



Non-Profit Mining Site Reclamation

Mineral Park Tailings Ponds, CO

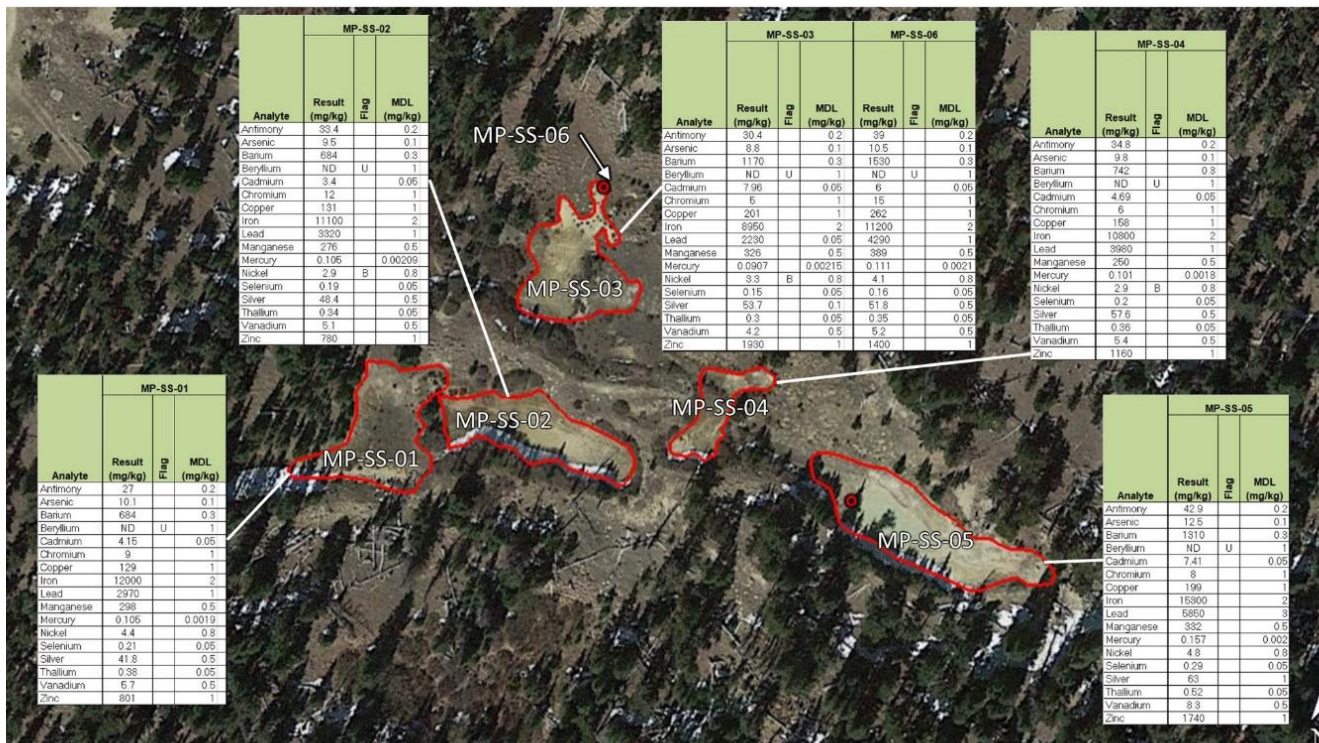
Lead Stabilization



Project Background: The U.S. Forest Service (USFS) contracted Trout Unlimited Inc., to finalize CERCLA Engineering Evaluation and Cost Analysis, pre-removal action checklist and contract procurement and construction for remediation of the Mineral Park Settling Ponds in the high sierras of Colorado at an elevation of approx 11,550 feet above sea level 2.25 miles northwest of the town of Alma, Park County, Colorado.



The Mineral Park Settling Ponds featured five man-made depressions or basins (settling ponds) that were devoid of vegetation, though well-vegetated berms formed the boundaries of each pond. Historical sampling of these ponds show that heavy metals were present in concentrations greatly exceeding maximum allowable concentration levels. Analytical samples collected from the largest pond revealed excessive levels of Ag, Al, Cu, and Pb [(silver, aluminum, copper, and lead)]. Based on human health risk assessment, the ponds were identified to be impacted with actionable levels of lead requiring removal action. Lead ranged from 2,230 mg/kg to 5,850 mg/kg, compared to 322 mg/kg in the in the background sample location.



Scope of Work: The Site is under the control of the United States Department of Agriculture, Forest Service (USFS) Rocky Mountain Region (Region 2 [R2]) and contracted Trout Unlimited (TU) to develop and execute the removal action to satisfy the following goals:



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Mineral Park Tailings Ponds, CO

Lead Stabilization



- Prevent the migration of hazardous substances, pollutants, or contaminants in Site surface soils (tailings/mine waste);
- Reduce potential human and ecological receptor exposure to metal-bearing soils and water in the area of the settling ponds;
- Reduce or eliminate potential physical hazards associated with settling ponds;
- Achieve compliance with Applicable, Relevant and Appropriate Requirements (ARARs) and To Be Considered (TBC) guidance, to the extent possible; and
- The removal action selected in this EE/CA evaluation will meet Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requirements.
- Reduce lead and other heavy metals leachable concentrations to below human and ecological health risk criteria. USEPA Tapwater RSL for lead is 0.015 mg/l and Colorado DPHE SL is 0.05 mg/l.

Solution: An engineering and cost analysis completed by TU under the direction and oversight of the USFS and in accordance with Environmental Protection Agency (EPA)/540/F-94/009 “Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA” (EPA, 1993) determined that insitu stabilization and capping was the most cost effective and viable solution compared to phytostabilization, off-site repository, or no action (natural attenuation).

Lead Stabilization Pilot Test (200lb of MTS[®] MgO):

TU performed a field scale pilot test in eight 24 sqft test plots in early October 2020 utilizing 200 lbs of MTS[®]MgO *donated* by CERES Remediation Products. CERES provided technical support throughout the remedial design and implementation process at no additional cost. MTS[®]MgO was applied at a dosage ranging from 1.0% to 4.5% by weight of soil. Toxicity characteristic leaching procedure (TCLP) testing was used to evaluate performance of the Pb stabilization.



Stabilization pilot trials found that MTS[®] addition to soil reduced leachable lead concentrations to below CDPHE SL of 5 µg/L resulting in a greater than 98% reduction of lead at an MTS[®]MgO dosage of 2.0 wt. %.

Full Scale Lead Stabilization and Site Reclamation:

The total treatment area encompassing the tailing ponds was approximately 1.7 acres. Treatment depths of approximately 2 feet within tailing pond sediments was remediated with MTS[®]MgO with a total volume of approximately 2,700 cubic yards. MTS[®]MgO was applied at a dosage rate of approximately 2 wt% utilizing a bulldozer and long reach excavator for mixing while adding water to the mixing to minimize dusting while also activating the chemistry resulting in the mineralization of lead and reduction in leachability.



*Non-Profit Mining Site Reclamation
Mineral Park Tailings Ponds, CO
Lead Stabilization*



Stabilization of the tailings ponds at full scale with 2% wt dosage of MTS[®]MgO addition to soil reduced leachable lead concentrations to below CDPHE SL of 5 µg/L resulting in 100% reduction of lead at an MTS[®]MgO dosage of 2.0 wt. %.

Soil Confirmation Sample Results					
Method		6020 - SPLP		6020 - SPLP	
Analyte		Lead		pH	
Units		mg/L		Mg/L	
Target Remedial Goal		<10.0		>9.5	
Sample ID	Date Collected	Result	Q	Result	Q
Samples Collected From Blending Area (0 – 2’ BGS)					
Pond 1 Pretreatment	7/8/22	10.7		0.0957	
Pond 2 Pretreatment	7/8/22	21.2		ND <0.050	
Pond 3 Pretreatment	7/8/22	33.8		0.190	
Pond 4 Pretreatment	7/8/22	4.95		ND <0.050	
Pond 3 Post Treatment	7/8/22	ND <0.050		ND <0.050	
Pond 4 Post Treatment	7/8/22	ND <0.050		ND <0.050	
Pond 1 Post Treatment	7/10/22	ND <0.050		ND <0.050	
Pond 2 Post Treatment	7/10/22	ND <0.050		ND <0.050	
Pond 3 Post Treatment	7/10/22	ND <0.050		ND <0.050	
Pond 4 Post Treatment	7/10/22	ND <0.050		ND <0.050	
Performance Assessment	% Reduction	100%		100%	





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Lead Stabilization*



Customer Feedback:

“Everyone is happy with the results! We chose CERES MTS[®]MgO because our soil pH was neutral to alkaline in areas, yet we had high concentrations of dissolved and total metals in soils and tailing ponds. Our more traditional amendment, limestone, would not have been as effective at this site due to the alkalinity of soils. Moreover, the mining site split a large wetland feature to create the tailings pond, and therefore, we expected to see long-term shallow groundwater across most of the site. To reduce the potential for metals to leach during seasonal saturation of the top 18 to 14 inches of soils, reactive MTS[®]MgO would be a more effective amendment for the long-term stabilization of lead.”

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.