

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.

### ***Nahant Marsh – 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.

### ***Confidential Site – North Carolina***

Untreated soil contained lead totals of 3,740 mg/kg and antimony totals of 187 mg/kg. Lead was leaching at 1,660 mg/L and antimony at a concentration of 1.71 mg/L. TCLP site standards for antimony and lead were 0.5 mg/L and 5 mg/L, respectively. Dosage rates of 4% to 5% EnviroBlend 80/20 Coarse reduced antimony to acceptable leachable levels.

Leaching Results							
Sample Name	Lab ID	EnviroBlend® Dosage		Screening Leaching Test Results			
		Chemical	Percentage	Pretest pH	Solution	Final pH	Lead, mg/L
Sludge	09-01016	Untreated	-	2.16	TCLP 1	5.11	368
		EnviroMag® Coarse	2.0%	-	TCLP 1	6.07	89.4
			3.0%	-	TCLP 1	8.86	2.22
			4.0%	4.54	TCLP 1	9.78	0.90

### ***Twin Cities Army Ammunition Plant – Minnesota***

The former Twin Cities Army Ammunition Plant (TCAAP) is a 4-square mile site located in New Brighton/Arden Hills, Minnesota. The extent of the contamination covers a 25-square mile area. Land use in the area consists of residential, commercial, and industrial with on-site wetlands and woodlands surrounding Rice Creek watershed. From 1941 to 1981, the site was used to manufacture, store, and test small arms ammunition and related equipment. Waste materials such as VOCs, heavy metals, corrosive materials, and explosives were disposed of at 14 source areas, several of the source areas impacted by test-firing activities were targeted for remediation to remove metals and reduce the toxicity characteristics concentrations of the soil.

The remedial objective for this work included on-site stabilization of contaminated soil to below the Toxicity Characteristics Leaching Procedure (TCLP) criteria for lead and antimony and off-site disposal.

Phytoremediation and lead-extraction processes were implemented in earlier remediation phases of the TCAAP project. In 1998 EnviroBlend was selected in a competitive bid process to stabilize additional soil. Total lead concentrations in the soil were between 113,000 and 330,000 mg/kg. Stabilization with EnviroBlend achieved results below the Toxicity Characteristic Leaching Procedure (TCLP) criteria of 5.0 mg/L.

Contaminated soil at the TCAAP site was characterized, excavated, and stockpiled. A coarse granular EnviroBlend was thoroughly mixed in the stockpiles using conventional construction equipment at a recommended dosage rate of 3%. The EnviroBlend stabilization process does not require the use of water or a curing period. The treated material was then analyzed using the TCLP test. All stabilized material passed the TCLP criteria and was disposed of in a Subtitle D landfill. Ethylenediamine tetra-acetic (EDTA) acid was found in soil at a portion of the site, potentially leftover from former lead-extraction processes implemented at the site. EDTA complexes lead and other heavy metals and increase their leachability. A quick-turnaround treatability study in a third-party applied chemistry laboratory demonstrated treatment effectiveness using EnviroBlend on a representative sample of soil contaminated with lead and EDTA.

EnviroBlend was used for the stabilization of 47,000 tons of soil. The total project cost was less than \$10 per treated ton for soil stabilization assistance, including treatability studies, technical assistance, pilot studies, and reagent supply.

### ***Ductile Iron Foundry – Texas***

A ductile iron foundry in Texas has been using EnviroBlend<sup>®</sup> CS to treat baghouse dust for the past 11 years. The metals treated annually are Lead, Arsenic, Barium, Beryllium, Boron, Cadmium, Hexavalent Chromium, Mercury, Selenium, and Silver. The baghouse dust pH levels are also of concern for the foundry and are treated with EnviroBlend. The foundry uses the baghouse injection method for application at a dosage rate of 2-3lbs per hour of baghouse run time.

While the initial Toxicity Characteristic Leaching Procedure (TCLP) levels were unknown, the waste did test as hazardous per an EPA inspection. After treatment, the TCLP levels for each metal were all below detection limits.



## Antimony/Silver

Since the facility has had great success with EnviroBlend treating the baghouse dust, they recently started treating the baghouse filters prior to removal with a specialized EnviroBlend chemistry. Each filter has tested as non-hazardous since the use of EnviroBlend.

The site is regulated by the Texas Commission on Environmental Quality and the U.S. Environmental Protection Agency.