

**Site Background:** Arsenic in shallow stiff sandy silt and clay soils exceeds risk-based regulatory screening criteria and background level and thus required reduction to meet State and Federal cleanup standards. Potential sources of arsenic at the site are from the historical application of arsenate-containing herbicides used in the 1940s for fire control. Maximum concentration of total arsenic found at the site is 240 milligrams/kilograms (mg/kg) with the range of reported concentration of 3.04 to 240 mg/kg. Background arsenic concentrations are estimated to be approximately 10 mg/kg.



**Approach:**

In Situ-Stabilization (ISS) was evaluated as one of several remediation approaches to agency cleanup criteria. CERES Remediation Products was retained by WSP USA Environment and Infrastructure to provide non-hazardous and non-ecotoxic reagent(s) for ISS that would reduce arsenics bioavailability at the site and not result in more hazardous byproducts. CERES provided MTS<sup>®</sup> remediation chemistries to achieve the site remedial goals.

**Bench-Scale Study:**

A bench-scale treatability study was initially performed to assess optimal amendment and dosage rate applications for ISS treatment to occur as part of the field portion of the pilot study.

The results indicated that MTS<sup>®</sup> addition to soil reduced bioaccessible Arsenic concentrations to 5.1 mg As/kg soil resulting in a greater than 83% reduction at a 10% wt dosage after simple mixing of soil and reagent and addition of water for increased moisture. Soil conditions post treatment included a change in pH from 6 to 5 and short-term increased temperature by 3 degrees °F. Relative bioavailability was reduced from a background of 19.6% in the untreated soil to 7.0% in the treated soil, **resulting in a reduction of relative bioavailability of 64%.**

**In-Field Portion of Pilot Study:**

The pilot study plot was divided into four treatment areas approximately 20-feet wide by 10-feet long several remedial alternatives. Treatment depths were limited to the upper 12 inches of soil which is where the accumulated As remained.



The treatment was performed with rotary tilling equipment to mix in the MTS<sup>®</sup> reagent mixture and water.

**Performance Criteria:**

Performance criteria included 3- and 12-month post treatment soil testing to verify longer term performance and resilience of MTS<sup>®</sup> sequestration and reduction of relative bioavailable Arsenic.

The results are as follows:



*Arsenic*  
*Bioavailability Reduction*  
*Reduction/Stabilization*



**3-month results:** Baseline As bioaccessibility 30.5 mg As/kg soil and relative bioavailability of 19.6%

MTS<sup>®</sup> amended As bioaccessibility 4.4 mg As/kg soil and relative bioavailability of 6.6% resulting in a **reduction of relative bioavailability of 66%**. This is 4% greater reduction than lab result!

**12-month results:** Baseline As bioaccessibility 30.5 mg As/kg soil and relative bioavailability of 19.6%

MTS<sup>®</sup> amended As bioaccessibility 2.4 mg As/kg soil **resulting in a 92% reduction in bioaccessible As**. Relative bioavailability was 4.4% resulting in a **reduction of relative bioavailability of 78% from the control**. This is 12% greater reduction than 1<sup>st</sup> Qtr results!

MTS<sup>®</sup> continues to perform better than lab scale results 1 year after application on-site, ensuring the highest level of sequestration resilience and long-term reduction of Arsenic bioaccessibility.

### **Customer Feedback:**

**“4<sup>th</sup> Qtr results are even better!”**

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.