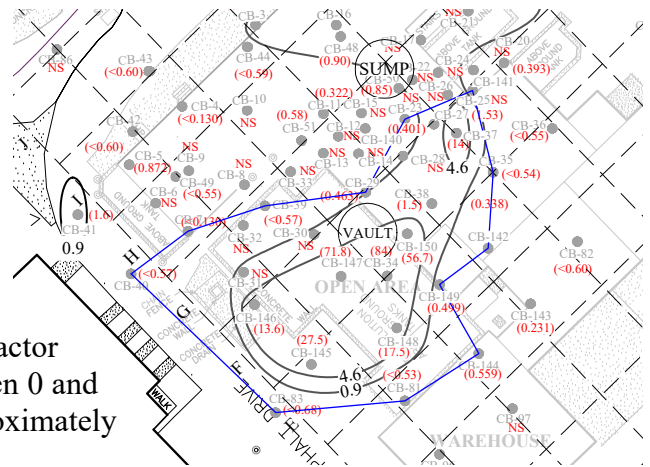


Site Background: A decommissioning chemical production facility that operated for decades has a legacy of cobalt impacts to soil along with thallium at low levels. However the cobalt represents the most significant risk based on cleanup levels. Background concentrations of cobalt across the site ranged from non-detect to 2,000 mg/kg and pH levels from 5.5 to 9.5. The areas with elevated cobalt impacts also have chloride, potassium, sodium, and sulfate detections, which are believed to be associated with the former processes used in this area of concern. ReSolution Partners (RP) was retained by the consultant to verify reagent(s) that would minimize both cobalt and thallium at the site. CERES provided MTS[®] remediation chemistries to achieve the site goals.

Solution: The RP treatability study resulted in the following primary findings: the measured adsorption capacities defined by Langmuir Adsorption isotherms were a function of soil type, depth and pH; and ranged from 59 to 390 mg of cobalt per kilogram of soil. In general, synthetic precipitation leaching procedure (SPLP) testing determined less than 10 percent (%) of cobalt leached from site soil samples. Source-area SPLP data showed soil with cobalt at concentrations up to 10 mg/kg do not result in a leachate concentration that exceeds the regional background aquifer concentration of 10 µg/L and was determined to be the target treatment goal.

Stabilization trials found that MTS[®] addition to soil reduces leachable cobalt concentrations to below 10 µg/L resulting in a greater than 98% reduction of cobalt at an MTS[®] dosage of 0.5 wt. %.

Full Scale Results: The consultant divided the main treatment area into 30-foot wide by 30-foot long grids, which extend down to the water table in 5-foot increments (Figure 13). Grid dimensions were selected based on the estimated quantity of work a remedial contractor could perform in a 1-day period by blending soil between 0 and 5 feet bgs. Each 5-foot deep grid volume equals approximately 250 to 300 tons of soil.



The treatment was performed in two phases, with the lower half of the contaminated soil (10 ft to 22 feet bgs) being blended first, followed by upper half of soil (0 ft to 10 ft bgs). The MTS[®] was injected into the subsurface utilizing the Lang Tool[™] blender head as it was being mixed with water.



A total of 14 confirmation samples were collected from the treated soil and the results confirmed that 95% to 100% of leachable cobalt was removed. All but one sample passed remedial goal criteria as noted in the summary table. The results of the failed sample location indicated the prescribed dosage of 0.5% (by weight) of MTS[®] product was not achieved. There may have been higher than expected cobalt at this area. Therefore, additional MTS[®] was blended in this area and resampled for



*Chemical Plant Site
Cobalt and Thallium
Reduction/Stabilization*



the same parameters. The second confirmation sample achieved remedial goal of below 10 µg/L. Below is a summary table of results that shows the remedial goals for this project.

Soil Confirmation Sample Results					
Method		6020B - SPLP		9045D	
Analyte		Cobalt		pH	
Units		µg/L		SU	
Target Remedial Goal		<10.0		>9.5	
Sample ID	Date Collected	Result	Q	Result	Q
Samples Collected From Upper Half of Blending Area (0 - 10' BGS)					
E1S1-5'	6/5/17	0.382	J	10.9	T8
E1S4-6'	6/2/17	<2.0		10.9	T8
E7S2-6.5'	6/5/17	0.307	J	10.7	T8
E6S9-4'	6/2/17	<2.0		11	T8
E9S6-5'	6/1/17	<2.0		10.9	T8
E14S1-5.5'	5/31/17	103		10.7	T8
E14S1-5'-2	6/7/17	0.385	J	11.2	T8
Samples Collected From Lower Half of Blending Area (10 - 22' BGS)					
N2-20'	4/27/17	<0.260		9.78	T8
E12S2-22'	5/3/17	<2.34	J4	10.9	T8
E3S3- 20'	5/5/17	<0.260		10.9	T8
E3S6- 20'	5/5/17	<0.260		10.4	T8
E7S3- 20'	5/15/17	<0.002		10.6	T8
E7S5- 20'	5/15/17	<0.002		10	T8
E9S4- 17'	5/17/17	0.000443	J	10.9	T8

Customer Feedback:

“All in all, I’d say it was a great success! The slurry mixture created by mixing water with MTS® in order to use the Lang Tool equipment did cause some metal fittings to be abraded during the process, but aside from that, all seemed to work as planned.”

Plus, the project was completed successfully with only 90% of projected reagent demand. That is like a 10% discount since it worked better than expected with the right mixing tools.

Contact C.E.R.E.S. Remediation Products for information about cobalt or thallium 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.