

Site Background: JAG Consulting Group, Inc. was hired to investigate and remediate chromium impacts at a metals plating facility in San Bernardino County, California. Elevated levels of hexavalent chromium Cr(VI) were discovered beneath a plating shop at a depth of 5 feet to 12 feet beneath large portions of the interior of a Plating Shop building. Initially, a slot excavation approach was implemented by digging 4-foot-wide trenches in an alternating fashion perpendicular to the building wall. Unfortunately, confirmation sampling performed during the excavation determined that the Cr(VI) extended laterally under the footing of the building, which could not be safely excavated. Residual Cr(VI) present in excavation sidewalls and up to 5 feet below the base of the excavation was identified at concentrations of Cr(VI) as high as 860 mg/kg, with 8 of 11 samples exceeding the 12.3 mg/kg remediation goal for Cr(VI) in soil.



Treatability Study and Remediation Design: Initially, JAG consulted with CERES about Metals Treatment Solution (MTS[®]) applicability and then hired ReSolution Partners (RP) treatability laboratory to perform a treatability test to evaluate the effectiveness of MTS[®] in the reduction of Cr(VI) to trivalent chromium (much less toxic). An iron based MTS[®] formulation releases ferrous iron (Fe²⁺) that transfers electrons to Cr(VI) to form trivalent chromium. The iron is oxidized to its ferric form (Fe³⁺). In the presence of excess Fe³⁺, the trivalent chromium is coprecipitated with the Fe³⁺ to form the amorphous mineral species Fe_{0.75}Cr_{0.25}(OH)₃. This form of trivalent chromium has a lower solubility over a broader range of pH than the Cr(OH)₃¹.

The results of the RP treatability study demonstrated achievement of treatment goal of <12.3 mg/kg Cr(VI). An MTS[®] dosage of 8% (MTS[®] weight to soil weight) was determined to be the most effective concentration for use at this site.

Full Scale Results: MTS[®] reagent was delivered in powder form and was thoroughly mixed with contaminated soil using the bucket on an excavator and then heavily sprayed with water and mixed again to achieve uniform moisture for chemistry activation. The MTS[®] reagent was also manually mixed by technicians working in hard-to-reach areas. Soil mixing was



¹ Palmer, C. D. and R. W. Puls, 1994. Natural attenuation of Cr(VI) in ground water and soils. USEPA Ground Water Issue, EPA/540/S-94/505, 13 pp.



*Metal Plating Shop
Upland CA
Hexavalent Chromium Reduction*



initially performed on small areas at the bottom of the excavation (12 feet), and then increased to larger areas once the testing confirmed the treatment effectiveness. This mechanical and manual mixing approach was suitable for this site due to the shallow depth of soil contamination (12 feet). As a means of treating the undisturbed side walls of the excavation, the MTS[®] reagent was mixed into a water solution and sprayed on the side walls.

Over the course of this project, 390 tons of Cr(VI) contaminated soil was excavated and disposed off-site, along with JAG performing the soil mixing and MTS treatment of 8,500 pounds (4.25 tons) of Cr(VI) contaminated soils (in hard-to-reach areas).

The target treatment goal of 12.3 mg/kg of Cr(VI) was achieved for all confirmation samples. Human dermal and inhalation exposure was the primary risk driver for this cleanup (due to the shallow contamination). Cr(VI) reductions of between 89 and 100% was achieved in the 20 soil confirmation samples. Groundwater contamination was a secondary driver evaluated using a Synthetic Precipitation Leaching Procedure (SPLP) extraction. The SPLP testing was performed on a selected number of confirmation samples to prove the leaching potential of treated Cr(VI) was reduced below the TCLP Hazardous Waste Limit (HWL) of 5 mg/L.



This remediation project was completed in 20 days. The work was completed under the regulatory authority of the U.S. EPA (Emergency Response Unit) who provided approval of the remediation design and granted final closure of the site.

Customer Feedback:

“It was very effective! Received site closure from EPA.”



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

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