STATEMENT OF QUALIFICATIONS

ENVIRONMENTAL CONSULTING AND REMEDIATION SERVICES

3203 Audley
Houston, Texas 77098
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Service-Disabled Veteran-Owned

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INTRODUCTION

MEC^X, LP is a technology-based, challenge-driven, performance focused, team of innovative solution providers. We are a relatively new company (incorporated on February 2, 2002) but our roots go back to 1968 when our former parent, ManTech International, a highly regarded federal contract management and innovative technology provider was created. Yes, we are small but we are endowed with an entrepreneurial client-focused, solution-driven team of dedicated employees.

We are a certified veteran-owned business, which is definitely opening doors for us within the federal arena. It also means that our company is lead by a veteran "hands-on" management team that has "been-there and done-that" on time, on budget and most important of all, exceeding client expectations every time. We are unique in our history, corporate formation, and client service delivery system.

Through our "MEC to the Power of X" strategic alliance partnerships with over a dozen innovative remediation technology providers, we have multiplied our separate and unique niche technology capabilities into a full complement of outside the box solutions capable of solving our client's most difficult problems!

MEC^X welcomes any opportunity to listen to your most difficult problems. Updated information regarding our latest cutting edge technology innovations and hyperlinks to the most current list of our "Power of X" strategic alliance partners can be found on our web site at www.mecx.net.

MEC^X VISION

To enhance or restore built and natural environments, creating exceptional value for our clients, employees, and families within communities in which we work and live.

MISSION STATEMENT

MEC^X is a team of technology-driven, service-oriented professionals with client success central to our total business approach, from project concept through completion. We continually invest in, develop, and empower our results-oriented employees to maximize value by creating innovative solutions that assure project success.

MEC^X COMPANY HISTORY

Our company roots go back to 1968 when our former parent company, ManTech International Corporation, a highly regarded federal contract management and innovative technology provider was created. For many years we operated as ManTech Environmental Corporation (MEC), a subsidiary and integral part of of ManTech International. MEC was created primarily to serve as a vehicle to implement practical innovative soil and groundwater remediation technologies developed by the USEPA Kerr Research Lab in Ada, Oklahoma.

In 1992, MEC aquired the assets of Biospherics, Incorporated's Environmental and Laboratory Services Division, which provided a wealth of industrial hygiene and indoor air quality expertise and experience, including all areas of lead paint, asbestos, and mold consulting services. In February of 2002, when ManTech International went public, our solution-driven team of dedicated staff members was spun-off to form a new totally independent entrepreneurial small business (MEC to the "Power of X")

Today, MEC^X is a service-disabled veteran-owned small business. We believe this means that our company is lead by a veteran "hands on" management team that designs and executes projects on time, on budget, and most important of all, exceeding client expectations every time. We are unique in our history, our path towards corporate formation, and most of all our approach to client service.

MEC^X ENGINEERING SERVICES

MEC^X offers consulting, engineering, remediation and scientific services to industrial, commercial and governmental organizations. MEC^X has successfully and consistently shown its commitment to excellence, responsiveness, safety and delivery of technically sound environmental solutions driven by client needs. Thus, MEC^X personnel take an active interest in understanding our client's business needs.

MEC^X REMEDIATION CAPABILITIES

MEC^X understands that thorough and careful planning and execution is critical to obtaining regulatory closure of contaminated sites. MEC^X personnel have extensive experience conducting remedial investigations, performing feasibility studies, performing treatability studies/pilot tests, managing remedial design and construction projects, operating and monitoring the progress of remedial systems, negotiating site cleanup objectives and obtaining closure from regulatory agencies. MEC^X has unique proven expertise in designing, installing and operating innovative remedial approachs to treat soil, sludge, groundwater and wastewater. Our specialties are in innovative in-situ chemical oxidation designs, engineered excavations and enhanced soil vapor extraction systems.

INNOVATIVE CHEMICAL OXIDATION TECHNOLOGY

The MEC^X In-Situ Chemical Oxidation (ISCO) Process is recognized as one of the most cost-effective remediation technologies to remediate organic contaminants in groundwater and saturated soils. MEC^X ISCO uses proprietary formulations of reagents that are applied directly into the area of concern. The reagents then treat contaminated groundwater and saturated soil *in-situ*, producing no waste streams that require permitting, treatment, or disposal. Reductions in organic compound concentrations are realized in a matter of days as compared to the many years of treatment required for other remediation technologies (i.e. pump and treat, MNA). Another advantage of MEC^X ISCO technologies is the elimination of costly long-term operation and maintenance (O&M) that is often associated with conventional remediation technologies.

MEC^X is constantly expanding the type of robust applications for its proprietary family of oxidation technologies. Examples include the application of the catalyzed hydrogen peroxide to effectively desorb contaminants such as gasoline, fuel oils and coal tars. The exothermic reaction reduces the viscosity of highly viscous petroleum products. The catalyzed hydrogen peroxide breaks down larger molecules into smaller molecules. In addition to these chemical effects, the physical action of hydrogen peroxide-created bubbles facilitates the separation of free product from the soil matrix.

MEC^X ISCO CUSTOMIZATION

MEC^X typically performs a design parameter evaluation (DPE; i.e. bench test) to maximize the oxidant efficiency on a site-specific basis. MEC^X also utilizes a proprietary, empirically-derived computer modeling program that has been developed from laboratory and field applications over the last several years. This Oxidation Estimating Tool (OET) is used with DPE data and relevant site data (e.g., hydrogeology, water chemistry, contaminant type and concentrations), to develop a customized, site-specific treatment for each field-scale remediation project.

ACTIVATED SODIUM PERSULFATE

The MEC^X ISCO Process also includes the simultaneous application of sodium persulfate (i.e. Klozür®) which is activated by novel methods such as heat, iron, peroxide and high pH. The longer-lasting oxidant persists in the formation and attacks contaminants that have been converted from the adsorbed phase to the dissolved phase by catalyzed hydrogen peroxide.

KLOZUR®
Power. Stability. Versatility.

Application of MEC^X ISCO has demonstrated significant contaminant reductions for a variety of organic compounds in groundwater within a short time period following treatment. Based on design parameter evaluation, pilot, and full-scale applications, the MEC^X ISCO Process has been determined to be applicable for the treatment of petroleum-based fuels, chlorinated and non-chlorinated solvents, organic pesticides, and other organic contaminants in groundwater and saturated soil.

APPLICATION SEQUENCE OPTIMIZATION

An innovative sequence of four complementary in-situ soil and groundwater treatment technologies has recently been developed to reduce total contaminant mass encountered at difficult to treat remediation sites.

Pre-conditioning

The first step is to pre-condition low permeability soils using either chemical and/or mechanical means. Mechanical augers and direct push probes are now available with specialized chemical injection devices to facilitate breaking up tight soils. Pneumatic and hydraulic fracturing are emerging and promising technologies that MEC^X uses to increase the radial influences of our ISCO projects.

Mass Reduction & Desorption

The second step is to apply an enhancement of the traditional catalyzed hydrogen peroxide chemical oxidation process. The use of exothermic free radical reactions to destroy contaminants in the dissolved (saturated zone) phase is well documented. However, unlike previous applications of the Traditional Fenton's Reagent, the new emphasis is on optimization of the "Total Contaminant Mass Desorption Process".

High temperature applications (greater than 180^{o}F) in the saturated zone have resulted in inefficient use of hydrogen peroxide and runaway exothermic reactions. Likewise, low temperature applications (less than 100^{o}F) have resulted in problems with dissolved phase contamination rebound. MEC^X engineering controlled approach includes innovative equipment and chemical delivery techniques, whereby the saturated zone temperature is maintained consistently between 140^{o}F and 170^{o}F and effectively desorbs both adsorbed and absorbed contaminants. Further oxidation and, ultimately, significant mass contaminant destruction occurs, which facilitates the third and fourth steps, which involve bio-treatment polishing.

Aerobic Polishing

The third optional step is an advanced aerobic treatment processes, which optimally produces stable concentrations of dissolved oxygen to biodegrade petroleum hydrocarbons in the contaminated groundwater using indigenous bacteria. MEC^X is teamed with Terra Systems, Incorporated to provide an in-situ continuous oxygen bubbling system. MEC^X is also teamed with FMC Technologies to provide calcium peroxide-based PermeOx® Plus, an oxygen release compound able to deliver up to 18% oxygen, versus the usual 10% oxygen with magnesium peroxide. In addition, MEC^X is teamed with Solvay Chemical to provide sodium percarbonate which upon dissolving in groundwater will provide hydrogen peroxide as an additional oxygen releasing compound.

Anaerobic Polishing

If chlorinated contaminants are also present, the treatment train process is followed by a fourth advanced anaerobic treatment step that employs emulsified food-grade soybean oil that is injected into the aquifer to stimulate reductive dechlorination. The edible oil, with a very low viscosity (consistency of skim milk), slowly dissolves over several years providing a carbon and hydrogen source to accelerate the anaerobic biodegradation of contaminants.

ENHANCED AEROBIC BIO-TREATMENT

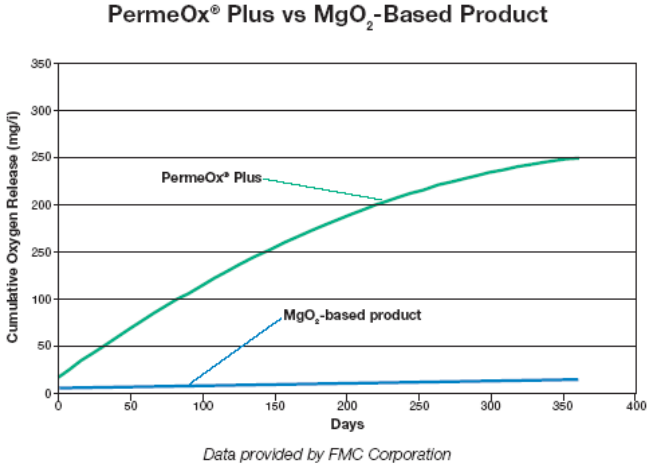
Successful bioremediation of petroleum contamination through aerobic microbial respiration depends on a number of factors including the presence of appropriate microbes, nutrients, electron donors and terminal electron acceptors. In the aerobic metabolism of petroleum contaminants, oxygen acts as a terminal electron acceptor and petroleum contaminants act as electron donors, which are then oxidized. Often, the limiting factor in aerobic bioremediation of petroleum contaminants is oxygen. MEC^X is teamed with FMC Technologies to provide calcium peroxide-based PermeOx® Plus, an effective oxygen releasing compound.

PermeOx® Plus provides oxygen through a reaction of calcium peroxide and water:

$$CaO_2 + 2H_2O \rightarrow Ca(OH)_2 + H_2O_2$$

$$2H_2O_2 \rightarrow O_2 + 2H_2O$$

Laboratory studies have demonstrated that PermeOx® Plus can continually release oxygen for over 350 days. PermeOx® Plus Contains More Available Oxygen than Magnesium Peroxide. PermeOx® Plus is formulated to contains a least 18% Available Oxygen (AO), a measure of how much oxygen is available to be released. This compares to a 10% AO level found in typical magnesium peroxide based oxygen release products that are subject to lock-up. This means that on a pound to pound basis PermeOx® Plus is able to deliver >80% more oxygen.



Data provided by FMC Corporation

In a study conducted at FMC's Princeton, New Jersey Research Facility, the oxygen-releasing capacity of a MgO_2-based product and PermeOx® Plus were conducted over a one-year time frame. Results of the study show that PermeOx® Plus released significantly more oxygen than the MgO_2 product.

MEC^X has successfully used PermeOx® in advanced applications such as select backfill amendments at dry cleaner excavations were vinyl chloride, which degrades aerobically, was the driving contaminant. MEC^X has also applied PermeOx® as amendments to backfill for excavation performed in difficult formations such as fractured limestone. The PermeOx® served as a remediation tool to reach fractures that were unable to be excavated.

ENHANCED ANAEROBIC BIO-TREATMENT

MEC^X is teamed with a "Power of X" Strategic Alliance Partner, Terra Systems, Incorporated for anaerobic biological remediation of contaminated soil and groundwater. Terra Systems' senior microbiologists are considered pioneers in the bioremediation field.

SRS™ is a slow release substrate for the remediation of chlorinated compounds in soil and groundwater. The addition of time-released soluble organic substrates to contaminated soil and groundwater has been proven to be a cost-effective approach for accelerating biodegradation of chlorinated compounds and other contaminants. Naturally occurring microorganisms use the substrate as an energy and carbon source in the process known as reductive dechlorination. SRS™ is designed to release bio-available hydrogen over a period of 2 to 4 years thus enhancing the long-term anaerobic biodegradation of chlorinated compounds.

SRM™ is an injectable compound designed for the remediation of dissolved metals in groundwater. It stimulates reductive processes required for treatment of chlorinated compounds in mixed metals/chlorinated solvent plumes.

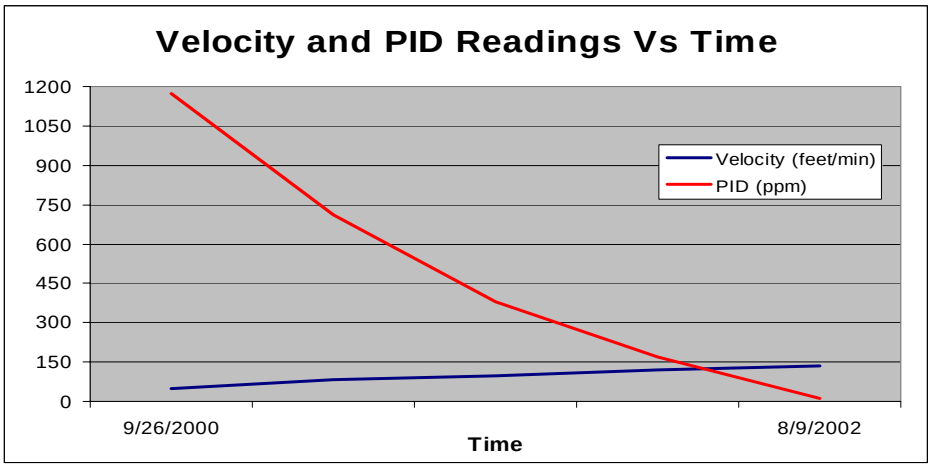
Pinellas Dechlorinater Culture is a *dehalococcoides* bio-augmentation culture provided by Terra Systems. *Dehalcoccoides* is utilized to ensure complete dechlorination of PCE and TCE past 1,2-DCE to ethene.

ENHANCED SOIL VAPOR EXTRACTION

MEC^X has successfully developed a proprietary vadose treatment process, which is extremely effective on removing volatile organic compounds from tight impermeable soils. Soil vapor extraction is a well known and effective technology when applied in permeable soils but has not been effective in tight impermeable soils, particularly those soils containing significant amounts of silt and clay.

Our proprietary technology operates as a closed loop hot air recirculation process in the vadose (unsaturated) zone. Since there are no external emissions, no air permit is required. Warm air from a blower is injected directly into the impermeable soil, which desiccates the soil. The dry soil then readily desorbs its volatile organic compounds, which are collected through a conventional soil vapor extraction system. The vapors from the soil extraction system then pass through an activated carbon system and re-circulate back to the blower, where the process begins again. The heat of compressing the air flowing through the blower creates the hot air that is introduced back into the contaminated vadose zone treatment area. The closed loop enhanced soil vapor extraction system takes advantage of the fact that desiccated soils are much more permeable.

Combination of an enhanced soil vapor extraction system, operating the vadose zone, with the MEC^X ISCO Process, operating in the saturated zone, is particularly effective as a synergistic push-pull contaminant removal system. ISCO technologies are exothermic (heat generating) processes. Typically, groundwater temperature rises from 60 ºF to between 140 & 160 ºF. This temperature increase has a direct effect on the degree of volatilization and the partitioning of contamination between the solid (absorbed) phase and the vapor (desorbed) phase. Note: The partitioning coefficient between the absorbed and desorbed phases is known as the Henry's Law Constant.



INNOVATIVE SOURCE REMOVAL EXCAVATIONS

MEC^X understands that rapid source area remediation can be the key to the long term effectiveness of many remediation programs. In addition, we understand that thoroughness and carefulness in planning, selecting and implementing the appropriate remedial strategies is critical to obtaining regulatory closure of contaminated sites. The use off innovative source area excavations have gained popularity do to the minimal impact on the facilities and the assurance that all environmental impacts have been addressed, permanently.

Clients from the real estate industry are very concerned with losing revenue from closure of facilities during remediation activities. Thus, MEC^X has developed techniques for excavating contaminated soils from beneath occupied buildings and active facilities. The largest benefits of this approach are the rapid regulatory closure and elimination of long-term liabilities on-site.

The engineered approach requires three critical elements to ensure that the excavation is safe and effective with minimal delays. These elements include:

- Complete delineation of the contaminants and identification of fractures and utility corridors that must be removed or supported prior to commencement of excavation activities
- Accurate set of building and foundation design documents to ensure that the structural integrity of the systems can be maintained
- Design of an effective shoring plan that minimizes interference with excavation activities while ensuring the integrity of the building systems and worker safety.

Delineation activities must provide a level of acceptable confidence that all required contamination will be removed during excavation activities. Iterative excavation activities can be performed; however, the expense of shoring and bracing will increase if the innovative systems need to be moved. MEC^X has developed several proprietary in-situ bracing and shoring systems that are installed through borings prior to commencing excavation activities.

REMEDIATION STRATEGIC ALLIANCE PARTNERS

Each of our remediation strategic alliance partners has a proven track record of success and a long standing close working relationship with MEC^X. Together, the following partners are committed to harnessing the "Power of X" to solve our client's most difficult remediation problems:

C^3 Environmental sets the industry standard for the construction of permeable reactive barriers and Waterloo Barrier systems. C^3 Environmental is the exclusive Canadian licensee for a steel sheet piling system with sealable joints designed to provide a very low permeability barrier for containment of groundwater. Waterloo Barrier® can be utilized to construct cutoff walls, for source zone isolation cells and as impermeable structural shoring to facilitate excavation of contaminated soils. C^3 Environmental is the exclusive agent and representative for the application of the proprietary MEC^X in-situ chemical oxidation technology in Canada.

Columbia Technologies is a veteran-owned small business providing innovative site characterization and contaminant delineation services.

Microseeps' is a veteran-owned small business providing monitored natural attenuation research evaluation and analytical services.

Olgoonik Environmental Services is an Alaskan Native Corporation, 8 (a) and HUBZone Enterprise that provides professional environmental and remediation construction services.

Terra Systems' is a small business whose core competency is biological remediation of organic chemical contaminated soil and groundwater. Their senior microbiologists are considered pioneers since 1971 in the bioremediation field. Terra Systems owns the patent rights for a slow release emulsified oil substrate (SRS®) that enhances anaerobic biological activity. Terra Systems also owns an application patent for the use of a unique bacterium that effectively degrades chlorinated compounds.

Additional information on "MEC to the Power of X" strategic alliance partners can be found at our web site at www.mecx.net, by contacting our technology marketing director at richard.cartwright@mecx.net, or by calling one of our local offices.

ATTACHMENT A

REMEDIATION PROJECT DESCRIPTIONS

IN-SITU CHEMICAL OXIDATION PROJECT DESCRIPTION

Pipeline Release Threatening a Nearby Creek
Kentwood, Louisiana

INTRODUCTION

MEC^X, LP performed an in-situ chemical oxidation (ISCO) application at a pipeline site in Kentwood, Louisiana. The site was located in a remote part of Louisiana, adjacent to a major four-lane highway. A repair coupling in a refined products pipeline developed a leak after several years of service and threatened a nearby creek and wildlife. Non-aqueous phase liquid (NAPL) was identified at thicknesses ranging from 0.1 to greater than 1 foot thick in addition to high concentrations of dissolved petroleum hydrocarbons. Due to the proximity of the contamination to the creek, a rapid and effective in-situ chemical oxidation remediation solution was selected to prevent further migration.

PROJECT BACKGROUND

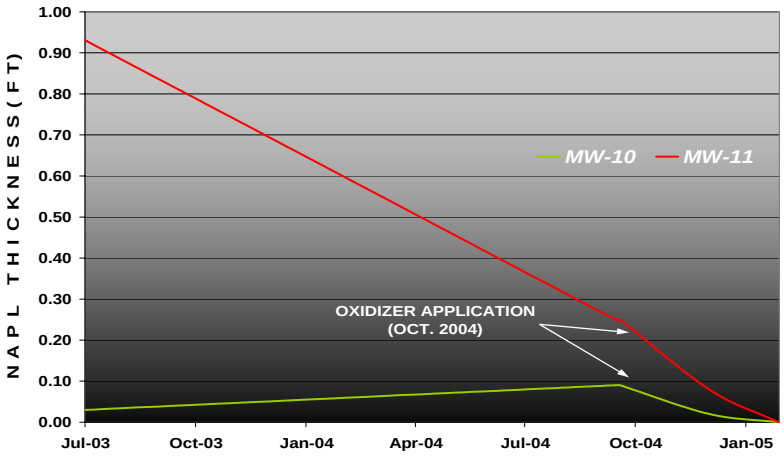
The target remediation zone was located between approximately 7 to 13 feet below grade surface and the groundwater dissolved plume/saturated zone covered approximately 30,000 square feet. Logistical challenges that the remote location posed included the lack of electric power, lack of potable water and access for chemical delivery to the site. MEC^X overcame the logistical challenges by renting a farm house (located approximately 1 mile away from the site) with a potable water well and an all-terrain fork lift to transport diluted reagents from the farm house to the site.

REMEDIATION SOLUTION

MEC^X ISCO Process for the site included the application of low concentration hydrogen peroxide and ferrous for the high-energy desorption of contaminants in the saturated zone and for activation of sodium persulfate (Klozür®), a slow-release oxidant which is activated by ferrous, hydrogen peroxide and heat. Prior to field activities, MEC^X performed a design parameter evaluation in a laboratory setting prior to field application and achieved an average contaminant reduction of 96.8% to 100% in groundwater and 84.6% to 100% in soil.

REMEDIATION EFFECTIVENESS

MEC^X successfully eliminated measurable NAPL in perimeter monitoring wells 4 months after completion of application, as depicted. Furthermore, post-application sampling showed an average of 83% decrease in benzene concentrations (target compound) within 4 months and an overall total petroleum hydrocarbon reduction of 70% only 4 months after application completion.



IN-SITU CHEMICAL OXIDATION PROJECT DESCRIPTION

Transfer Pipe Release at Bulk Storage Terminal

Dallas/Fort Worth Area, Texas

INTRODUCTION

MEC^X, LP performed an in-situ chemical oxidation (ISCO) application at a fuel bulk storage terminal located northwest of Dallas, Texas. An underground transfer pipe associated with a fuel storage tank was suspected to have leaked and was subsequently cleaned and abandoned in-place. Non-aqueous phase liquid (NAPL) and high concentrations of dissolved petroleum hydrocarbon constituents including methyl tert-butyl ether (MTBE) benzene, toluene, ethyl-benzene, xylene (BTEX) and were identified. Rather than excavate affected soils, near utilities, and compromise the tank berm and floor, a rapid and effective in-situ chemical oxidation remediation solution was selected to remove the source area (i.e. NAPL) and reduce the BTEX and MTBE levels.

PROJECT BACKGROUND

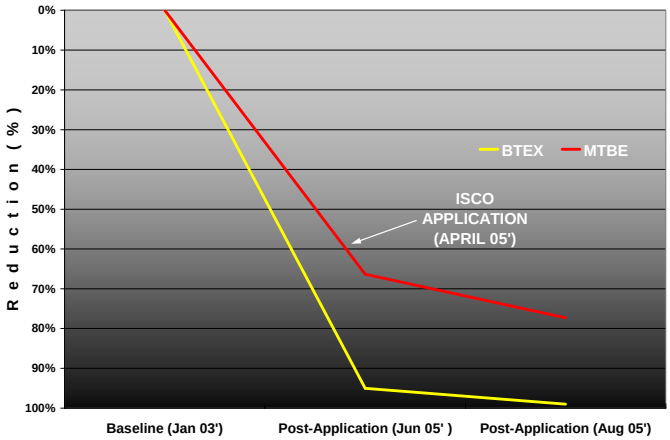
The target remediation zone was located between approximately 2 to 16 feet below grade surface (bgs) and the groundwater dissolved plume/saturated zone covered approximately 13,400 square feet with portions located inside and outside of the tank berm. Shallow lithology included silty clays with interbedded gravel seams. Logistical challenges included staging of equipment away from emergency right-of-ways and working at an active storage facility. The MEC^X versatile and scaleable chemical delivery system allowed configuration to meet the safety objectives while safely applying reagents to the affected area, while not interrupting ongoing site fueling activities.

REMEDIATION SOLUTION

MEC^X ISCO process includes the application of low concentration hydrogen peroxide and ferrous for the high-energy desorption and some oxidation of contaminants in the saturated zone and for activation of sodium persulfate. Sodium persulfate is a slow-release oxidant that further oxidizes contaminants for 30 to 60 days after activation. Real-time monitoring of water quality parameters, including temperature, dissolved oxygen, pH, conductivity and oxidation/reduction potential were performed during the application to determine the effectiveness of the application and allow adjustments of reagents in the field.

REMEDIATION EFFECTIVENESS

MEC^X successfully eliminated NAPL and significantly reduced total BTEX by 95% within 1 month after the May 2005 application and to below detection levels after 3 months, as depicted below. Also, MTBE concentrations were reduced to by 66% 1 month after and 77% 3 months after the application.



IN-SITU CHEMICAL OXIDATION PROJECT DESCRIPTION

Former Dry Cleaner Site Affecting Drinking Water

Pensacola, Florida

INTRODUCTION

MEC^X, LP performed an in-situ chemical oxidation (ISCO) application at a former dry cleaning facility in Pensacola, Florida. The use of tetrachlroethylene (PCE) during dry cleaning activities contaminated a groundwater zone beneath the site. Complicating matters was a drinking water well located approximately 300 yards away from the release area and was drawing the contamination toward it. Therefore, a rapid and effective remediation solution was required to prevent contaminant migration and ISCO was selected as the best technology.

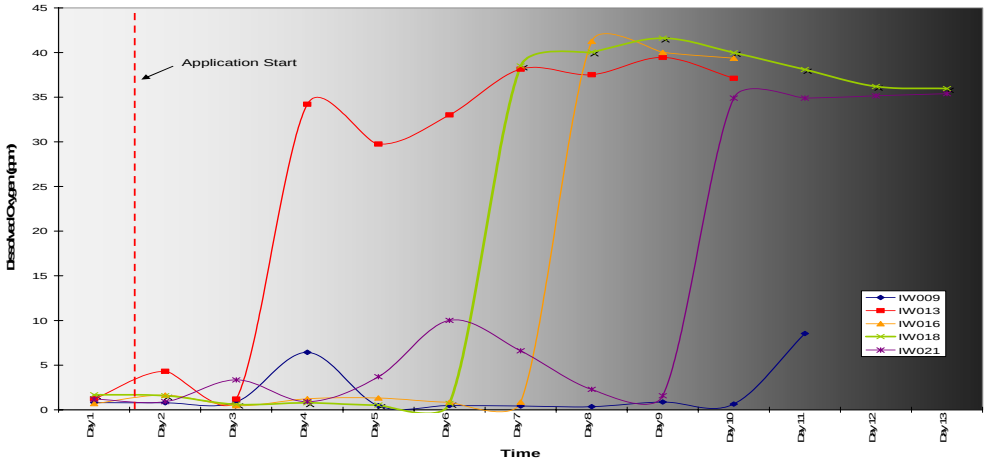
PROJECT BACKGROUND

The target remediation zone was located between 95 and 115 feet below ground surface (bgs) and the local lithology consisted of fine to coarse sand. Remediation of affected soils by a soil vapor extraction groundwater pump & treat of the target treatment area has previously been performed by others.

REMEDIATION SOLUTION

MEC^X performed a 15-day application of catalyzed hydrogen peroxide to 15 application wells. Water quality parameters in offset monitoring points were selected to observe the approximate radial influence. The graph shown below indicates that within 30 hours after beginning the application, parameters which indicate an oxidative state (i.e. increased dissolved oxygen, increased oxidation-reduction potential, etc.) were observed. Monitoring wells further down-gradient also displayed an increase in dissolved oxygen.

MEC^X applied approximately 12,000 gallons of hydrogen peroxide and achieved an average of 74% reduction in groundwater contaminant concentrations. Furthermore, high dissolved oxygen concentrations were reported 6 months after completion of the application.



IN-SITU CHEMICAL OXIDATION PROJECT DESCRIPTION

Roadway Expansion at Former Gas Station Site
Pensacola, Florida

INTRODUCTION

MEC^X, LP formerly operated as ManTech Environmental Corporation (MEC) performed a in-situ chemical oxidation (ISCO) application at a former gasoline station facility in Pensacola, Florida. The MEC^X ISCO Process was selected as the remedial solution because the Department of Transportation was expanding a roadway and needed to rapidly and permanently remediate the contaminated groundwater beneath the former gasoline station.


Remediation

PROJECT BACKGROUND

The Site was a typical gasoline station facility encompassing ¼ to ½ acre. Depth to the affected groundwater was approximately 23 feet below ground surface. The affected water-bearing zone consists of permeable sand. Prior to the ISCO application, the site had been cleared and graded in preparation for construction of a roadway expansion.

REMEDIATION SOLUTION

MEC^X performed a single 10-day ISCO application at the Site in August 2001. Contaminant mass was calculated for the affected area prior to and after the final application. An overall contaminant mass reduction of 95 to 100% was achieved as a result of the single ISCO Process application. A summary of limited data from the pilot test is presented below.

	North	South	East	West	Center
Baseline					
BTEX/MTBE	0	3.86	4.6	1900	792
PAHs	0.23	2.22	2.76	51.03	94.04
Total (ppb)	0.23	6.08	7.36	1951.03	886.04
Post-Application					
BTEX/MTBE	0	0	0	78	28.2
PAHs	0	0	0	18.23	0.22
Total (ppb)	0	0	0	96.23	28.42
Reduction (%)	**100%**	**100%**	**100%**	**95%**	**97%**


Post-Remediation

REMEDIATION EFFECTIVENESS

Based on the results of the single ISCO application, the roadway expansion continued without delay and further remediation of the site was not needed, resulting in a timely, financially and technically effective solution.

PROJECT DESCRIPTION: *ENGINEERED EXCAVATION, UST REMOVAL, STATE CLOSURE*

Hydraulic Lifts & USTs Automobile Maintenance Facility
Farmers Branch, Texas

INTRODUCTION

MEC^X, LP performed an environmental site assessment and an engineered excavation at a former automobile dealership maintenance facility in Farmers Branch, Texas. Shallow groundwater (less than 10 feet) had been affected by a release of non-aqueous phase liquid (NAPL) associated with historical vehicle maintenance operations. MEC^X performed the initial site assessment, phase II investigation and ultimately the remediation efforts to rapidly secure closure to allow a real estate transaction to proceed. An engineered excavation approach was selected to quickly remove the NAPL-affected groundwater source area. Other technologies were used in addition to excavation to ensure the groundwater had been remediated, including in-situ bio-enhancement using Permeox® (an oxygen release compound).

PROJECT BACKGROUND

The remediation area was located beneath a typical automobile dealership maintenance facility (i.e. multiple service bays each with hydraulic car lifts). NAPL-affected groundwater was located beneath both service bays which were divided by a load-bearing wall. MEC^X team of engineers designed an engineered excavation to remove the fractured limestone, which contained the NAPL, from beneath the building while leaving it standing. Additional challenges encountered during the excavation included removal of abandoned in-place underground storage, previously thought to be removed, and multiple underground utilities (i.e. electrical, gas) that could not be removed or relocated.

REMEDIATION EFFECTIVENESS

MEC^X prepared the appropriate specifications and work plans, sealed by one of several registered Professional Engineers on staff and secured competent contractors to perform the difficult excavation. Constant interaction with the Texas Commission on Environmental Quality (TCEQ) facilitated the timely approval of a Certificate of Closure. The closure document then allowed an approximate $6 million transaction.

PROJECT DESCRIPTION: ENGINEERED EXCAVATION, IN-SITU OXIDATION AND BIOENHANCEMENT

Former Dry Cleaning Facility
Hurst, Texas

INTRODUCTION

MEC^X, LP performed an environmental site assessment and an engineered excavation at a former dry cleaning facility in Hurst, Texas. Shallow groundwater (less than 10 feet) had been affected by a release of tetrachloroethylene (PCE) and its degradation products, specifically vinyl chloride (VC). The affected groundwater zone tracked a twin 48-inch storm sewer and the associated gravel pack. An engineered excavation approach was selected to quickly remove the source area before the plume migrated to a creak located approximately 100 feet downgradient of the site. To ensure that groundwater would be completely remediated, in-situ chemical oxidation (ISCO) using catalyzed hydrogen peroxide, sodium persulfate (Klozür®) and a backfill amendment with Permeox® (an oxygen release compound) was applied.

PROJECT BACKGROUND

The remediation area was located in a typical strip shopping center. Facilities that were located immediately adjacent to the treatment area include residential homes, two active 48-inch diameter storm sewers, an active gas station and numerous active retail establishments. Additionally, a sanitary sewer and 10,000-volt electric line traversed the excavation. The affected saturated zone extended from 6 to 10 feet below ground surface and consisted of low permeability sandy clay.

REMEDIATION SOLUTION

Unsaturated and saturated soils were removed from an approximately 10,000 square feet area to a depth of 10 feet. One significant challenge included the remediation of affected water entrained in the storm drain backfill gravel pack. MEC^X designed and implemented an innovative technique to apply hydrogen peroxide into the storm drain backfill gravel. The hydrogen peroxide oxidized chlorinated hydrocarbons present in the sewer fill material safely and effectively.

Prior to backfilling the main body of the excavation, the imported fill was amended with Permeox®, an oxygen release compound, to further enhance the biodegradation of VC-affected groundwater (which degrades aerobically) from extended portions of the plume that could potentially re-infiltrated the remediated area. In another portion of the excavation area where PCE and its degradation products (which degrades aerobically or anaerobically depending on the compound), MEC^X amended the backfill with a slow-release oxidation compound, Klozür®, to oxidize potentially affected groundwater emanating from extended portions of the plume.

REMEDIATION EFFECTIVENESS

MEC^X innovative approach by using multiple remediation tools allowed the rapid closure of a former dry cleaning site. The State of Texas Voluntary Cleanup Program granted closure only one year after remediation efforts were completed.

PROJECT DESCRIPTION: EXCAVATION AND ISCO APPLICATION

Petroleum Hydrocarbons Remediation
Washington, DC

INTRODUCTION

MEC^X, LP designed and implemented a two stage remediation strategy involving soil excavation and in-situ chemical oxidation of free product and residual petroleum hydrocarbons in soil and groundwater which had resulted from gasoline and fuel oil UST leaks, at a former telecommunications facility in Washington, DC. MEC^X was able to obtain closure on the Site in a period of eight months from the commencement of remediation activities including post closure monitoring.

PROJECT BACKGROUND

During the period 1993 through 2002, the responsible party retained numerous consultants and contractors to perform extensive subsurface investigation of the soil and groundwater on the Property and down-gradient adjacent parcels. Several technologies, including dual phase extraction and air sparging were employed by these contractors, however, none of the technologies utilized were successful in improving the condition of the subsurface soils and groundwater sufficient to allow the redevelopment.

REMEDIATION SOLUTION

MEC^X was hired to develop a new remedial strategy to be performed in two stages. The first stage involved the removal and off-site disposal of approximately 175 cubic yards of petroleum-saturated soils from the area beneath the former fuel oil UST, down to the shallow perched water table (located approximately 16 feet below the grade of the concrete slab in the basement of the facility).

The second stage involved the in-situ treatment of the shallow perched water table on the property. MEC^X introduced a dilute solution of sodium persulfate into the open excavation inside the building upon completion of the removal and disposal of saturated soils. Additionally, MEC^X performed an intense in-situ chemical oxidation (ISCO) application downgradient of the source area, which destroyed petroleum hydrocarbons in approximately 5,000-cubic feet of soil and groundwater, encompassing the perched water layer and its capillary fringe, all of which was located outside the footprint of the on-site building.

REMEDIATION EFFECTIVENESS

Post-corrective action monitoring of the property indicated a massive reduction in concentrations of petroleum hydrocarbons in the soil and groundwater across the entire property. Free-phase product was no longer observed in any monitoring well on the Property. MEC^X then completed a risk assessment for the Property in accordance with DC Environmental Health Administration protocol and final closure was granted in October, 2004.