



Cool-Ox[®]

for Environmental Restoration

Prepared for:



- Remediation of a diesel fuel release in a sensitive wetland area located in Big Cypress National Preserve.
- This report will include a pictorial overview and results of the application.

- The freshwaters of the Big Cypress Swamp, essential to the health of the neighboring everglades, support the rich marine estuaries along Florida's southwest coast. Protecting over 729,000 acres of this vast swamp, Big Cypress National Preserve contains a mixture of tropical and temperate plant communities that are home to a diversity of wildlife, including the elusive Florida panther.

- The Sunniland Trend is a well-defined, onshore oil reserve stretching from Ft. Myers to Miami. Oil was first discovered in the Trend in 1943 by the Humble Oil and Refining Company, now known as Exxon. Since then, eight commercial oil fields have produced more than 118 million barrels of oil at some of the highest on-shore per-well flow rates in the country. There are a total of eight (8) producing well pads located in this highly sensitive area.

Big Cypress and the National Park Service

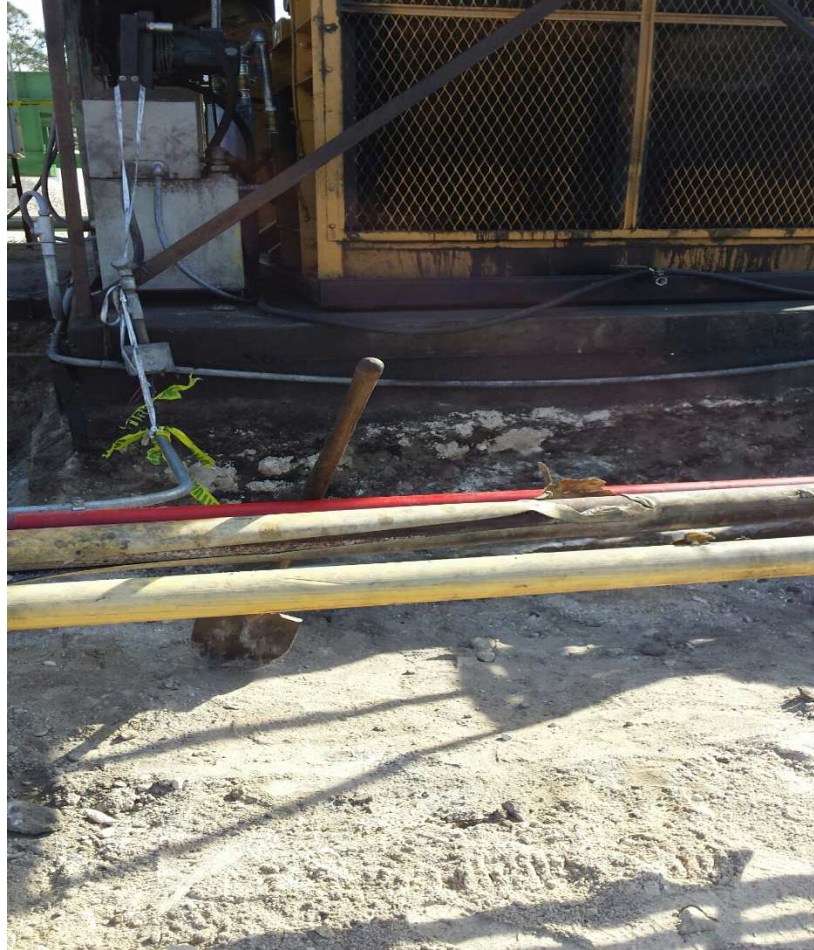


No Cell Signal!



Accidental Release

- At one of the pads, a hose carrying diesel oil that fuels electrical generators, separated and a released occurred. A portion of the diesel breached the underside of the well pad berm, leaking into the wet marshland bordering the well pad. Because of the sensitive nature of the park ecosystem, excavation was not an option.



- The National Park Service was involved, since the spill made its way off the pad and into wetland area.
- There was no excavation allowed.
- DTI was called down to the Park Service HQ's to discuss strategy.
- The National Park Service recommended Cool-Ox ® for several reasons.

Why Cool-Ox ®?

- One remedial technology, the patented Cool-Ox® process, was recommended to the responsible party by the Florida Department of Environmental Protection (FDEP) and the National Park Service.
- Unlike other oxidizing processes, no heat is generated by this technology thus, eliminating risks associated with conventional oxidation applications.
- This safety factor, the remoteness of the release location, and the ease of handling prompted the use of the Cool-Ox® spill kits for this application.
- Consequently, the usual need for heavy equipment associated with most remedial projects was obviated thus, no damage to the ecology of the area was sustained.

- With direction from the Park Service, State, and the producer, we decided that the Cool-Ox ® spill kits would provide the best method for the characterization and treatment of this sensitive area.
- We used the kits and simple mixing tools such as rakes, etc.



- One of the first items we needed to address was to locate the exact location of the diesel in the wetland area.
- We started by applying Cool-Ox for a surface application. The foam reaction and tight lather will indicate where product is located. This along with use of a boom and small flags will tell us the extent of the location.

Finding the Source(s)

- **How do we do it?**
 - **Reaction of Contaminant & Reagent!**
 - **Why do we do it?**
 - **Precisely Place the Reagents!**
- **What are the Benefits?**
 - **Target Source Areas!**
 - **Optimize use of Reagent!**
 - **Speeds up Remediation Closure!**
 - **Saves Money for the Client!**

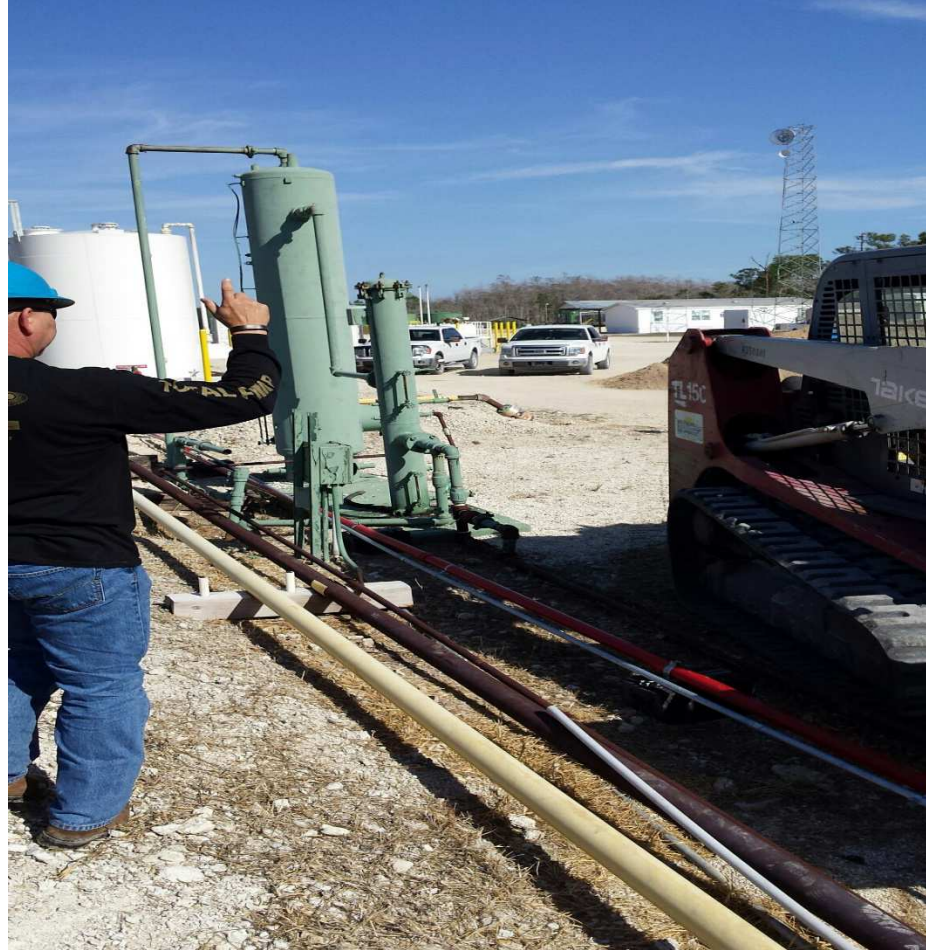


Site Characterization













Depth of Contamination (inches)	Area of Spill That Can Be Treated (square yards)*
1	6
2	3
3	<i>*Using one set of blended oxidant components. Two sets of oxidant components per Cool-Ox® Spill Response Kit</i>
4	1.5
6	1









Cool-Ox[®] (eliminates)*

- the need to excavate
- the need for sheet piling and/or shoring
- the need to dewater
- the complications of POTW disposal restrictions
- the need to treat groundwater
- the requirement for a NPDES permit
- the need for contaminated soil treatment/disposal
- transferred liability
- EPA permitting requirements for excavated contaminants
- the need to classify and permit waste to disposal facility
- risk of waste rejection from disposal facility
- ingress/egress trucking issues
- the need for backfill material
- the generation of odors or noxious gasses
- hazards of open excavations
- hauling permitting problems
- potential odors from transported waste
- many safety hazards of concern to Loss Prevention Programs waiting for trucks

Incident Summary

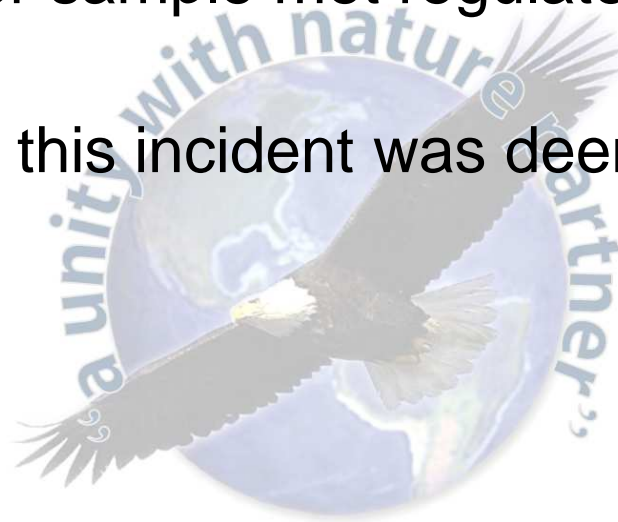
- The FDEP requested that two (2) confirmatory soils samples be collected, and analyzed pursuant to EPA Method 8270 for Polynuclear Aromatic Hydrocarbons from the impacted area.

Incident Summary Cont.

- In addition the FDEP requested that a single surface water sample be collected west of the impacted area and that sample also analyzed pursuant to EPA Method 8270 for PAH's.

Summary

- Both soil samples met regulatory guidelines for this site.
- The groundwater sample met regulatory guidelines for this site.
- Remediation for this incident was deemed sufficient.



Who is DTI?

DeepEarth Technologies, Inc. was chartered in 2003 to bring new innovation in chemical oxidation to the environmental remediation marketplace.

Unlike most companies that simply sell products, DTI is a total turn-key operation offering:

- **Proven Technology**
- **Experienced Personnel**
- **Innovative Application Machinery**

Resulting in:

- **Economical life cycle costing**
- **Accelerated Site Closures (NFA Tombstone Remedies)**

What is **Cool-Ox**[®] ?

- **Green** In-situ and Ex-situ Oxidation technology leaving no harmful by-products
- Treats both soil and groundwater in place
- Uses food grade chemical oxidants
 - Clean Hydrogen peroxide, H_2O_2
- Provides nutrients to support biodegradation for polishing
- Most Important – **Destroys Contaminants**

Cool-Ox[®] Advantages

- **Eliminates Odor**
- **No Heat Generation**
- **No Corrosion**
- **Real Time Characterization**
- **Long-term Oxidation (> 90 days)**
- **Sustained Bioremediation**
- **Free Phase Destruction**
- **Produced Water (SAR Mitigation)**
- **Can Stabilize Soil**

Safety Comes First!

All Field Employees trained in:

- **40-hour OSHA Hazwoper training and 8-hour refresher training**
- **OSHA Employee Right-To-Know Hazard Communication**
- **OSHA requirements for selection & use of PPE**
- **Training in Dept. of Transportation Requirements**
- **PEC Basic Orientation safety awareness course which includes both Safe Gulf and Safe Land training. (Mandatory for our work in the oil and gas industry)**
- **The National Safety Council Defensive Driving Course (DDC-PC)**

Field Preparation:

- ***Maintenance of equipment and vehicles
(Inspection Checklist)***
- ***DTI In-House Health & Safety Plan Review***
- ***Job Safety Analysis (Review written procedures
for each task)***
- ***Developing Site Specific Health & Safety Plans
and then implementing them at the “tailgate”
sessions at the beginning of each work shift***

Outstanding Achievement

“Outstanding achievement! An unannounced internal audit with nothing but, positive findings!

*This is a true demonstration of your **strong** EH&S culture and leadership.*

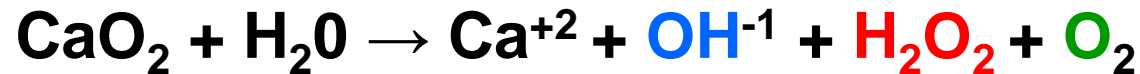
Thank you all for living and working safely!”

Dennis A. Huggard
EH&S Remediation Manager
Global Remediation Business
The Dow Chemical Company

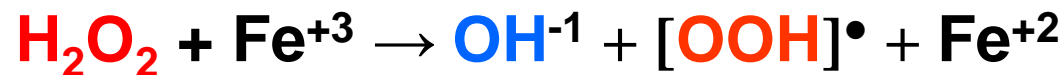


The Chemistry

(Produce Hydrogen Peroxide In-Situ)



(Chelates Activate Intrinsic Catalysts – Produces Radicals)



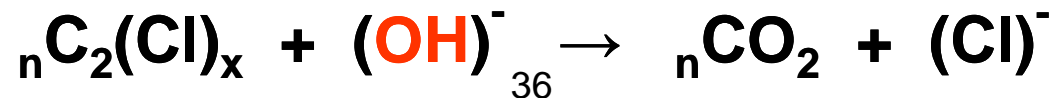
(Radicals React with Contaminants – Oxidation By-products)



(Biodegradable By-products Used by Microbes)

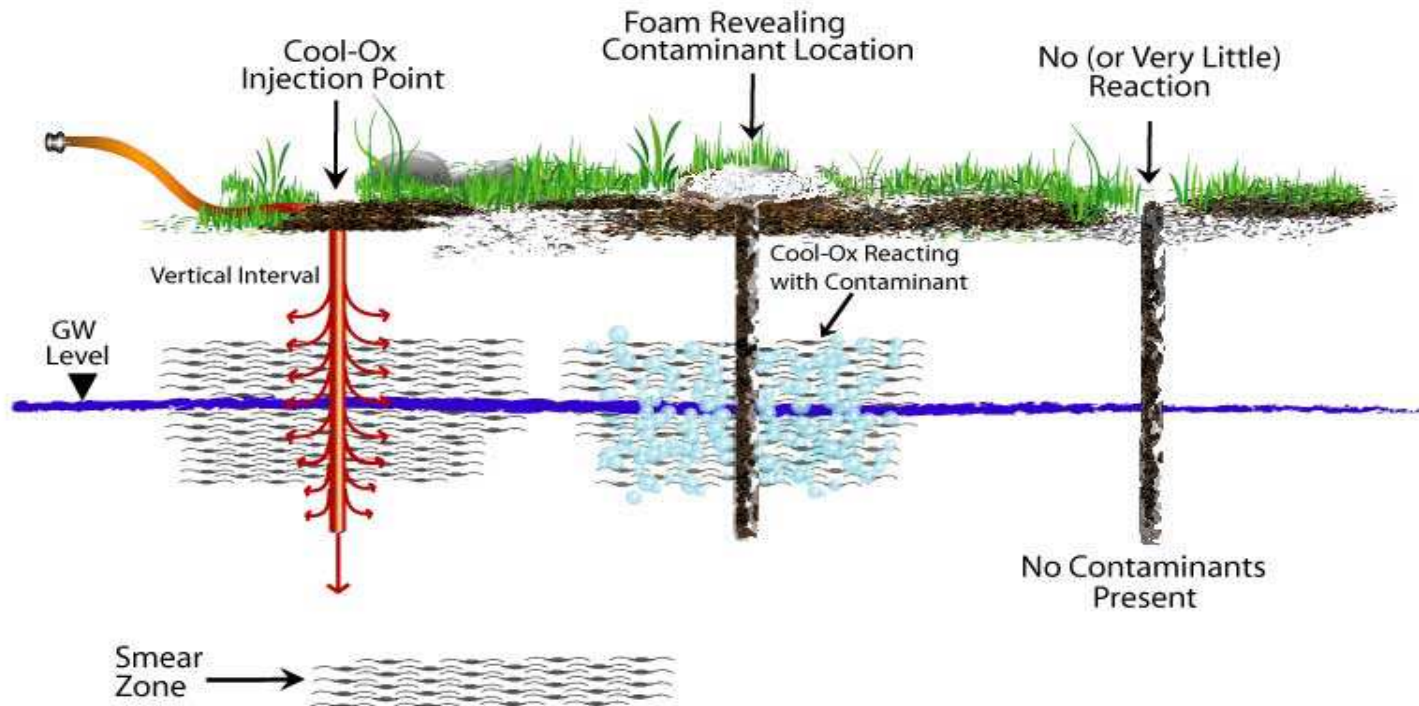


(Reductive Dechlorination)



Rationale

Cool-Ox Technology As A Site Characterization Tool



What we Have Treated

- Free Product (NAPL)
- **BTEX**
- Coal Tars
- Vinyl Chloride & DCE
- Chlorobenzenes
- PAHs
- Creosote
- Jet Fuel
- Gas Condensate
- Fuel Oil
(GRO/DRO/TPH)
- Herbicides
- Pesticides
- Pentachlorophenol
(PCP)
- Dioxins
- Chlorinated Solvents
- PCBs
- Ethylene Dibromide
(EDB)

And now Brine

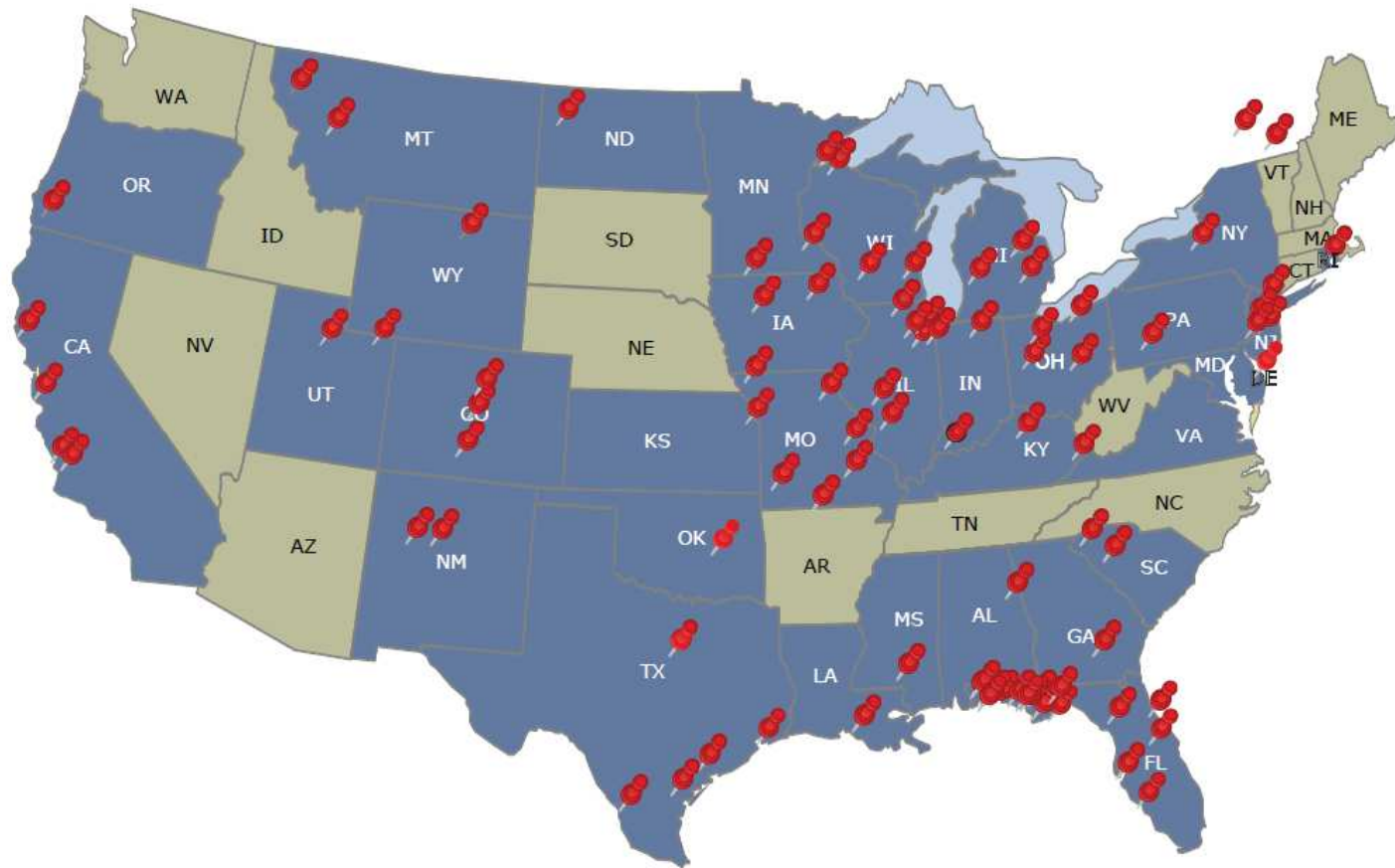
Contact is Vital

Why is the method of delivery in the field so important?

- Contact Sport!
- The oxidant and contaminant must meet for a chemical reaction to occur.
- Proper application is vital to a successful remedial project.
- Nothing beats Know-How!**



Site Locations





**DeepEarth
Technologies, Inc.**

Questions?

Thank You !

Keys Oakley

DeepEarth Technologies, Inc.

www.deepearthtech.com

Remember Total Green



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Cool-Ox™