In Situ Chemical Reduction at a Former Chrome Plating Facility

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Former Hard Chrome Plating Facility
Site Information and Historical Use

- Plating shop operated from 1943 to 1991
- Operations included electroplating processes, anode fabrication, stripping, neutralizing, glass bead blasting, grinding, buffing and polishing
- 0.25 Acre property
- Structures damaged by a fire in 1991 and were removed in 1994
- Located within a residential/commercial/industrial area of Los Angeles
Monitoring Well Location Map
Chemicals Found

- Chromium
  - Associated with former plating shop operations
  - Found in soil and groundwater (42,400 milligrams per kilogram (mg/kg) in soil and up to 1,750 milligrams per liter (mg/L) in groundwater)
- Hexavalent Chromium
  - Associated with former plating shop operations
  - Found in soil and groundwater (9,800 mg/kg in soil and 1,700 mg/L in groundwater)
- Trichloroethylene (TCE)
  - TCE coming from an offsite source
  - Found in deeper soil and groundwater (2,970 micrograms per liter (µg/L) in groundwater)
Isoconcentration Map of Hexavalent Chromium in the Uppermost Water-Bearing Unit
Remedial Action Objectives

- Minimize or eliminate potential exposure of humans to Cr\(^{+6}\) in surface or shallow soil
- Prevent or control further Cr\(^{+6}\) groundwater plume migration horizontally or vertically to deeper aquifers
- Prevent or control potential exposures to contaminants in deep soil and groundwater using institutional and engineering controls and monitoring
Planned Remedy using Calcium Polysulfide (CPS)

Example of typical reduction/oxidation reaction that occurs with CPS:

\[ 2 \text{CrO}_4^{2-} + 3 \text{CaS}_5 + 10\text{H}^+ \rightleftharpoons 2 \text{Cr(OH)}_3(\text{s}) + 15 \text{S(}s\text{)} + 3 \text{Ca}^{2+} + 2\text{H}_2\text{O} \]

Where \( \text{CrO}_4^{2-} \) = chromate ion, Cr in hexavalent form

\( \text{CaS}_5 \) = calcium polysulfide

\( \text{Cr(OH)}_3(\text{s}) \) = chromium hydroxide precipitate

\( \text{S(}s\text{)} \) = sulfur precipitate

\( \text{Ca}^{2+} \) = calcium ion
Planned Remedy (Soil)

- Excavation of soil down to approximately 5 feet to remove contaminated soil
- Removal of subsurface features from former plating shop
- Transport offsite to either a treatment/recycling or disposal facility
- Conduct Post Cleanup Confirmation Sampling (Lateral and Vertical)
- Construct gallery wells for delivery of Calcium Polysulfide (CPS) for reduction of hexavalent chromium to trivalent chromium
- Removal area will be backfilled with clean imported soil
- Injection of CPS to soil
Planned Remedy (Groundwater)

- Calcium Polysulfide (CPS) vadose zone infiltration (12 onsite injection wells planned)
- CPS injection in groundwater source area and downgradient barrier (8 offsite wells planned)
- Institutional controls (i.e. deed restriction)
- Long term monitoring
Site Plan Showing Injection and Monitoring Well Locations for CPS Pilot Test
Calcium Polysulfide Pilot Test
CPS Pilot Test
CPS Pilot Test
SCHEMATIC CROSS-SECTION OF PILOT TEST INJECTION
## CPS INJECTION SUMMARY

<table>
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<tr>
<th>Date</th>
<th>Total Dye Injected (Gal)</th>
<th>Total CPS Injected (Gal)</th>
<th>Total H2O Injected (Gal)</th>
<th>Total Volume Injected</th>
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CrVI Concentrations Versus Days – Post-Injection
Summary of CPS Pilot Test

- In-situ chemical reduction by CPS is feasible at this site at an injection rate of approximately 15 to 20 gallons per minute
- Radius of reactive influence is at least 16 feet but less than 30 feet
- Reactive influence of CPS at FW-1 and URSW-1 was demonstrated by dramatic decrease of CrVI concentrations in groundwater from 200 mg/L and 910 mg/L, respectively, to non-detect levels
Infiltration Gallery As-Built Layout

See figure 3-5

EXPLANATION:
- Groundwater Well
- Former Buildings/Structures
- Outer Wall Liner/Trench
- Inner Berm Liner/Trench
- 4-inch PVC Pipe, Slotted
- Pole-Mount Transformers
- Not Excavated Due To Nearby Pole-Mount Transformers

Scale in Feet

North

West

South

East

56th Street

MW-17

URSW-2

URSW-3

URSW-1

PW-1

MVW-5

MVW-18

MW-17

0 20'
Infiltration Gallery Construction
Infiltration Gallery Construction
Infiltration Gallery Construction
Infiltration Gallery Cross Section – Construction Details
Infiltration Gallery Construction
Well Locations (Groundwater)
Contact:

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