Hexavalent Chrome Soil Remediation, Hagerstown, Indiana

Client: DANA Corporation

SITUATION

DANA Corporation operated a chrome plating facility for automotive parts manufacturing in eastern Indiana. Following shut down of operations, the building was demolished; a concrete wall footing and several concrete plating dip tanks were left in-place. The soils within the foundation area were contaminated with total levels of Hexavalent Chrome ranging from 5,600 ppm to 10,000 ppm. Results of a site characterization indicated approximately 9,400 tons of impacted soil to a depth of eight (8) feet. Static ground water was present at 8.2 feet.

The Indiana Department of Environmental Management (IDEM) and DANA entered into an agreement under the state's Voluntary Cleanup Program to remediate areas of the facility that had been contaminated with Hexavalent Chrome. In order to meet the State's treatment level, site soils had to be treated to less than 1 mg/l TCLP, (<1 mg/l Leachable Chrome).

CBA'S TECHNOLOGY AND APPROACH

CBA was approached by the DANA's engineering firm, RMT, prior to completion of the remedial action plan. The primary objective was to utilize an innovative IN-SITU Soil Treatment Technology that could meet treatment objectives in accordance with the IDEM soil treatment criteria, and to generate cost savings to the client. CBA's Mobile Injection Treatment Unit (MITU) was selected as a potential innovative methodology. A pilot study was scheduled to demonstrate the MITU technology's mixing ability and to finalize the chemical dosage application prior to full scale remediation.

RESULTS

During the pilot study, additional sub-surface obstructions were discovered. These obstructions consisted of seven (7) full-length concrete reinforcement walls, which were located throughout the entire treatment area. The clients initial decision was to excavate and dispose off-site of the concrete. CBA proposed the option of excavation and on-site crushing of the concrete. A crusher was mobilized to the site. All concrete was excavated and crushed to 2 inch minus, re-applied over the treatment area and treated in-place by the MITU technology. CBA successfully treated all crushed concrete and generated a $250,000 savings to the client, in addition to eliminating any materials from going off-site for disposal.

During the full-scale operation, the MITU technology averaged a treatment and production rate of 450 tons per day of treated chrome contaminated soil, which included chemical handling, application and treatment. Despite adverse weather conditions of continuous rain, very dense and plastic soils and site mobility, CBA completed the project with success prior to the end of the year.

Project Manager: Bruce L. Bruso
Site Manager: Mike Siravo
Bid Cost: $750,000
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RMT Project Manager: Jack Anderson (608) 831-4444

INTERNATIONAL **Projects**

Hydrocarbon Soil Remediation, Hovedstadens Jordrens, Copenhagen, DK

SITUATION

Over the past century, the land use in the Copenhagen area has changed dramatically. Initially, land was used for farming in the surrounding communities and residential use in the main city area. Later, these properties were changed into manufacturing areas as the industrial revolution took hold and progressed for many years. Recently, these properties have become disused and are changing back into residential areas and recreational parks. This redevelopment construction has created an abundance of contaminated soils associated with the previous manufacturing and industrial use. In Copenhagen, the contaminated soils are managed at an off-site soil management firm. This allows construction to continue and soils can be managed for a set fee. However, this has resulted in a significant volume of soils to be managed at the local Copenhagen soil management facilities.

Because hydrocarbon soils are generally conducive to low-cost bioremediation, the soil management firms prefer to use this approach. However, bioremediation typically takes much longer to implement (i.e., time consuming) and generally can't achieve the desirable low levels (i.e., Class I). The time consumption has resulted in an increased quantity of soils on-site and little movement of soils off-site due to the slow remedial process.

CBA'S TECHNOLOGY AND APPROACH

CBA's innovative technology was considered to provide a pathway toward achieving the lower concentrations in the soils after the bioremediation had been performed. The primary objective was to utilize the EX-SITU soil treatment technology that could meet treatment objectives in accordance with the Denmark's soil treatment criteria. This treatment could be done by applying heat and hot-air for the lighter fraction hydrocarbons and a chemical amendment for the heavier compounds. CBA focused on treating the soils in separate piles that would be selectively removed following treatment.

RESULTS

At the request of the client, CBA began EX-SITU soil treatment work on a test pile in late May. Pre-treatment results indicated TPH levels of 5,000 ppm in one of the samples. CBA completed EX-SITU soil treatment by use hot-air treatment on TPH contaminated soils in a very rapid fashion. While performing under adverse working conditions, including heavy precipitation, it was determined that the soils actually contained the heavier hydrocarbon compounds (C25 – C35) which required chemical amendment as well as heat. CBA ordered the appropriate chemical mix and was able to completely mix the pile within one day.

Based on historical information, this type of rapid mixing process with the MITU will render the soils as Class I (Clean Fill).

Project Manager: Bruce L. Bruso
Site Manager: Jorgen Ravn
Cost: $

Mixed Waste Soil Remediation, Milwaukee, Wisconsin

Client: WDNR/HSI Geotrans

SITUATION

In the 1950s and 60s, the property at 3033 West Walnut Street was being utilized as plating operation for Electro-coatings. Following shut down of operations, the soils within the area of the operation were found to be contaminated with Hexavalent Chrome and chlorinated VOCs (e.g., PCE, TCE, etc.). Results of a site characterization indicated approximately 14,400 tons of impacted soil to a depth of 40 feet. VOC contaminated soils were expected to be less than 7,700 ppm.

The Wisconsin Department of Natural Resources (WDNR) elected to remediate the site under a publicly funded approach. Two separate bid options were evaluated: 1) Treat metals in-place, Excavate and remove VOC soils as hazardous and incinerate; 2) Treat metals soils in-place and perform IN-SITU hot-air treatment on VOC soils to lower/ eliminate contamination levels to meet a non-hazardous classification for off-site disposal. In order to meet the State's treatment level, site soils had to be treated to less than 5 mg/l TCLP, Leachable Chrome, 14 ppm for PCE and 5 ppm for TCE. Bid option 2 was selected due to cost savings.

CBA'S TECHNOLOGY AND APPROACH

CBA's innovative technology was considered instrumental for IN-SITU hot-air soil treatment by the WDNR's prime contracting firm, HSI Geotrans. The primary objective was to utilize the IN-SITU soil treatment technology that could meet treatment objectives in accordance with the WDNR soil treatment criteria. CBA focused on treating the soils in shallow lifts that would be selectively removed following treatment.

RESULTS

At the request of the WDNR, CBA began IN-SITU soil treatment work on Lift No. 1 in late December. Post-treatment results indicated VOC levels of 15,000 ppm in one of the grids. Based on treatment time, it was estimated that PCE soils within that grid were likely at or near 25,000 ppm prior to treatment. CBA completed IN-SITU soil treatment on chrome-contaminated soils in rapid fashion and continued to use hot-air treatment on VOC contaminated soils. While performing under adverse winter working conditions, heavy precipitation and the presence of marine clays, CBA was able to meet the treatment objectives for TCE and achieve 99% mass removal from the PCE soils (i.e., to about 100 ppm) with hot-air only. However, the desired result of 14 ppm had not been met. The WDNR was prepared to move to incineration of all VOC soils at the higher project cost, when the CBA / HSI team proposed the use of chemical amendment (i.e., chemical oxidation) for VOC soils.

Bench and pilot scale studies indicated that potassium permanganate could achieve the desired results. The CBA / HSI team proposed the use of $KMnO_4$ as a polishing step in the treatment train; this approach was still approximately $2MM less than Option 1. CBA utilized the MITU-LVR to mix the $KMnO_4$ as a dry crystalline form with the VOC contaminated soils. The average $KMnO_4$ dose was 4% by wt., and results were generally achieved within 72 hours after initial application.

Project Manager: Clark Romberger
Site Manager: Mike Bauer
Cost: $1.85 Million
Client Contact Reference: Tom Wentland, Project Mgr., WDNR (414) 229-0853
HSI Project Manager: Dan Morgan (262) 792-1282

VOC and Metals Soil Remediation, Arcade, New York

Client: HSI Geotrans/Motorola, Inc.

SITUATION

A chemical and waste storage building was the source of contamination at a former Motorola facility near Buffalo, New York. An Interim Remedial Measure (IRM) was developed to address the heavy metal and VOC impacted soils remaining at the currently active facility now owned by Prestolite Electric, Inc. The VOC contamination included BTEX and TCE, while the metal contamination included primarily cadmium but also elevated levels of chromium and lead. The contamination extended to a depth of 12 feet and encompassed a volume of approximately 4,500 cubic yards.

Several alternative remedial options were tested and evaluated at the site; they included soil vapor extraction and phytoremediation. These approaches were unsuccessful due to the lithology and characteristics of the site soils. As part of the IRM, and as a voluntarily negotiated Order of Consent, a Remedial Action Plan (RAP) was submitted to the New York State Department of Environmental Conservation (NYSDEC) and approved proposing the use of the MITU technology to remediate VOC and metals impacted soils.

CBA'S TECHNOLOGY AND APPROACH

Motorola's consultant HSI Geotrans awarded the remediation contract to CBA through a competitive bidding process. The MITU technology was selected based on total cost and on the MITU's ability to treat soils contaminated with mixed waste (*e.g. metals and VOCs*). CBA proposed forced hot air and mechanical mixing for the thermal stripping and removal of VOCs and admixing of a chemical reagent for the stabilization of heavy metals. The most appealing aspect of this approach was that the MITU could perform both remedial processes simultaneously or as a parallel or serial technique utilizing one or more MITUs.

RESULTS

Treatment goals were established for the following volatile organic compounds; TCE - 0.7ppm, toluene - 1.5ppm, ethyl benzene – 5.5ppm, and xylene – 1.2ppm. The objective for metals treatment was to minimize the potential leachability with TCLP values for cadmium, chromium, and lead approaching or meeting the NYSDEC groundwater standard. During the treatment process subsurface debris in the form of concrete, as large as 14 ft x 4 ft x 4 ft; asphalt; wood and timber; crushed and in tact drum carcasses; metal pipes, plastic and geofabric material, was discovered. A perched water table was also encountered throughout the treatment area at depths as shallow as 3 feet.

In-situ treatment with the MITU began in December and was conducted throughout the winter months. A temporary portable structure was erected to facilitate working through the severe climate in this region.

The cleanup goals for all heavy metals and for TCE, toluene, and ethyl benzene were met or exceeded. Although the cleanup goal of 1.2 ppm for xylene was not met in nineteen of thirty-one treatment grids; A xylene mass removal of at least 87% was obtained throughput the treatment area. In addition, a 96% reduction was achieved in twelve of the nineteen grids and a reduction in excess of 99% was shown in four of those grids. Based on these results, the Client was able to obtain closure.

Project Manager: Clark A. Romberger
Site Manager: Donald Chescavage
Bid Cost: $500,000
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