ExxonMobil Production Company
P.O. Box 4358
Houston, Texas 77210-4358

ExxonMobil
Production

September 20, 2011

RE: FRU 297-16A Sundry 4
Wellsite Pit Closure Plan Amendment
Trial Use Of Cool-Ox Technology
Remediation Project Number - 5568

Colorado Oil and Gas Commission
Attn: Chris Canfield
707 Wapiti Court, Suite 204
Rifle, Colorado 81650

Dear Mr. Canfield:

Please review the enclosed Sundry Notice (Form 4) and Deep Earth Technologies' Cool- Ox data package. We plan to use the Cool-Ox technology this week on a sample size of material (~100yds^3) to test effectiveness of this product to assist with meeting COGCC's Table 910-1 requirements.

Below is a simplified description of the project:

- Impacted soils to be laid out in 30 x 30 x 3 feet area.
- Cool-Ox to be applied directly into impacted material.
- Adequate mixing of Cool-Ox with impacted soils to be performed using a track hoe.
- Treatment area to be protected against any potential storm water/run-off issues from this area.
- Soil samples will be collected before and after treatment to assess TPH levels.
- Assuming soils are treated to below Table 910-1, soils to be left on site.

Please contact Keith Hebert at (281) 654-5165 with any requests for additional information, questions, or concerns.

Sincerely,

Jennifer W. Baird
Compliance Group Supervisor

JWB/kmh
Enclosures

DOCUMENT #2216370

FORM 4 Rev 12/05

Page 1

State of Colorado
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203 Phone (303)894-2100 Fax (303)894-2109

SUNDRY NOTICE

Submit original plus one copy. This form is to be used for general, technical and environmental sundry information. For proposed or completed operations, describe in full on Technical Information Page (Page 2 of this form.) Identify well or other facility by API Number or by OGCC Facility ID. Operator shall send an informational copy of all sundry notices for wells located in High Density Areas to the Local Government Designee (Rule 603b.)

1. OGCC Operator Number:	28600	4. Contact Name	Keith M Hebert
2. Name of Operator:	ExxonMobil Corporation		
3. Address:	P. O. Box 4358, CORP-MI-3011	Phone:	281-654-5165
City:	Houston State: TX Zip 77210-4358	Fax:	281-654-1147

Complete the Attachment Checklist

OP OGCC

5. API Number	05-103-11290	OGCC Facility ID Number	336042	Survey Plat		
6. Well/Facility Name:	Freedom Unit	7. Well/Facility Number	FRU 297-16A1	Directional Survey		
8. Location (Qtr/Qtr, Sec, Twp, Rng, Meridian):	SWNW, 16, 2S, 97W,6TH			Surface Eqpmt Diagram		
9. County:	Rio Blanco	10. Field Name:	Freedom Unit	Technical Info Page		
11. Federal, Indian or State Lease Number:	COC-63728			Other		

General Notice

☐ **CHANGE OF LOCATION:** **Attach New Survey Plat** (a change of surface qtr/qtr is substantive and requires a new permit)

	FNL/FSL		FEL/FWL	
Change of **Surface** Footage **from** Exterior Section Lines:				
Change of **Surface** Footage **to** Exterior Section Lines:				
Change of **Bottomhole** Footage **from** Exterior Section Lines:				
Change of **Bottomhole** Footage **to** Exterior Section Lines:				attach directional survey

Bottomhole location Qtr/Qtr, Sec, Twp, Rng, Mer

Latitude | Distance to nearest property line | Distance to nearest bldg, public rd, utility or RR

Longitude | Distance to nearest lease line | Is location in a High Density Area (rule 603b)? Yes/No

Ground Elevation | Distance to nearest well same formation | Surface owner consultation date:

GPS DATA:

Date of Measurement | PDOP Reading | Instrument Operator's Name

☐ **CHANGE SPACING UNIT**

Formation	Formation Code	Spacing order number	Unit Acreage	Unit configuration

☐ **Remove from surface bond** Signed surface use agreement attached

☐ **CHANGE OF OPERATOR (prior to drilling):**

Effective Date:

Plugging Bond: ☐ Blanket ☐ Individual

☐ **CHANGE WELL NAME** **NUMBER**

From:

To:

Effective Date:

☐ **ABANDONED LOCATION:**

Was location ever built? ☐ Yes ☐ No

Is site ready for Inspection? ☐ Yes ☐ No

Date Ready for Inspection:

☐ **NOTICE OF CONTINUED SHUT IN STATUS**

Date well shut in or temporarily abandoned:

Has Production Equipment been removed from site? ☐ Yes ☐ No

MIT required if shut in longer than two years. Date of last MIT

☐ **SPUD DATE:**

☐ **REQUEST FOR CONFIDENTIAL STATUS** (6 mos from date casing set)

☐ **SUBSEQUENT REPORT OF STAGE, SQUEEZE OR REMEDIAL CEMENT WORK** *submit cbl and cement job summaries

Method used	Cementing tool setting/perf depth	Cement volume	Cement top	Cement bottom	Date

☐ **RECLAMATION:** Attach technical page describing final reclamation procedures per Rule 1004.

Final reclamation will commence on approximately

☐ Final reclamation is completed and site is ready for inspection.

Technical Engineering/Environmental Notice

☒ Notice of Intent
Approximate Start Date: February 2011

☐ Report of Work Done
Date Work Completed:

Details of work must be described in full on Technical Information Page (Page 2 must be submitted.)

☐ Intent to Recomplete (submit form 2)	☐ Request to Vent or Flare	☐ E&P Waste Disposal
☐ Change Drilling Plans	☐ Repair Well	☐ Beneficial Reuse of E&P Waste
☐ Gross Interval Changed?	☐ Rule 502 variance requested	☐ Status Update/Change of Remediation Plans for Spills and Releases
☐ Casing/Cementing Program Change	☒ Other: Pit Closure Plan (Update)	

I hereby certify that the statements made in this form are, to the best of my knowledge, true, correct and complete.

Signed: [signature] Date: 9/20/2011 Email: keith.m.hebert@exxonmobil.com

Print Name: Keith M. Hebert Title: Senior Staff Environmental Specialist

COGCC Approved: [signature] Title FOR Date: 09/21/2011

CONDITIONS OF APPROVAL, IF ANY:

Chris Canfield

EPS NW Region.

FORM 4 Rev 12/05

TECHNICAL INFORMATION PAGE

FOR OGCC USE ONLY

1. OGCC Operator Number: 28600 API Number: 05-103-11290
2. Name of Operator: ExxonMobil Corporation OGCC Facility ID # 336042
3. Well/Facility Name: Freedom Unit Well/Facility Number: FRU 297-16A1
4. Location (QtrQtr, Sec, Twp, Rng, Meridian): SWNW, 16, 2S, 97W,6TH

This form is to be completed whenever a Sundry Notice is submitted requiring detailed report of work to be performed or completed. This form shall be transmitted within 30 days of work completed as a "subsequent" report and must accompany Form 4, page 1.

5. **DESCRIBE PROPOSED OR COMPLETED OPERATIONS**

ExxonMobil Production Company submits this Sundry Notice, Letter, and supporting documentation to utitlize an oxidation process (Cool-Ox) on a test sample size (~100yd^3) to treat soil on the FRU 297-16A well pad location. The soil to be treated is from the subject pad and will be treated on site. Confirmation sampling will take place upon completion and measured against Table 910-1.

Below is a description of the project:

- Impacted soils to be laid out in 30 x 30 x 3 feet area.
- Cool-Ox to be applied directly into impacted material.
- Adequate mixing of Cool-Ox with impacted soils to be performed using a track hoe.
- Treatment area to be protected against any potential storm water/run-off issues from this area.
- Soil samples will be collected before and after treatment to assess TPH levels.
- Assuming soils are treated to below Table 910-1, soils to be left on site.

DeepEarth Technologies, Inc.

Cool-Ox™

12635 South Kroll Dr. Alsip, IL 60803 Tel: (708) 396-0100 Fax: (708) 396-0111 tech@deepearthtech.com

Cool-Ox™ Technology

The patented *Cool-Ox™* *Process is an in-situ (and ex-situ) remediation technology that combines controlled chemical oxidation with accelerated biodegradation subsequent to the oxidation phase. The process is based upon using hydrogen peroxide as the generator of the oxidizing radicals. However, unlike the Fenton or Fenton like processes that use liquid hydrogen peroxide, the *Cool-Ox™* Process generates hydrogen peroxide from solid peroxygens that are injected into the soil or groundwater in an aqueous suspension. Once in place, the peroxygens react with water to produce hydrogen peroxide. This reaction is widely understood.

In conventional Fenton or Fenton like processes, the liquid hydrogen peroxide reacts with iron salts introduced to produce the oxidizing radicals. This reaction is largely uncontrollable and usually produces excessive amounts of heat. Even where the iron is introduced in a separate injection sequence, the reaction can be robust. Similarly, other processes that have begun using solid peroxygens with introduced iron salts find it difficult to avoid volatilization of contaminants because of the heat produced. The *Cool-Ox™* Process has eliminated these problems.

Because most peroxygens are only sparingly soluble in aqueous solutions, their dissolution rate is quite slow. Therefore, once injected they remain in the contaminated media for an extended period of time before they become soluble. This low solubility characteristic also allows peroxygens to be hydraulically distributed by the injection equipment thereby increasing the radius of influence from the injection point. This significantly increases the probability of the oxidizer contacting the contaminants. However, the greatest distinguishing feature of the *Cool-Ox™* Process is that it does not require the introduction of iron salts to produce the radicals necessary for chemical oxidation.

The *Cool-Ox™* formulations include compounds that activate the catalytic metals that are intrinsic in the soil matrix being treated. This eliminates the need to artificially introduce iron salts either into the oxidizing reagent or injected sequentially. The use of these reagents also imposes a second control factor (the first is the low solubility of the peroxygens) on the reaction rates of the oxidizers. Knowing how to manipulate these factors allows the oxidation reactions to proceed without producing heat. Therefore, the probability of volatilizing contaminants because of heat generation is eliminated when the *Cool-Ox™* Process is employed. This increased control eliminates the risk associated with other oxidizing processes and there are no hazardous metals such as lead, chrome or arsenic in the *Cool-Ox™* formulations.

An additional and extremely important characteristic of the *Cool-Ox™* Process is the pH at which the oxidation reactions proceed. Unlike the Fenton or Fenton like reactions that require a low acidic pH, the optimum pH of the *Cool-Ox™* Process is slightly basic at around pH 8. This is critical for treating contaminants found in limestone or soils containing high concentrations of carbonates where a low pH would be buffered toward neutrality. Equally important is the factor that almost all phenolic, chloro-phenolic and chlorinated organic compounds exhibit organic acid characteristics. In general, these compounds become increasing soluble in aqueous solutions as the pH is increased. Once soluble, they are quite susceptible to oxidation via the *Cool-Ox™* Process. Thus, a broad family of troublesome recalcitrant compounds such as creosotes, PCP, PCBs, PAHs, fuel hydrocarbons, dioxins as well as a host of herbicides and pesticides are treatable using the *Cool-Ox™* Process.

DeepEarth Technologies, Inc.

Cool-Ox™

CASE HISTORY©

Work Summary (Site History) *CHS-0005 (Perchloroethylene)*

Probable off-site migration of dissolved perchloroethylene was the remedial action driver for this confidential client. Repeated releases of recycled perc over several years from a dry cleaning operation were complicated by the presence of smeared naphtha, along with oil and diesel range hydrocarbons. Action by the State required the property owner to address the problem immediately. It was concluded that chemical oxidation could provide the quickest most effective solution. Permanganate was ruled out because of the presence of hydrocarbons and Fenton peroxide was considered to reactive because much of the plume was located beneath the building. The recently developed Cool-Ox™ Technology was selected because of its effectiveness at treating mixed contaminants and its greater safety. Five weeks after completing injections of the sources, perc levels decreased to below residential levels for soil.

Project at a Glance

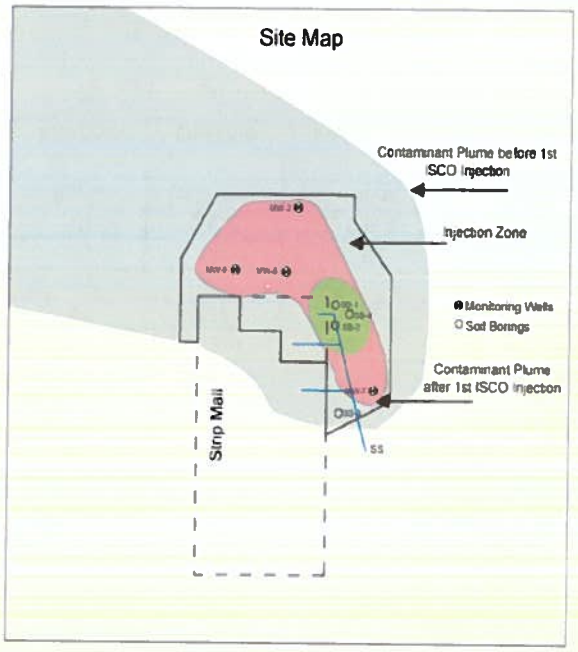
Site 0005 - Site Information

Type of site	Former Drycleaner
Contaminants	Recycled Perchloroethylene
Work Scope	Inject Oxidizer
Media Treated	Soil & Groundwater
Soil Type	Dense Clay over claystone
Groundwater Depth	14 fbgs
Remedial Objective	Locate and mitigate soil sources and reduce perc concentrations in GW

Site 0005 - Application Information

Technology Selected	Chemical Oxidation
Application Method	DPT Probe Rod
Area Treated	9,520 square feet
Vertical Interval	0 to 24 feet bgs = 24 feet
Injection Point (IP) Spacing	6 feet
Media Volume Treated	8,460 cubic yards
Number of Injection Points	265
Oxidizer Volume	29,700 gal
Oxidizer per IP	112 gal

Site Map



The green area on the site map depicts the extent of soil contaminants exceeding MCLs prior to the first Cool-Ox™ injection. During the injection work, free product was observed in several of the injection points in this area. However, post injection sampling data revealed that all soil contaminant concentrations had been reduced to levels below maximum concentrations for site closure. Groundwater (blue area prior to treatment) samples collected 18 months after the Cool-Ox™ injection, revealed that contaminant concentrations exceeding MCL closure levels had been reduced to the area depicted in red. During the injection work high concentrations of hydrocarbons (light oils) were also discovered. These were confined mainly to the green area on the Site Map.

Current Status

The Cool-Ox™ application successfully located all soil sources and reduced soil levels to less than those required by the state agency for residential standards. Groundwater is currently monitored on a quarterly basis. The site is under evaluation to ascertain future remedial needs if any.

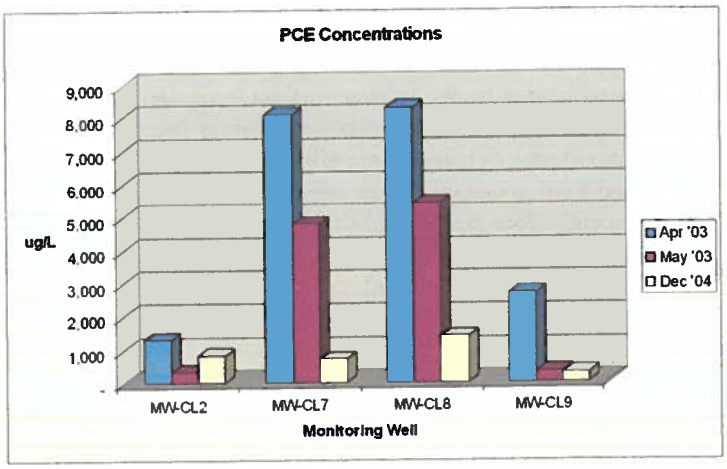
CASE HISTORY

Results

Site 0005- Contaminant Data-GW (PCE)

Groundwater Samples	Pre[1] Injection Samples	30 day Post Injection Samples	18 months Post Injection Samples
MW-CL2	1,300	340	830
MW-CL7	8,100	4,800	710
MW-CL8	8,300	5,400	1,400
MW-CL9	2,700	320	300

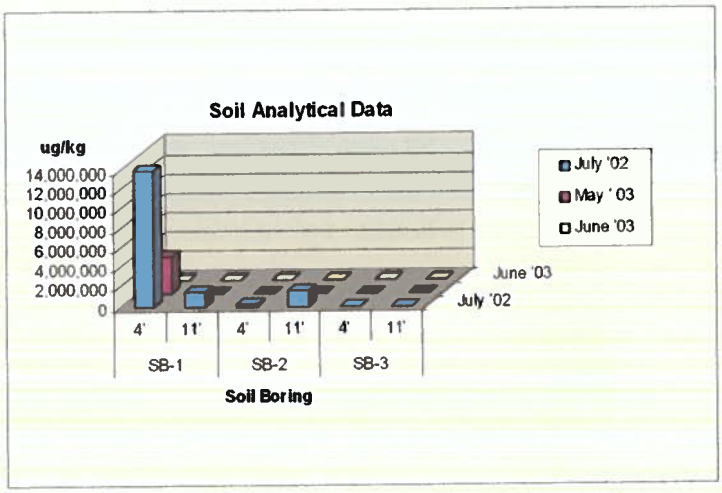
(1) All data reported in µg/L



Site 0005- Contaminant Data-Soil (PCE)

Soil Boring	Depth	07/09/02	05/28/03	06/24/03
SB-1	4'	14,000,000	3,800,000	1,700
	11"	1,500,000	2,900	320
SB-2	4'	280,000	NS	120
	11'	1,700,000	120	110
SB-3	4'	5,000	NS	59
	11'	1,100	0	12

(1) All data reported in µg/Kg



Contact: Jeff Citrone – Higgins & Associates, LLC

DeepEarth Technologies, Inc. – 12635 Kroll Drive – Alsip, IL 60803 – tech@deepearthtech.com (877) 266-5691

DeepEarth Technologies, Inc.

Cool-Ox™

CASE HISTORY©

Work Summary (Site History) ***CHS-0008 Chlorinated Compounds(TCA- DCA- DCE)***

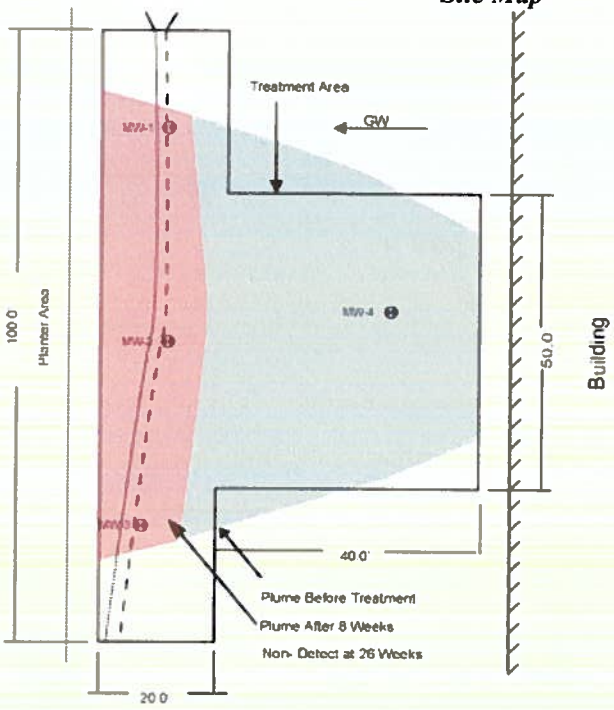
The sale of an industrial property was being held up because a groundwater plume contaminated with chlorinated VOCs required remediation. Compounding the problem was the specter that the plume was poised to migrate off-site. Because underground electrical cables were located in the plume, care had to be taken so that these utilities would be protected from physical and corrosive damage by any remedial process. Conventional technology such as SVE was ruled out because the plume was located in a wet, dense-clay strata 12 to 22 fbgs. Because of the consultants enjoyed success at treating vinyl chloride and DCE at a previous site, an in-situ chemical oxidation (ISCO) process based upon the controlled long-term in-situ generation of hydrogen peroxide was selected. The work was successful and the site was closed.

Project at a Glance

Site 0008 - Site Information

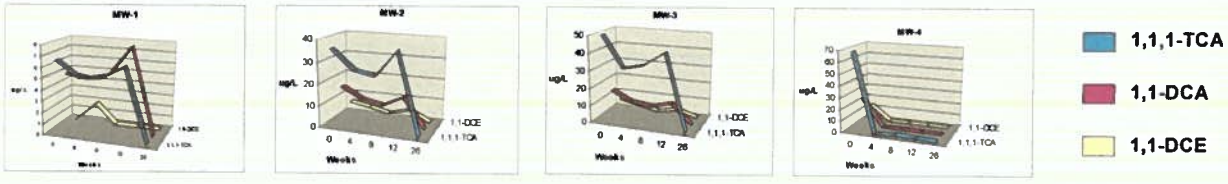
Type of site	Industrial Park
Contaminants	1,1,1-TCA, 1,1-DCA, 1,1-DCE
Work Scope	Inject chemox reagent
Media Treated	Groundwater
Soil Type	Wet Clay
Groundwater Depth	12 feet
Remedial Objective	Reduce contaminants to levels < MCLs

Site Map



Site0008 - Application Information

Technology Selected	ISCO
Application Method	DPT Probe
Area Treated	4,000 sf
Vertical Interval	12 to 22 fbgs
Injection Point (IP) Spacing	5 feet
Media Volume Treated	1,480 cubic yards
Number of Injection Points	160
Oxidizer Volume	13,320 pounds
Oxidizer per IP	~83 pounds
Oxidizer per cubic yard	~9 pounds
Time to Complete	12 days



Current Status

Site Closed! A NFA letter was issued by the State of California

The remedial solution for this site was designed and managed by a DET Principal.

Results

Site 0008- Contaminant Data

Well	Week	Contaminants of Concern (µg/L)		
		1,1,1-TCA	1,1-DCA	1,1-DCE
MW-1	0	6.6	5.0	ND
	4	5.2	4.7	1.8
	8	5.3	5.2	ND
	12	6.4	7.8	ND
	26	**ND**	**ND**	**ND**
MW-2	0	36.0	16.0	5.9
	4	27.0	11.0	4.1
	8	25.0	8.9	2.1
	12	37.0	14.0	4.7
	26	**ND**	**ND**	**ND**
MW-3	0	50.0	15.0	6.1
	4	32.0	9.1	3.5
	8	35.0	8.0	1.3
	12	43.0	11.0	3.4
	26	**ND**	**ND**	**ND**
MW-4	0	68.7	24.4	13.4
	4	ND	ND	ND
	8	1.2	ND	ND
	12	0.9	ND	ND
	26	**ND**	**ND**	**ND**

Examination of the data collected approximately one month after the injection work was completed revealed that little or no change had occurred in the concentrations of the contaminants in monitoring wells MW-1, MW-2 and MW-3. However, dramatic reductions were observed in MW-4 (see graph page 1). Comparison of this data to previously treated sites impacted with the same contaminants, indicated that the expected results should have duplicated the reductions found in MW-4.

Review of the Site Map shows an underground electrical utility corridor traversing the length of the injection area near the property line. It also reveals that monitoring wells MW-1, MW-2 and MW-3 are located in this corridor. During the injection work care was taken not to impact the underground electrical cables with the direct push equipment. Consequently, the two (2) rows of injection points on either side of the utility corridor were shifted away from the electrical lines to accommodate safety concerns. This inadvertently left the injection wells located in the utility corridor in an area not immediately impacted by the reagent. It was decided that because the groundwater was flowing perpendicular to the corridor, the reagent should eventually reach these monitoring wells. Data collected approximately six (6) months after the application indicated that the concentrations of contaminants in the wells had dropped below maximum contaminant levels (MCLs) for site closure.

Client Contact: Scott Alin – Versar – Sacramento, CA

DeepEarth Technologies, Inc. – 12635 Kroll Drive – Alsip, IL 60803 – tech@deepearthtech.com (877) 266-5691

DeepEarth Technologies, Inc.

Cool-Ox™

CASE HISTORY©

Work Summary (Site History) *CHS-0001 (Vinyl Chloride)*

A property sale was the driver that prompted the remedial action of this site in Southern Indiana. A former hazardous waste UST had released both hydrocarbons and chlorinated solvents to the environment. Because the primary chlorinated contaminants remaining were vinyl chloride and cis-1,2-dichloroethene, it was concluded that anaerobic dechlorination had mitigated the bulk of the chlorinated solvents. Therefore, hydrogen peroxide based in-situ chemical oxidation was selected to remediate the remainder of the contaminants. At the conclusion of the mitigation process the site met State closure requirements and the property was sold.

Project at a Glance

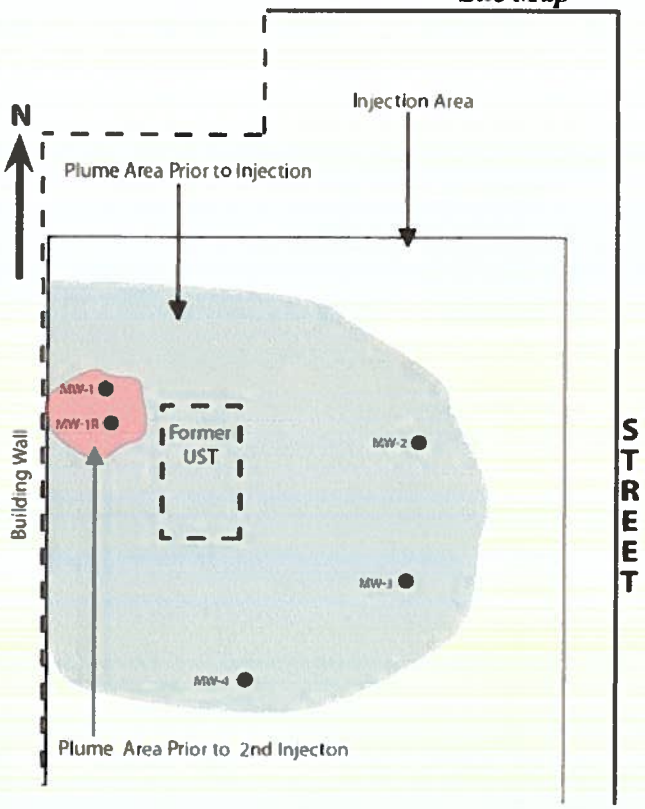
Site 0001 - Site Information

Type of site	Industrial
Contaminants	Vinyl Chloride, cis-1,2-DCE, TCE, BTEX,
Work Scope	Inject Oxidizer
Media Treated	Soil & Groundwater
Soil Type	Dense Clay with Sand Stringers
Groundwater Depth	14 fbgs
Remedial Objective	Reduce VC GW concentration to <10 µg/L

Site 0001 - Application Information

Technology Selected	Chemical Oxidation
Application Method	DPT Probe Rod
Area Treated	1,425 square Feet
Vertical Interval	9 to 18 feet bgs = 9 feet
Injection Point (IP) Spacing	5 feet
Media Volume Treated	475 cubic yards
Number of Injection Points	57
Oxidizer Volume	1,900 gal
Oxidizer per IP	33 gal

Site Map



The blue area on the site map depicts the extent of the groundwater contaminant plume prior to the first ISCO injection. Two weeks after treatment it was discovered that the monitoring wells were dry due to extreme drought conditions. Samples from replacement wells collected 13 weeks after the initial injection revealed that the contaminant plume had shrunk to a small area (see pink area on Site Map) surrounding MW-1R. A second injection (area 20 feet square) was completed. Sixteen weeks after the second treatment, groundwater samples indicated that the vinyl chloride concentrations had been reduced to site closure standards.

Current Status

Site Closed! - No Further Environmental Action Notification (NFEA) received from Indiana Department of Environmental Management

The remedial solution for this site was designed and managed by a DET Principal

Results

Site 0001- Contaminant Data*

Contaminants	Baseline[1]	Samples #1	Samples #2	Samples #3
Time	0	2weeks [2]	13weeks[3]	16Weeks[4]
Vinyl Chloride	77[a]	NS	57	<2.0
Cis 1,2-DCE	300	NS	<MCL	<MCL
TCE	44	NS	<MCL	<MCL
Benzene	36	NS	<MCL	<MCL
Toluene	6,800	NS	<MCL	<MCL
Ethyl Ben.	150	NS	<MCL	<MCL
Xylenes	553	NS	<MCL	<MCL

* Data Presented from most contaminated monitoring well.

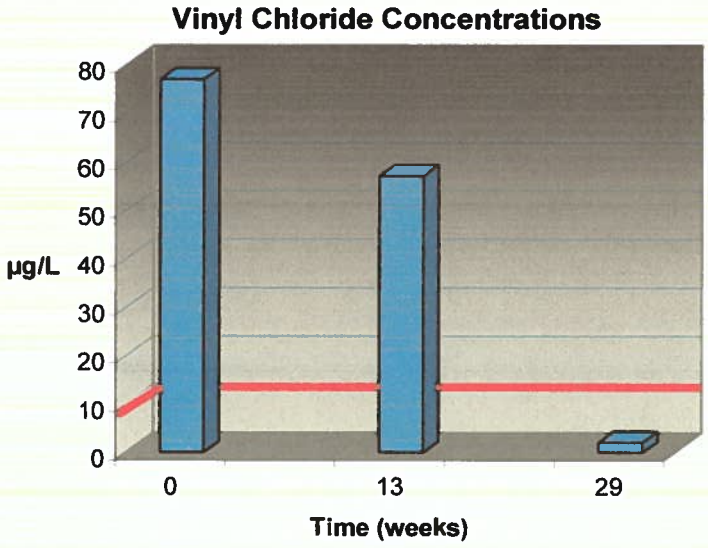
[a] Indiana Tier II Non-residential Standard for Vinyl Chloride concentration in groundwater = <10 µg/L.

[1] All data reported in µg/L

[2] Because of a severe drought, groundwater levels had dropped such that the monitoring wells were dry. Six weeks after treatment new wells were installed to contact groundwater.

[3] Data collected thirteen weeks after treatment, revealed that with the exception of VC in one well, all contaminant concentrations had dropped below the Indiana Tier II Non-residential Goals for groundwater standards. Three weeks after sampling, a 400 square foot area around the remaining contaminated well was retreated.

[4] Sixteen weeks after the second application, the VC concentration had decreased to <2.0 µg/L. The site subsequently received NFA status and the property was sold.



Client Contact: Troy Risk, Inc. – Indianapolis, IN

DeepEarth Technologies, Inc. – 12635 Kroll Dr. – Alsip, IL 60803 – tech@deepearthtech.com (877)266-5691

DeepEarth Technologies, Inc.

Cool-Ox™

CASE HISTORY©

Work Summary (Site History) ***CHS-0016 (GRO/DRO) – Free Product Destruction)***

Discovery of contaminated soil adjacent to a gasoline UST and acceptance into the FDEP Petroleum Cleanup Pre-Approval Program provided remedial funding for this active service station. Initial remedial actions included the excavation of fuel impacted soil and the removal of three USTs in 1994. However free phased gasoline components were still present in the clayey soil following these activities. Sparging and vapor extraction were eliminated after pilot tests proved them to be difficult and impractical. ISCO technology employing the *Cool-Ox™* Process was selected based upon its superior performance at similar sites. Post remedial monitoring results revealed that free product was eliminated with the exception of a small area around MW-9. Groundwater sustained reductions of >95% in total BTEX and MTBE.

Project at a Glance

Site 0016 – Site Information

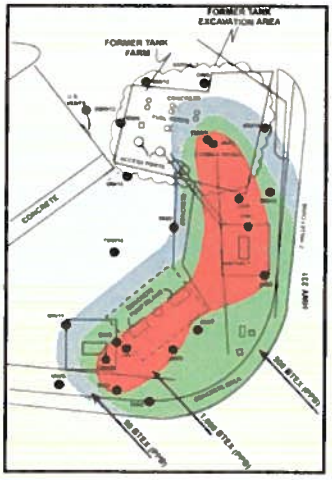
Type of site	Retail Gasoline Station
Location	Jackson County, Florida
Contaminants	Free Product - BTEX/MTBE/PAHS/EDB
Work Scope	Inject *Cool-Ox™* Reagent
Media Treated	Soil & Groundwater
Soil Type	Sandy Clay to Hard Clay
Groundwater Depth	~21 fbgs
Remedial Objectives	1. Eliminate Free Product 2. Initiate GW remediation

Site 0016 –Application Information

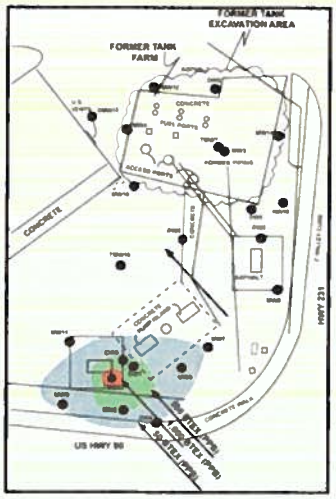
Technology Selected	*Cool-Ox™* Process
Application Method	DPT Probe Rig
Area Treated	9,800 square Feet
Vertical Interval	8 to 55 feet bgs
Injection Point (IP) Spacing	8 feet
Media Volume Treated	17,926 cubic yards
Number of Injection Points	153
Oxidizer Volume	53,520 gal
Oxidizer per IP	350 gal

The colored areas on the site maps depict the extent of the groundwater contaminant plume (blue (BTEX >50 ppb), green (>500 ppb), and red (>1,000 ppb)) prior to and following the first ***Cool-Ox™*** injections. Samples collected after the initial injection revealed elimination of nearly all free product coupled with a dramatic reduction in the size of the plume as well as GW concentrations.

Site Map - Pre Injection (1)



Post Injection (2)

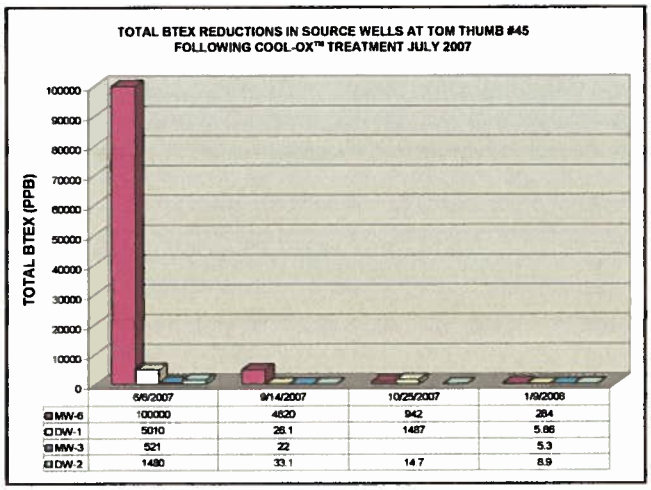


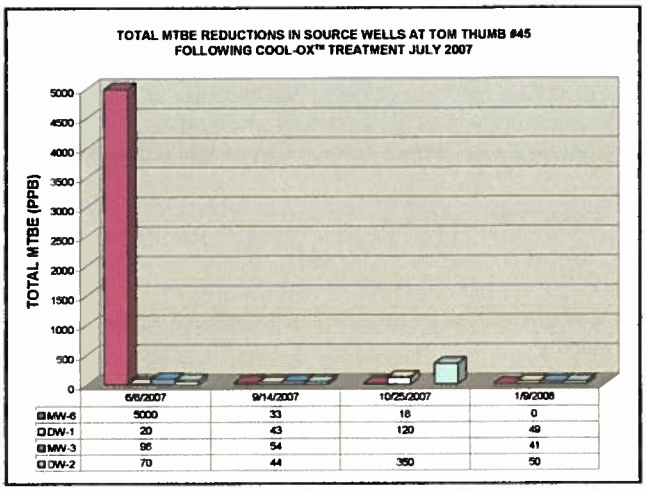
Current Status

Phase 1 eliminated all but, a small area of free product and reduced the size and concentrations of BTEX and MTBE in the GW plume. Most contaminant concentrations are now below Florida's Monitored Natural Attenuation Criteria. The site is awaiting the Phase 2 Cool-Ox™ application to eliminate the remaining source area and dissolved phase groundwater contaminants.

Site 0016- Contaminant Data

Ground Water Results





Free product was eliminated in source well MW-6. BTEX, MTBE and PAH levels were dramatically reduced following the Phase I *Cool-Ox*™ application.

Soil Results

Sample ID	Date	DTW (ft)	Sample	OVA (ppm)	B	T	E	X	Totals
SB-24-07	6/5/2007	18 - 20	PRE	750,000	13.0	130	38	190	371
	6/5/2007	24 - 26	PRE	32,384	7.6	100	40	200	347.6
SB-24-07-02	9/13/2007	18 - 20	POST	3,701	0.41	4.9	3.5	15	23.81
	9/13/2007	24 - 26	POST	216	0.27	<0.041	0.18 I	0	0.681
SB-26-07	6/5/2007	22 - 24	PRE	32,919	2.80	23	21	120	166.80
	6/5/2007	28 - 30	PRE	3,186	2.50	29	19	110	160.50
SB-26-07-02	9/13/2007	22 - 24	POST	>50,000	5.0	43	14	92	154
	9/13/2007	28 - 30	POST	>50,000	5.2	7.1	0.90	5	18.5
PERCENTAGE REDUCED IN THREE SOIL SAMPLING LOCATIONS					58%	80%	84%	85%	81%

GW contaminant concentrations within the source area have enjoyed dramatic decreases. With the exception of a small area around MW-9, free phased product was eliminated. Petroleum contaminant concentrations continue to decline as a function of the long-term sustained chemical oxidation and biologic mechanisms indicative of the *Cool-Ox*™ remedial Technology.

Client Contacts: Mike Keethler, P.E., EPT, 3210 Barrancas Ave, Pensacola, Fl 32507 mkeethler@eptpensacola.com

DeepEarth Technologies, Inc.

Cool-Ox™

CASE HISTORY©

Work Summary (Site History) *CHS-0004 (BTEX)*

Acceptance into the Florida State cleanup program, was the driver for remedial action at this petroleum contaminated (gasoline) site in Northwest Florida. To mitigate gasoline released by leaking UST's, a remedial solution consisting of two systems was constructed. Air stripping and granular activated carbon absorption was employed to address groundwater contaminants. Attempts to mitigate soil contaminants employed a soil washing, water infiltration system with nutrient enhanced biodegradation. These were operated from 1993 through May, 1995, when it was concluded that they were ineffective because of the low permeability of the heavy soils and bio-fouling of equipment. In 2002, a RAP Addendum was approved incorporating a new hydrogen peroxide based ISCO remedial process. This proved to be very successful at reducing the contaminant mass due to it's ability to penetrate the heavy soil matrix.

Project at a Glance

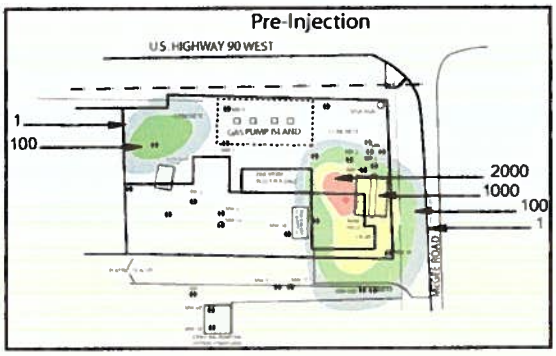
Site 0004 - Site Information

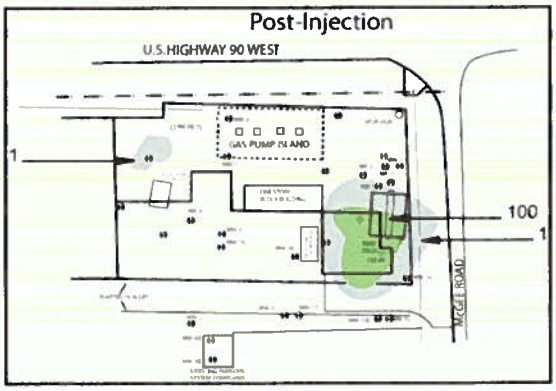
Type of site	Retail Gasoline Station
Contaminants	BTEX, MTBE
Work Scope	Inject ISCO solutions
Media Treated	Soil & Groundwater
Soil Type	Clayey sand to sandy clay
Groundwater Depth	3 fbgs
Remedial Objective	Natural Attenuation default levels

Site 0004 - Application Information

Technology Selected	Chemical Oxidation
Application Method	DPT Probe Rig
Area Treated	3,525 square Feet
Vertical Interval	3 to 12 feet bgs = 9 feet
Media Volume Treated	1,174 cubic yards
Injection Point (IP) Spacing	5 feet
Number of Injection Points	223
Oxidizer Volume	13,027 gal
Ave. Oxidizer per IP	58 gal

Site Map





The blue area on the site map depicts the extent of the groundwater contaminant plume prior to the ISCO injection. The red area shows the higher concentrations where the release occurred. Note the reduction in the size of the plume and GW concentrations after the ISCO injections. Because of a potential real state transaction, an additional application is planned.

Current Status

Because of the significant reductions in contaminant concentrations, the site was placed in Post Remedial Action Monitoring Status pending determination of natural attenuation activity.

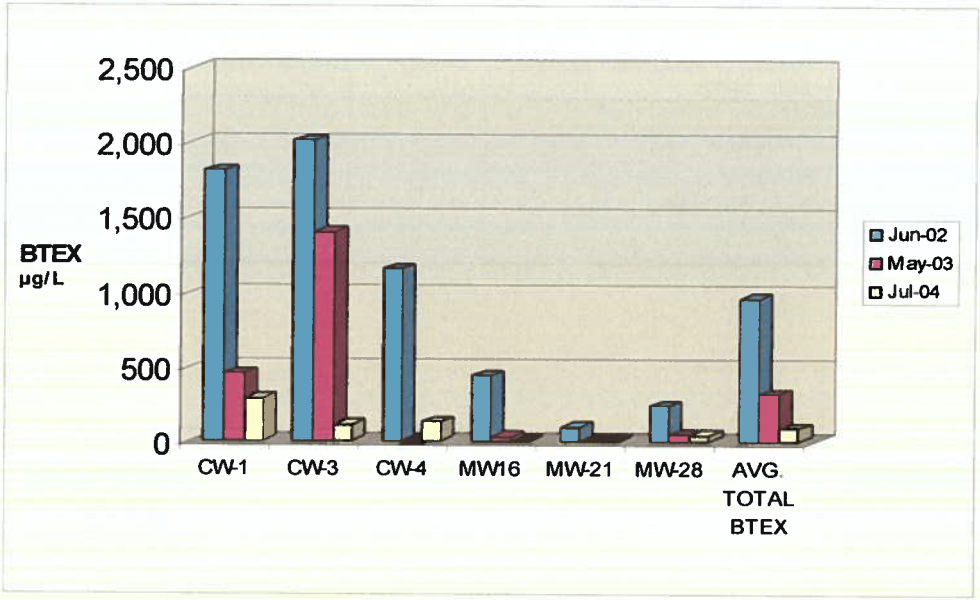
The remedial solution for this site was designed and managed by a DET Principal

Results

Site 0004 - Contaminant Data

DATE	CW-1	CW-3	CW-4	MW16	MW-21	MW-28	Avg. Total BTEX*
Jun-02	1,810	2016	1,155	445	105	247	963
May-03	462	1404	1	41	3	56	328
Jul-04	295	117	136	6	2	52	101

* Above data is an average of six wells (CW-1, CW-3, CW-4, MW-16, MW-21 & MW-28)



Client Contact: Tom Douglas – AET, LLC

DeepEarth Technologies, Inc.

Cool-Ox™

CASE HISTORY©

Work Summary (Site History) ***CHS-0010 Ethylene Dibromide (EDB & BTEX)***

Discovery of gasoline contaminated soil and a UST provided the criteria for acceptance for funding by the Florida Abandoned Tank Restoration Program. Initial remediation included removal of the 600 gallon UST and excavation of 45 tons of contaminated soil. Pilot testing ruled out DP extraction or SVE. Instead, the *Cool-Ox*™ Process, a Technology based upon the controlled production of hydrogen peroxide in-situ, was selected. This Technology had demonstrated its ability to eradicate mixed contaminants (hydrocarbons with halogens) and seemed ideal at this site where ethylenedibromide (EDB) was also present. Post remedial monitoring revealed 97% reduction in total BTEX with EDB reduced to non-detect.

Project at a Glance

Site 0010 - Site Information

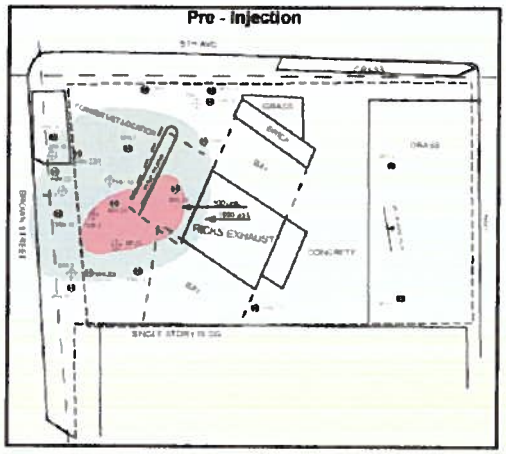
Type of site	Former Retail Gasoline Station
Location	Jackson County, Florida
Contaminants	EDB & BTEX
Work Scope	Inject *Cool-Ox*™ Reagent
Media Treated	Soil & Groundwater
Soil Type	Sandy Clay to Hard Clay, Limestone @ 40'
Groundwater Depth	11 fbgs
Remedial Objectives	1. Eliminate Soil Sources 2. Initiate GW Remediation

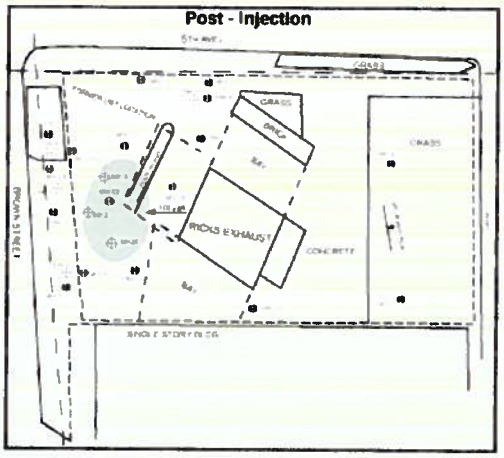
Site 0010 – Application Information

Technology Selected	*Cool-Ox*™ Process
Application Method	DPT Probe Rig
Area Treated	2,048 square Feet
Vertical Interval	10 to 40 feet bgs
Injection Point (IP) Spacing	7 feet
Media Volume Treated	2,276 cubic yards
Number of Injection Points	42
***Cool-Ox*™ Volume**	11,400 gal
***Cool-Ox*™ per IP**	271 gal

The blue area on the site map depicts the extent of the groundwater contaminant plume prior to the first *Cool-Ox*™ injection. Samples from replacement wells collected after the initial injection revealed that the contaminant plume had shrunk to a small area (see blue area on Post Injection Site Map).

Site Map





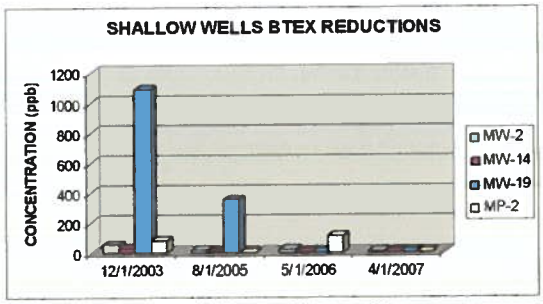
Current Status

As expected, EDB concentrations were reduced to non-detect. Because of the significant reductions in contaminant concentrations, the site was placed in Post Remedial Action Monitoring Status. Petroleum contaminant concentrations continue to decline as a function of the long-term sustained chemical oxidation and biologic mechanisms indicative of the Cool-Ox™ remedial Technology.

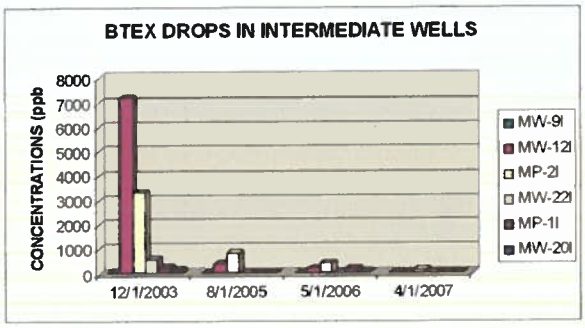
Results

Site 0010- Contaminant Data

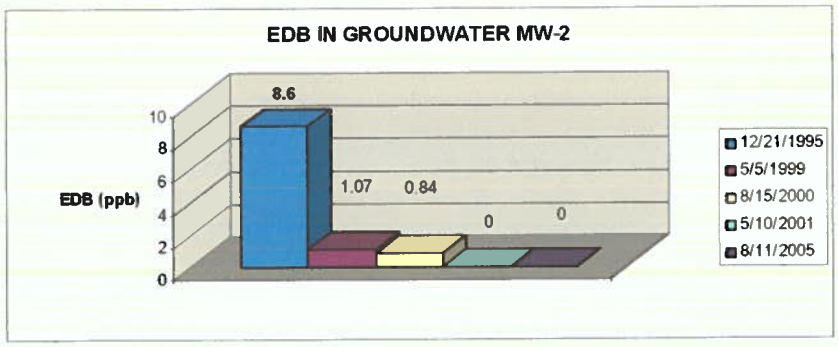
Date	MW-2	MW-14	MW-19	MP-2	AVG. Total BTEX
Dec-03	58	29	1086	84	314
Aug-05	15	5	352	4	94
May-06	25	1	<1	112	35
Apr-07	9	<1	<1	4	6.5



Date	MW-9I	MW-12I	MW-20I	MW-22I	MP-1I	MP-20I	AVG. Total BTEX
Dec-03	81	7207	140	560	220	3304	1919
Aug-05	3	383	2	2	2	813	201
May-06	10	202	15	2	192	401	137
Apr-07	0	14	0	<1	1	141	59



Date	12/21/95	5/5/1999	8/15/2000	5/10/2001	8/11/2005
EDB (ppb)	8.6	1.07	0.84	ND	ND



Client Contact: Alfie Nazario, P. E., AET, LLC, Pensacola, FL (850)471-2127

DeepEarth Technologies, Inc.

Cool-Ox™

CASE HISTORY©

Work Summary (History) ***CHS-0014 (Ethylenedibromide EDB/GRO/DRO – Free Product Destruction)***

Discovery of gasoline contaminated soil and a UST provided the criteria for acceptance for funding by the Florida Abandoned Tank Restoration Program. Initial remediation in spring of 2004, included removal of the 1,800 tons of contaminated soil. Because free product was observed, the excavation was sprayed with *Cool-Ox™ Pit-Stop Green*™ to eradicate the product and eliminate odor. This Technology had previously demonstrated its ability to destroy product, treat mixed contaminants (hydrocarbons with halogens) and eliminate odors and seemed ideal at this urban site where EDB was also present. Post injection monitoring revealed that subsequent to overspray in spring of 2004, dissolved groundwater concentrations (BTEX) dropped by >98%. A Phase 2 *Cool-Ox™* injection in September 2006, brought soil BTEX concentrations under and around the excavation, down by >80%. Free product was eliminated by the *Pit-Stop Green*™ application.

Project at a Glance

Site 0014 - Site Information

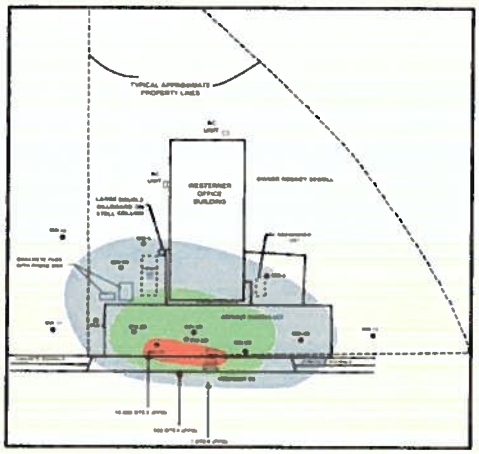
Type of site	Former Retail Gasoline Station
Location	Washington County, Florida
Contaminants	Free Product BTEX/EDB
Work Scope	*Cool-Ox*™ Reagent
Media Treated	Soil & Groundwater
Soil Type	Sandy Clay Hard Clay
Groundwater Depth	2 to 3 ft bgs
Remedial Objective	1. Eliminate Free Product 2. Initiate GW Remediation

Site 0014 - Application Information

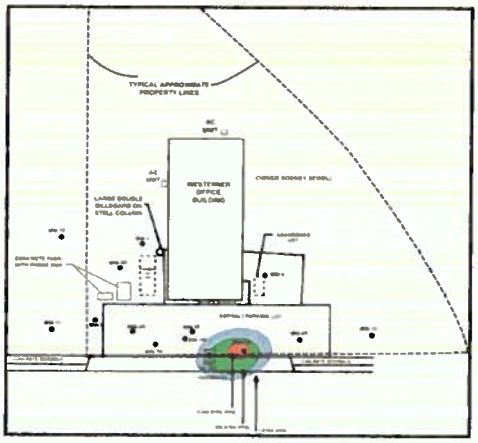
Technology Selected	*Cool-Ox*™ Process
Application Method	DPT Probe Rig
Area Treated	1,334 square Feet
Vertical Interval	3 to 35 feet bgs
Injection Point (IP) Spacing	5 feet
Media Volume Treated	1,186 cubic yards
Number of Injection Points	54
Oxidizer Volume	5,940 gal
Oxidizer per IP	~110 gal

The blue area on Map 1 depicts the extent of the groundwater contaminant plume prior to the first ISCO injection. Groundwater Samples collected after the initial injection revealed that the contaminant plume had shrunk to a small area (see blue area Map 2).

Map 1 – Pre Treatment



Map 2 – Post Injection

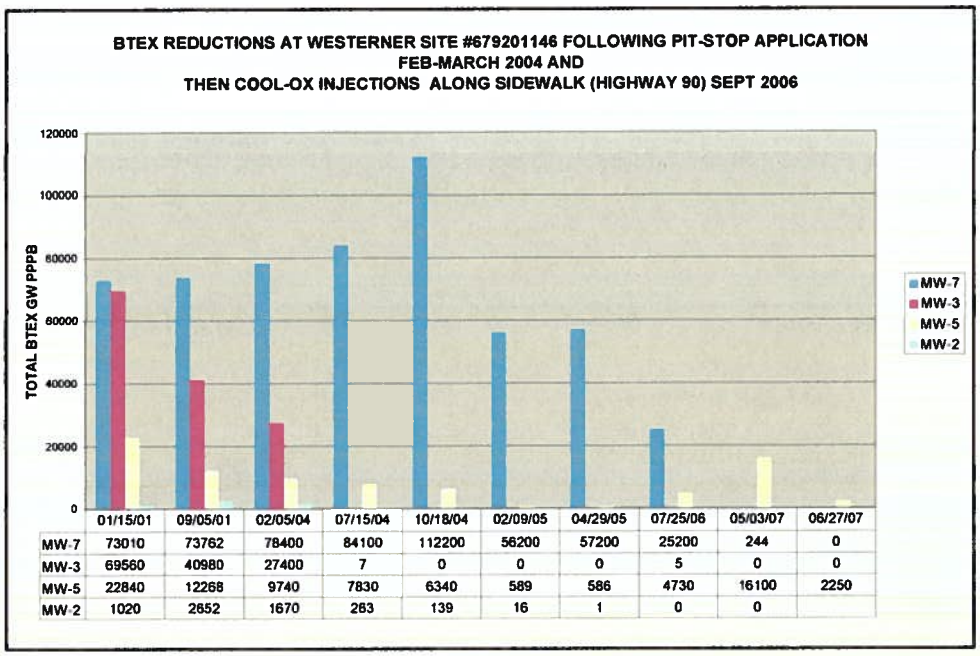


Current Status

Because of the significant reductions in contaminant concentrations, the site was placed in Post Remedial Action Monitoring Status and contaminant concentrations in the groundwater are expected to continue to decrease. Petroleum contaminant concentrations (BTEX &, PAH's) are only present where free phased product was discovered.

Results

Site 0014- Contaminant Data



	01/15/01	09/05/01	02/05/04	07/15/04	10/18/04	02/09/05	04/29/05	07/25/06	05/03/07	06/27/07
MW-7	73010	73762	78400	84100	112200	56200	57200	25200	244	0
MW-3	69560	40980	27400	7	0	0	0	5	0	0
MW-5	22840	12268	9740	7830	6340	589	586	4730	16100	2250
MW-2	1020	2652	1670	283	139	16	1	0	0	

A phased remedial action was performed February/March 2004 involving source excavation and over-spraying of the open pit with *Cool-Ox™ Pit-Stop™ Green*. Not all of the contaminated soil could be accessed due to sub surface utilities, the adjacent building, and highway. Free product was observed (prior to over-spraying) flowing into the excavated area. Subsequent to the over-spray, free product did not return and petroleum concentrations dropped significantly. Phase 2 (August 2006), involved the in-situ injection of *Cool-Ox™* reagent and has reduced the contaminant concentrations in both the soil and groundwater. The site is in Natural Attenuation Monitoring at this time.

	Soil Samples										
Boring No.	Lab Sample ID & Depth (Ft)	Date Collected	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	Naphth- alene	1-Methyl-Naphth-alene	2-Methyl-Naphth-alene	TRPH
SB-3	SB-3 / 5'	7/11/2006	5.3	170	150	1130	BDL	3.1	1.9	3.6	450
SB-3*	SB-3 / 6'	6/26/2007	0.67	3.6	20	97	BDL	0.44	0.23	0.46	100
SB-5	SB-5 / 5'	7/11/2006	2.6	10	87	413	BDL	17	10	18	1,200
SB-5*	SB-5 / 5'	6/28/2007	2.3	9	52	190	BDL	4.5	2.3	4.8	310
SB-6	SB-6 / 5'	7/11/2006	1.2	2.8	63	100	BDL	3.5	1.9	3.8	210
SB-6*	SB-6 / 5'	6/28/2007	BDL	0.36	1.3	BDL	BDL	0.27	0.46	0.82	28
PRE COOL-OX™		7/11/2006	9.1	182.8	300.0	1643	BDL	23.6	13.8	25.4	1,860.0
POST COOL-OX™		6/28/2007	3.0	12.9	73.3	287	BDL	5.2	3.0	6.1	438.0

Contact: Alfie Nazario, P. E., AET LLC, Pensacola, FL

DeepEarth Technologies, Inc. – 12635 Kroll Drive – Alsip, IL 60803 – tech@deepearthtech.com
Toll free: 877-COOL-OX1 (877-266-5691)

DeepEarth Technologies, Inc.

Cool-Ox™

12635 South Kroll Drive - Alsip, IL 60803 Tel: 708-396-0100 Fax: 708-396-0111 tech@deepearthtech.com

Site Information Sheet

Please fill in the information called for as completely as possible. Include site maps, boring & monitoring well logs, stratagraphics, analytical tables and photos if available. JPGs and PID files are encouraged. All information will be held confidential.

Please direct all information to DTI Technical Support Group at tech@deepearthtech.com or by Fax: 708-396-0111

Consultant Information

Company: _____
Address: _____
_____
Phone: _____ Fax: _____
Person: _____ email: _____

Site Information

Name: _____
Address: _____
_____
Business Type: _____

Urban___ Rural___ Active___ Inactive___

Contaminant Information

Contaminants: _____
Year release occurred: _____

Soil Data:
Concentration in Soil: _____
(D)NAPL present: _____ft. Don't know: _____
Soil type: _____
Area: _____ ft by _____ft Total: _____sf.
Depth of Soil Source (fbgl): _____ ft to _____ft
Cubic Yards: _____

Groundwater Data:
Concentration in Groundwater _____
Current Depth to GW (fbgl): _____
Historic Fluctuation (fbgl): _____ to: _____
GW Plume: _____ft by _____ ft Total: _____sf.
Depth of GW Plume (fbgl): _____ ft to _____ft

Site Conditions:

Is the Treatment Area Paved: No __ Yes ___
Concrete: ____ Asphalt: ____ Thickness: _____
Electricity Available: No __ Yes ___
Water Source: No __ Yes ___
Hydrant __ Spigot __ Must Haul-Distance ____
Treat Inside Building : No __ Yes ___
Ceiling Height: ___ Door Size : H ___ W____
Work Hours: AM: _____ to PM: _____
Week End Work Allowed: No___ Yes ___
Night Work O.K. No___ Yes ___

Additional Information

To aid DTI in determining the most appropriate remedial solution for your site, it is helpful to receive as much information as possible. This may be transmitted by mail, email or fax however, where possible we prefer to receive pdf or jpg because the quality is much better than faxed transmissions. We request the following where available.

- Site Maps
- Contaminant Tables
- Boring Logs
- Monitoring Well Logs
- Site History
- Pictures
- List of permits required for injection work

Please provide any additional information you believe will be helpful.

Comments: _____
_____
_____
_____
_____
_____

DeepEarth Technologies, Inc.

Cool-Ox™

12635 South Kroll Drive Alsip, IL 60803 Tel: (708) 396-0100 Fax: (708) 396-0111 tech@deepearthtech.com

The Cool-Ox™ Bio-Spunge™ Reactor

DTI has determined through experience gained by field applications, that a broad range of organic chemical contaminants are readily oxidized using the patented *Cool-Ox™* Technology. Although the Technology has the capability of converting the contaminants completely to carbon dioxide, this total mineralization process would prove to be prohibitively expensive because of the amount of oxidizer required. However, it has been observed at nearly every site treated, using the *Cool-Ox™* Technology, that significant contaminant reductions have been achieved with concentrations of *Cool-Ox™* reagents that are significantly lower than the stoichiometric ratios one would predict necessary. A study of the oxidation mechanism provided the answer to this question.

It has been determined that a myriad of organic compounds (please refer to The *Cool-Ox™* Technology) are readily oxidized (hydroxylated) by the addition of a hydroxyl group to the molecule or the substitution (replacement) of a halogen atom by a hydroxyl group onto the molecule. This chemical reaction has been illustrated in organic chemistry textbooks and has been successfully applied, under field conditions, by DTI and DTI principles on numerous occasions. Once this conversion is complete, the resultant compounds are quite biodegradable and the indigenous microbes complete the remedial work.

A second, and very important characteristic of the *Cool-Ox™* technology is that the chemical reaction is controllable. Virtually all hydrogen peroxide systems, or Fenton-type technologies, require the injection of iron salts either sequentially or as a co-injectant of the oxidation formula. It is the reaction of the liquid hydrogen peroxide with the iron salts that create the very robust exothermic reaction of the Fenton systems. The distinguishing feature of the *Cool-Ox™* Technology is that it does not require the injection of metal catalysts to activate the production of oxidizing radicals in the substrata; thus, the creation of heat is eliminated.

It is vitally important to understand that the reaction does not create heat. This feature eliminates the volatilization of the VOCs and is an extremely important safety factor when dealing with compounds having low toxicity thresholds and/or the potential for flammability.

DTI works on a continuing basis with its academic associates and major clients to perfect the DTI in-situ application techniques for both soil and groundwater. This work has produced major breakthroughs in the understanding of bioactivity subsequent to the application of the *Cool-Ox™* reagents. Cassidy[1] in his work with BTEX and PAH contaminated samples from Manufactured Gas Plant (MGP) sites, has stated that when conducting bench scale studies, "***a most significant finding is that enhanced biological activity begins even before the oxidation reactions are completed***. This would indicate that the hydrogen peroxide produced by the *Cool-Ox™* process does not inhibit the activity of microbes indigenous in the samples."

Unlike Fenton chemistry where liquid hydrogen peroxide is used as the source of the oxidizing radicals, the *Cool-Ox™* technology injects an aqueous suspension of solid peroxygen compounds. These compounds hydrolyze in-situ to generate hydrogen peroxide in the proximity of the contaminants.

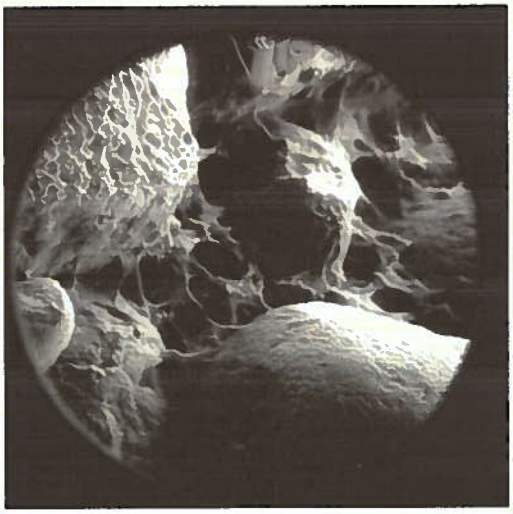
A key to success of the technology is that the relative insolubility of these compounds allows the oxidizers to be produced over an extended period of time. This greatly enhances the probability of the oxidizing compounds contacting the contaminants as well as providing an ongoing source of molecular oxygen for the enhancement of aerobic microbial proliferation.

The keys to the development and successful application of the *Cool-Ox™ Bio-Spunge™ Reactor* for the in-situ remediation of groundwater contaminants are:

- **The extended life of the peroxygen compounds,**
- **The conversion of the contaminants to biodegradeable co-metabolites,**
- **The oxidation buffering systems conversion to nutrients subsequent to the oxidation phase, and**
- **The absence of heat produced from chemical reactions.**

With the development of the *Cool-Ox™* Process, DTI became aware that at nearly all sites treated with the *Cool-Ox™* reagents, the proliferation of indigenous aerobic microbes increased by as much as six orders of magnitude. Upon visual inspection of samples collected from numerous sites, it was obvious that the appearance of the soil had changed from a clean material to that resembling the type of natural sponges found in marine environments. It was also noted that contaminant concentrations found in groundwater down gradient from the injection zones, had significantly decreased – in most cases by orders of magnitude. Once this discovery was made, DTI developed *Cool-Ox™* reagent formulations to improve both the efficiency of the oxidation reactions and optimize indigenous microbial proliferation.

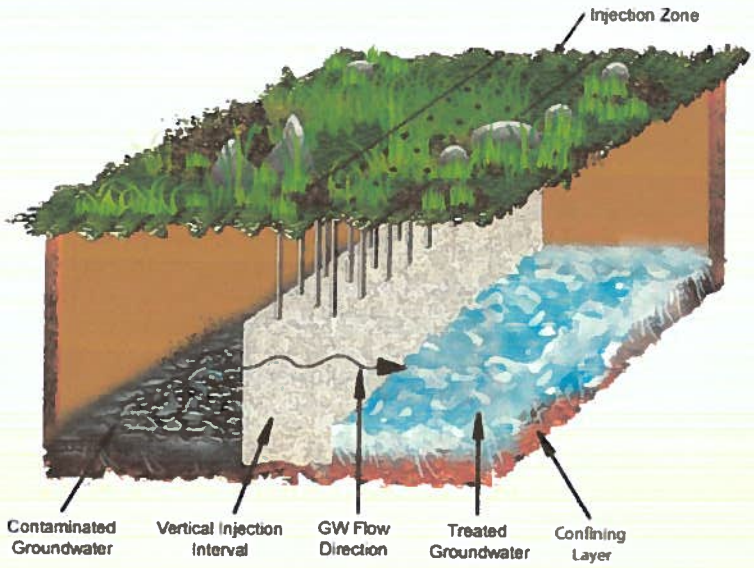
The scanning electron microscopic photographs[2] below depict clean sand particles (left) and the same soil after treatment (right). Note the engineered accumulation of microbial cells giving the appearance of the matrix seen in live sponges. The extra-cellular polymeric substances (ECPS) hold the microbes in place while allowing the groundwater to flow through. Thus forming the matrix of the *Cool-Ox™ Bio-Spunge™ Reactor.* This configuration increases the surface area thus increasing the probability of contact between contaminants and microbial degraders.



When the bio-fortified *Cool-Ox™* reagents are properly placed in the groundwater plume including the soil/groundwater interface, the indigenous microbes produce the ECBS biofilm depicted above. If the injection points are properly placed and the reagent contains the formulation necessary to encourage the proliferation of microbes as well as the production of

the biofilm, a filtration system (such as that depicted in the drawing below) is produced that allows the microbes to cleanse the groundwater as it passes through the formation. No other technology is presently available that ties chemical oxidation to subsequent bioremediation in the efficient manner as the *Cool-Ox™* process. DTI has proven through field applications, that this new technology concept is ideally suited for application where the contaminated groundwater plume is present in both permeable (sandy soil) and less permeable (clayey soils). The illustrations below depict these application concepts.

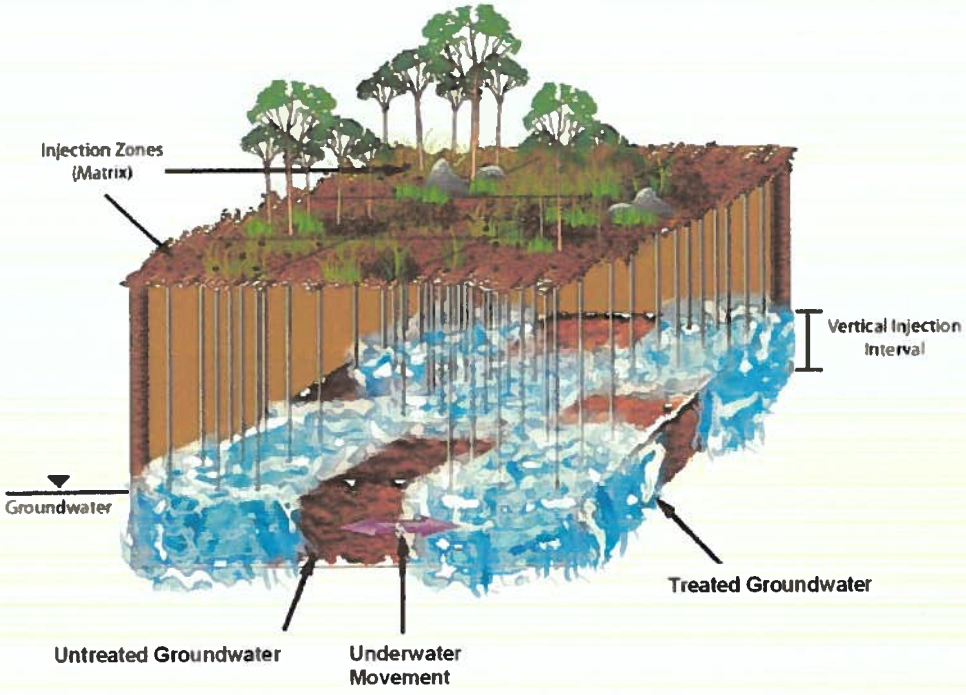
The Cool-Ox™ Bio-Spunge™ Reactor
(Groundwater Defined Flow (Streamline) Application)



The drawing above illustrates the *Cool-Ox™ Bio-Spunge™ Reactor* installation at a site where the soil consists of a permeable matrix and where the groundwater flow is defined. This installation technique calls for the placement of the *Cool-Ox™* reagents in a configuration perpendicular to the direction of the groundwater flow. Contaminants located in the installation zone are rapidly oxidized while the microbial population indigenous to the treatment zone are stimulated by the bio-fortified *Cool-Ox™* reagents and begin accelerated proliferation. This technique is especially economical because contaminated plumes can be mitigated by treating only a fraction of the area and volume of the overall mass of groundwater. For example, the developer of the *Cool-Ox™* Process successfully remediated a BTEX contaminated groundwater plume over limestone bedrock underlain by hard clay. The groundwater area impacted was approximately three-hundred (300) feet long by sixty (60) feet wide (18,000 square feet). The scope of work consisted of placing six (6), twenty (20) feet wide by sixty (60) feet long injection zones (6,000 square feet) equally spaced and perpendicular to the length of the plume. The vertical injection interval extended from the bed rock surface, five (5) feet upwards into the clay. Decontamination of the groundwater plume was accomplished in approximately sixty (60) days with approximately only thirty percent (30%) of the entire area injected.

The Cool-Ox® Bio-Spunge® Reactor
(Static Groundwater (Matrix) Application)

While the Defined Flow Application technique works very well in the remediation of moving groundwater, it is less effective at sites where the groundwater is static, present in low permeable soils, doming or moving in different directions over a broad area. To meet the static groundwater treatment challenge, DTI has developed the matrix or checker-board injection technique. In the matrix technique, the area of the contaminant plume is subdivided into a series of squares resembling the squares of a checker-board. The *Cool-Ox™ Bio-Spunge™ Reactor* is then injected into the alternating squares (for example, only the black squares of the checker-board). This injection technique immediately reduces the treatment area by one-half there-by, instantly offering significant cost savings.



As depicted in the above figure, the injection point spacing that would normally be required to deliver sufficient *Cool-Ox™* reagents to oxidize the contaminants in the low permeability soil/groundwater matrix is maintained only in the treated squares. This assures that contaminant reductions will be accomplished in these areas and that the bio-fortified *Cool-Ox™* reagents will stimulate the accelerated proliferation of indigenous microbial degraders.

This technique establishes a matrix of so called "clean zones" within the contaminant plume. As the groundwater slowly moves about within the plume area the *Cool-Ox™ Bio-Spunge™ Reactors* ultimately facilitate the mitigation of the groundwater. Periodic analysis of the groundwater will reveal if supplemental *Cool-Ox™* reagent injections are required.

(1) Cassidy, D., Osgerby, I., Nuttall, H., Lundy, W., (2004), "Oxidation and Subsequent Biodegradation of Coal Tar Residues Using the newly Developed Fenton-Like Lund-Ox™ Technology." *Procedings, International Conference on Oxidation and Reduction Technologies for In-Situ Treatment of Soil and Groundwater,* October, 2004.
(2) Photographs courtesy of H. Eric Nuttall – University of New Mexico, Albuquerque, NM