



*Industrial Site
Cadmium and Chromium
Reduction/Stabilization*



Site Background:

A commercial product was used to stabilize lead, cadmium and chromium at a site in Rockford, Illinois. After stabilization, the performance results were not uniform. While the prior selected product resulted in reduction of lead and chromium to meet the Hazardous Waste Toxicity Characteristic (TC) limit of 5.0 mg/L, cadmium concentrations exceeded the TC limit of 1.0 mg/L for non-hazardous disposal under the Toxicity Characteristic Leaching Procedure (TCLP). The consultant requested a study to evaluate an additive that can reduce concentrations of cadmium to below the TC limit. ReSolution Partners (RP) was retained by the consultant to verify reagent(s) that would minimize both cadmium and any residual chromium and lead at the site. CERES provided MTS[®] remediation chemistries to achieve the site goals.

Solution:

The consultant sent a composite sample of soil treated in the field with 2 wt. % of the previously applied product for analysis by RP on November 15, 2016 (sample identified as S1). The baseline TCLP tests exceeded the TC limit for cadmium (8.10 mg/L with a goal of 1.0 mg/L) and chromium (5.71 mg/L with a goal of 5.0 mg/L).

Various reagents over a range of dosage rates were added in a series of batch tests to achieve the required reductions for cadmium and chromium without increasing the leaching of lead. Results of these tests are summarized in the Table below. A 9 wt. % dose of MTS[®] -D achieved the remediation goals in the original S1 soil sample. Two additional duplicate soil samples provided by the consultant (IS1 and IS2, received December 2, 2016) did not achieve passing results with the 9 wt. % dose.

After additional testing on all 3 soil samples, an 11 wt. % dose of MTS[®]-D successfully achieved passing results in all samples.

Sample ID	Pretest pH	TCLP Solution	Final pH	Metals (mg/L)		
				Cadmium	Chromium	Lead
<i>Remediation Goal</i>				<i>1.00</i>	<i>5.00</i>	<i>5.00</i>
S1 Unamended	5.66	2	4.33	<i>8.10</i>	<i>5.71</i>	0.540
S1 6% MTS [®] D	6.88	2	4.95	<i>2.38</i>	0.370	0.054
S1 9% MTS [®] D	6.08	2	6.46	0.180	0.120	<0.030
IS1 9% MTS [®] D	6.55	2	5.20	<i>2.32</i>	0.230	0.061
IS2 9% MTS [®] D	6.63	2	5.21	<i>2.13</i>	0.240	0.061
S1 11% MTS [®] D	--	2	6.46	0.27	0.064	0.031
IS1 11% MTS [®] D	--	2	6.59	0.29	0.019	0.040
IS2 11% MTS [®] D	--	2	6.55	0.27	0.020	0.039

Full Scale Results:

Field scale remediation with MTS[®] successfully resulted in achieving cadmium and chromium reduction in all soil samples across the site mixed with MTS[®] at a dosage rate of 11 wt. %. A summary of full-scale results is provided below. Mechanical mixing was accomplished with an excavator.



MTS® - D Treatability Study Results (mg/L)			
MTS® Dosage of 11wt%			
Sample	Cr	Cd	Pb
Remediation Goals	5.00	1.00	5.00
36893-B (6-9)	0.0727	0.0025	0.0025
36894-B (3-6)	0.0993	0.0025	0.0025
36895-B (0-3)	0.153	0.0025	0.0025
36896-A1 (5.33-8.0)	0.139	0.0025	0.0025
36897-A1 (2.66-5.33)	0.174	0.0025	0.0025
36898-A1 (0-2.66)	0.0982	0.0025	0.0025
36899-A2 (5.33-8.0)	0.0936	0.0025	0.0025
36900-A2 (2.66-5.33)	0.154	0.0025	0.0025
36901-A2 (0-2.66)	0.195	0.0025	0.0025
36903-A3 (5.33-8.0)	0.106	0.0025	0.0025
36904-A3 (2.66-5.33)	0.494	0.0025	0.0025
36905-A3 (0-2.66)	0.242	0.0025	0.0025
mean	0.168	0.0025	0.0025
median	0.146	0.0025	0.0025
Std deviation	0.114	0.000	0.000
Result below reporting limit			
Cr MS/MSD slightly high but within control limits			

Field results were ~3 times higher for Cr, ~100 times lower for Cd and ~15 times lower for Pb than the laboratory study.

Contact C.E.R.E.S. Remediation Products for information about cadmium, chromium or lead remediation at your site.

C.E.R.E.S. Corporation is a remediation products manufacturer focusing on innovative and economical solutions for the sustainable remediation of heavy metals, chlorinated solvents, and petroleum hydrocarbons.