Case Study | Chrome Plating Facility

**PROJECT FACTS**

**Project Dates:**
2011 – 2013

**Site:**
Former Hard Chrome Plating Facility

**Contaminants of Concern:**
Hexavalent chromium, nickel, arsenic and antimony

**Problem:**
Manage the equipment and chemical residuals from a facility that was no longer viable including the contents of all the partially full plating tanks.

10,000+ tons of soil and 66,000 square feet of groundwater are contaminated with hexavalent chromium, nickel, arsenic and antimony.

300 foot long groundwater plume extends off-site beneath newly constructed neighborhood homes and park.

**Situation:**
Other remediation consultants/contractors estimated 15- to 20-years to complete the cleanup at a cost between $8 and $10 million.

**AcuityES Difference:**
Remediation successfully completed in less than two years for $4.5 million – saving the client nearly 50% of the remediation cost and completing the work on Site in a fraction of the time.
**Case Study | Chrome Plating Facility**

**AcuityES Solution:**
- Minimized waste streams through the use of Dry Ice Blast Cleaning to remove residue from building walls and equipment.
- *First-ever application* of a proprietary blend of nano-scale iron sulfide (FeS) reductant for in situ geochemical reduction and contaminant stabilization.
- Contaminated soils: Mixed 78,000 gallons of FeS with a dual-axis blender to a depth of 15 feet.
- Contaminated groundwater: Injected 40,000 gallons of FeS via 175 inspection points.
- Long-term, post-remediation groundwater monitoring.

**Results:**
- **Soil:** within 2.5 months, source area soil sampling confirmed non-detectable levels of hexavalent chromium and stabilization of the other contaminants.
- **Groundwater:** within 5 quarters, sampling confirmed cleanup objectives achieved.

**Project Details:**

**Site Background:**
The Site operated as a hard chrome plating and grinding facility beginning in 1981. Operations ceased in 2009, when the facility operator relinquished the assets back to the property owner in compliance with a legal settlement.

**Contaminant Details:**
Chemicals of concern detected in soil and groundwater beneath the Site exceeded the Indiana Department of Environmental Management's (IDEM) Risk Integrated System of Closure (RISC), residential default closure levels (RDCL) and the industrial default closure levels (IDCL). Contaminants identified that exceeded acceptable levels included:
- Antimony
- Arsenic
- Chromium (hexavalent and trivalent)
- Lead
- Nickel
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**Restoration Details:** Pre-treatment nickel contamination was present at the Site. Chemicals of concern detected in soil and groundwater beneath the Site exceeded both IDEM’s RISC, Residential Default Closure Limit and the Industrial Default Closure Limit.

This Site is unique because most heavy metal contaminated Sites with elevated levels of nickel are often unable to achieve Site closure levels using commercially available reagents.

Various remedial actions were conducted at the Site to address contaminated soils and groundwater:

**The Process:**

**Soil Remediation:** Contaminated soils in the immediate vicinity of the former plating operations were remediated using in situ chemical reduction (e.g., the reduction of hexavalent chromium Cr+6 to trivalent chromium Cr+3) and precipitation.

Chemical reduction was facilitated by in situ mixing of a reductive chemical agent throughout the entire 0- to 15-feet soil interval in the source area.

Additionally, treatment was extended approximately 30 feet to the north and 40 feet to the west beyond the deep treatment zone to a depth of approximately five feet below ground level to address shallow impacts from various regulated metals due to industrial material handling.

**Groundwater Remediation:** Contaminated groundwater was treated in situ using geochemical reduction and fixation.

175 injection points were placed on 15-foot centers across the footprint of the contaminant plume to facilitate injection of the chemical reagent.

Two smaller supplemental injection events were conducted on portions of the plume to augment the original injections.

**Closure Details:**

**Soil:** Within 2.5 months, confirmatory soil sampling indicated that hexavalent chromium was not detected at concentrations above laboratory method detection limits.

Synthetic Precipitate Leachate Procedure (SPLP) analyses confirmed that arsenic was stabilized with no leachate detections above laboratory method detection limits.

**Groundwater:** Remediation cleanup objectives were met within 5Q of post-performance monitoring.
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Nickel Pre-Treatment

1st Quarter Nickel

Hexchrome Pre-Treatment

5th Quarter Hexchrome

Antimony Pre-Treatment

4th Quarter Antimony