

EnviroBlend® has extensive knowledge of the fate and transport of heavy metal contamination, as well as remedial action experience. Our scientists have spent years developing cost-effective chemistries for rendering lead, cadmium, arsenic, hexavalent chromium, zinc and other heavy metal contaminants non-hazardous. This research has resulted in a number of patented products that have been widely applied for heavy metal remediation sites across the country.

Low Dosage Rates Translates into Savings

Former Herbicide Manufacturing – Kansas City, MO

The Armour Road site was used for railroad herbicide manufacturing and blending from 1948 to 1986. Powdered arsenic (95% pure), monosodium arsenic, and various other chemicals were part of the herbicide production. Subsurface testing showed significant arsenic contamination in over 40,000 tons of soil. The EnviroBlend team formulated site-specific treatment chemistry for the contaminated soil that was effective at low doses, saving the owner considerable off-site disposal costs.

Table 1. Initial Full-scale Treatability Data Summary

	Pre-Treatment		Post-Treatment	
	Dose	Total Arsenic	TCLP Arsenic	TCLP Arsenic
Range	0.75% - 2.30%	1,700 - 10,600	1.7 - 63.6	0.28 - 2.90
Median	1.25%	5,220	15.1	1.20
Mean	1.53%	5,450	20.7	1.32

Former Mining Site – Missouri

Site soils ranged from 1,000 mg/kg to 5,000 mg/kg arsenic, leaching from non-hazardous to over 30 mg/L. The soil was variable with some mine tailing inclusions. A 2% dosage of EnviroBlend CR50 was appropriate for the majority of site soils, and a 3% dosage of EnviroBlend CR50 was used for the pile/source area soils.

Leaching Results							
Sample Name	Lab ID	EnviroBlend® Dosage		Screening Leaching Test Results			
		Chemical	Percentage	Pretest pH	Solution	Final pH	Arsenic, mg/L
Composite	14-02015	Untreated	-	3.57	TCLP 1	5.52	4.45
		EnviroBlend® CR50	2.0%	-	TCLP 1	5.83	0.087
Source	14-02016	Untreated	-	1.87	TCLP 1	5.50	30.7
		EnviroBlend® CR50	2.0%	-	TCLP 1	5.64	3.87
			4.0%	-	TCLP 1	6.08	0.53

AIG Technical Services, Inc. – Indiana

Expedited property transfer of arsenic and chromium impacted site. Successfully treated with only 2 % dosage of EnviroBlend chemistry and disposed of off-site as non-hazardous soil.

EnviroBlend® Successful Near Residential Area

CMC Lite Yard- Former Pesticide Production – Minnesota

Pesticides were produced from 1938-1968 at this 5-acre former railroad yard adjacent to a residential area. Tests identified significant contamination, both on the site and in the surrounding neighborhoods. The remedial action plan called for the arsenic to be treated in place and disposed of off-site. EnviroBlend chemistry for arsenic was found to be the best overall chemistry for the on-site treatment due to its effectiveness at very low doses and its low cost per treated ton of soil. More than 15,000 tons of contaminated soil were treated and removed from the site.

Innovative Treatment for Arsenic Transforms Brownfield Site

Former Lumber Company Site – Wisconsin

Wisconsin's Taylor County inherited a prime location 45-acre Brownfield site. The former landowner used the site to treat lumber with copper-chromate arsenate (CCA). Arsenic levels exceeded 1,000 mg/kg in some areas. EnviroBlend was used to stabilize approximately 2,400 tons of soil contaminated with CCA. Arsenic concentrations in the soil were reduced to below 0.005 mg/L and the treated material was left on-site.

Significant Savings Realized at Metals-Impacted site

Former Ashepoo Fertilizer Works- Charleston, South Carolina

Spills at this former fertilizer plant contaminated the soil and groundwater with acid, arsenic, and lead. Sampling found arsenic as high as 220 mg/L. Over 45,000 cubic yards of saturated affected soil were effectively treated *in-situ* with EnviroBlend to below-drinking water standards. The site was located in a tidally influenced coastal environment, and the project was hailed as a success by both the USEPA and the client.

Copper Smelting Facility - Australia

Conducted treatability tests to determine field dosages for the treatment of arsenic, cadmium, copper, lead, selenium, and zinc. Designed a mapping plan that resulted in a 10% savings in treatment costs by identifying regions of the waste that required lower treatment dosages than would be required for a composite sample. Most parcels of material required only single dosing of chemicals. The overall percentage of batches passing the TCLP after a single treatment exceeded 95%. Total treatment cost was less than half of the cost of hazardous waste disposal.

Treated Soil Reused at Challenging Sites

Former Fertilizer Manufacturing Site – Carteret, New Jersey

This client needed to remediate 37,000 tons of soil in tidal areas impacted with lead (up to 136,000 mg/kg) and arsenic (54,000 mg/kg). The soil was in a low pH environment and was located at depths of 8-16 feet. The project was performed during winter. The soil was rendered non-hazardous by the application of EnviroBlend and was reused on the site, saving the client approximately \$1 million.

Property Development Corporation – Rhode Island

Treated 750 tons of arsenic-impacted soil using conventional construction equipment. Treated material was used for on-site backfill.

Expedited Property Transfer of Arsenic-Impacted Site

AIG Technical Services, Inc. – Indianapolis, Indiana

Soil impacted with arsenic and chromium was successfully treated with only 2% dosage of EnviroBlend chemistry and disposed of off-site as non-hazardous soil.

Former Fertilizer Manufacturing Facility – Tennessee

Untreated composite of arsenic impacted soil, average soil concentration result was 3,720 mg/kg; untreated high arsenic impacted sample was 6,330 mg/kg. The average sample resulted in leaching of 18.9 mg/L in TCLP prior to treatment. A dosage rate of 1% wt./wt. EnviroBlend HXD reduced arsenic leachability to 0.69 mg/L. The highly impacted area, untreated sample leached at 50.6 mg/L in TCLP testing. Dosage of 2% wt./wt. met TCLP criteria, and further dosage dropped the concentration of leachable arsenic.

Sample Name	EnviroBlend [®] Dosage				
	Chemical	Percentage	Solution	Final pH	Arsenic mg/L
Average	Untreated	-	TCLP 1	4.83	18.9
	EnviroBlend [®] AS	1%	TCLP 1	4.63	0.69
		2%	TCLP 1	4.55	0.42
High	Untreated	-	TCLP 1	4.88	50.6
	EnviroBlend [®] AS	1%	TCLP 1	4.62	8.26
		2%	TCLP 1	4.47	3.16
		3%	TCLP 1	4.44	1.48

Former Manufacturing Site – Missouri

C Comp and D Comp samples resulted in 1,170 mg/kg and 4,900 mg/kg TCLP arsenic, respectively. Treatment with EnviroBlend HX or EnviroBlend 50/50 HX produced exceptional treatment results at dosage rates of 1-4% wt./wt. EnviroBlend 50/50HX selected for application across affected areas at rates of 1-4%wt./wt. dosage.

Sample Name	EnviroBlend® Dosage				
	Chemical	Percentage	Solution	Final pH	Arsenic mg/L
C Comp	Untreated	-	TCLP 1	5.52	4.45
	EnviroBlend® HX	1.0%	TCLP 1	5.11	0.87
	EnviroBlend® 50/50 HX	2.0%	TCLP 1	5.83	0.087
D Comp	Untreated	-	TCLP 1	5.50	30.7
	EnviroBlend® 50/50 HX	2.0%	TCLP 1	5.64	3.87
		4.0%	TCLP 1	6.08	0.53

Former Pesticide Production Site – Superfund - (MN)

Pesticides were produced from 1938-1968 at a 5-acre former railroad yard adjacent to a residential area. Tests identified significant contamination, both on-site and in surrounding neighborhoods. EnviroBlend chemistry for arsenic was selected as the best solution for on-site treatment due to its effectiveness at very low doses and low cost per treated ton of soil. More than 15,000 tons of contaminated soil were treated and removed from the site.

Industrial Waste Disposal (SC)

Stabilization of more than 57,000 cubic yards of soil impacted by arsenic, cadmium, chromium, lead, mercury, and nickel. The site is surrounded by extensive residential development. Constructively reused treated soil, sludge, and waste. Treated soil was used as internal berms within the on-site landfill.

Former Tomco Wood Preserving Site - Indiana

From 1980 to the fall of 1993, Tomco Wood Preserving used the property to pressure-treat wood products intended for exterior construction. In 1999 the presence of arsenic and chromium impacts in surface and subsurface soils were identified. In 2000, on-site buildings were demolished, and a fence was erected around the facility. The Voluntary Remediation Program (VRP) accepted the Tomco application in May 2001. The remediation consisted of excavation along with *in-situ* EnviroBlend remediation. Soils not able to be treated were shipped to an off-site disposal facility. A total of 2,872 tons of arsenic and chromium-containing soil and 116 tons of debris were excavated as part of the source removal operation. Groundwater was sampled for four (4) consecutive quarters it was determined that arsenic did not exceed acceptable risk levels. VRP issued formal closure to the site on April 25, 2003.

Former Mill - Montana

EnviroBlend was used to treat 3,000 tons of mill tailings *ex-situ* at a former mill. Waste was contaminated with lead, arsenic, and cadmium. The remediated soil was leave-in-place at the site.

Nahant Marsh – Davenport, Iowa

The Nahant Marsh site in Davenport, Iowa is a former shooting range with lead-contaminated soil and sediment. Heavy-metal contamination consisting of lead, arsenic, silver, and antimony was found in soil and sediment surrounding the five shooting

platforms on site. An additional shooting area was identified and appeared to have been used early in the history of the site. An estimated 9 tons of lead shot was deposited on the site annually for 27 years for a total of 243 tons of lead shot.

The source area was identified as the area impacted by the past shooting activities. The U.S. Fish and Wildlife Service conducted sampling of the marsh area and found up to 283 lead pellets per grab sample in sediment samples collected between 109 and 177 yards from the shooting platforms. Local waterfowl were diagnosed with lead poisoning from lead shot. Since arsenic, silver, and antimony concentrations did not exceed RCRA Toxicity Characteristic Leaching Procedure (TCLP) limits, lead was the only constituent of concern.

The remedial objectives for the site included the development and implementation of a stabilization approach to meet the Toxicity Characteristic Leaching Procedure (TCLP) criteria of 5.0 mg/L for lead in the TCLP test, followed by off-site disposal of stabilized materials.

Through bench-scale treatability study analysis, it was determined that a 2% dosage rate by weight of EnviroBlend CS would effectively reduce TCLP-lead concentrations in the soil to below 5.0 mg/L. EnviroBlend was applied to stockpiled materials, then thoroughly mixed using conventional construction equipment. After receiving confirmational results from a certified laboratory, the stabilized material was disposed of at an off-site landfill. The cost per treated ton on this project was \$6.75 using EnviroBlend.