

Site Background: Elevated levels of hexavalent chromium Cr(VI) and nickel were discovered beneath a plating shop at depths of 30 feet beneath large portions of the interior of a Plating Shop building. The Site is underlain by Quaternary alluvium predominantly consisting of well-graded gravelly sands (SW) and sandy gravels (GW), with few relatively thin lenses of silty sand (SM). Groundwater beneath the Site generally flows to the southeast with an anticipated depth to water beneath the Former Plating Site of approximately 240 feet below ground surface. A former metal plating site was found to have chromium (Cr) up to 890 mg/kg, hexavalent chromium (Cr⁶⁺) up to 18 mg/kg and nickel (Ni) up to 720 mg/kg. There are no data regarding leachable metals concentrations. Client identified two remediation areas: Area 1 is approximately 900 yd³ to a depth of 10 feet below ground surface and Area 2 is approximately 3,500 yd³ to a depth of 15 feet below ground surface. The remediation goals for leachable metals concentrations provided by client include the following:



Analytes	MCL	DLR	PHG
Cr (mg/L)	0.05	0.01	none
Cr ⁶⁺ (mg/L)	none	none	none
Ni (mg/L)	0.1	0.01	0.012

MCL – CA maximum contaminant level
DLR – detection limit for purposes of reporting
PHG Public health goal

Treatability Study and Remediation Design:

Four composite samples were collected from the site by consultant in chromium hotspots to establish baseline conditions. Laboratory results are summarized as follows:

Soil Composition				
Analyte	Composite A	Composite B	Composite C	Composite D
pH (SU)	7.95	8.87	6.74	4.92
Cr (mg/kg)	692	1,140	375	78.2
Cr ⁶⁺ (mg/kg)	36.9	207	101	4.00
Ni (mg/kg)	593	241	204	240
Fe (mg/kg)	20,900	16,700	14,300	12,300
Moisture (%)	7.1	6.2	2.4	2.6



*Metal Plating Shop
Los Angeles CA
Hexavalent Chromium & Nickel Reduction*



Chromium concentrations generally decrease with increasing depth below 8 feet while nickel concentrations remain high and relatively constant from 4 to 16 feet below ground surface. The soil pH is slightly alkaline above 8 feet and decreases sharply in the deepest composite sample.

Fraction of Leachable Metals x 1000			
Sample	Cr ⁶⁺	Cr	Ni
Composite A	0.87	0.18	0.16
Composite B	0.80	0.41	0.90
Composite C	1.2	0.34	1.5
Composite D	1.3	0.17	34

While there appears to be a correlation between leachability of nickel in the CA-WET and pH, the leachability of chromium shows little correlation with pH. The total amount of chromium leached increases at the higher pH's because there is more chromium present in the shallower and more alkaline soil.

Composites B and D were selected for the treatability study trials because Composite B samples revealed the highest Chromium leachate with most alkaline soil conditions and Composite D revealed the highest Nickel leachate with lowest alkalinity.

Design Results: MTS[®] reagent was delivered in powder form and was thoroughly mixed with contaminated soil using the bucket on an excavator and then sprayed with water and mixed again to achieve uniform moisture for chemistry activation. The results are as follows:

Treatment	Dose (wt.%)	CAL-WET (mg/L)			
		pH (SU)	Cr ⁶⁺	Cr	Ni
Control	0	9.50	0.18	0.428	0.0225
MTS [®]	2	9.09	<0.01	0.0183	0.0127
MTS [®]	5	9.54	<0.01	0.019	0.0077
MTS [®]	10	9.58	<0.01	0.0102	0.0071
Remediation Goals			none	0.05	0.01

Italic text = estimated concentration (J-flag)

MTS[®] met both remediation goals for total chromium and nickel at the 5 wt.% dose.

Contact C.E.R.E.S. Remediation Products for information about chromium 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.