadbond EN 1.

TALEM, Inc. appreciates the opportunity to provide these analytical services, and if you have questions or need additional information please call us at 817-335-1186.

Respectfully,



Bob Garrett
Vice President
TALEM, Inc.