

Dual-Ox systems can deliver chemical oxidants to target the destruction of problem contaminants like...

- ACENAPHTHENE
- ANTHRACENE
- BENZO(A)PYRENE
- BENZO(A)ANTHRACENE
- BENZO(B,K)FLUORANTHENE
- DIBENZO(A,H)ANTHRACENE
- FLUORENE
- FLUORANTHENE
- INDENO(1,2,3-CD)PYRENE
- CRYSENE
- PYRENE
- PESTICIDES
- HERBICIDES
- DIOXINS/FURANS
- PCBs

...and more!

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The Dual-Ox™ technology was designed to provide a powerful combination technology that couples chemical oxidation with ongoing biological stimulation to create an unparalleled in situ remediation system. Pulsed injections of chemical oxidants into the subsurface rapidly oxidize recalcitrant compounds upon contact, and also aid in the desorption of heavily sorbed contaminants (i.e. PAHs), making them more amenable to biological degradation. The chemical reactions subsequently produce partially oxidized organic compounds that are soluble and readily degradable. Biological activity is optimized via consistent injection of bacteria, nutrients, and warm air or oxygenated



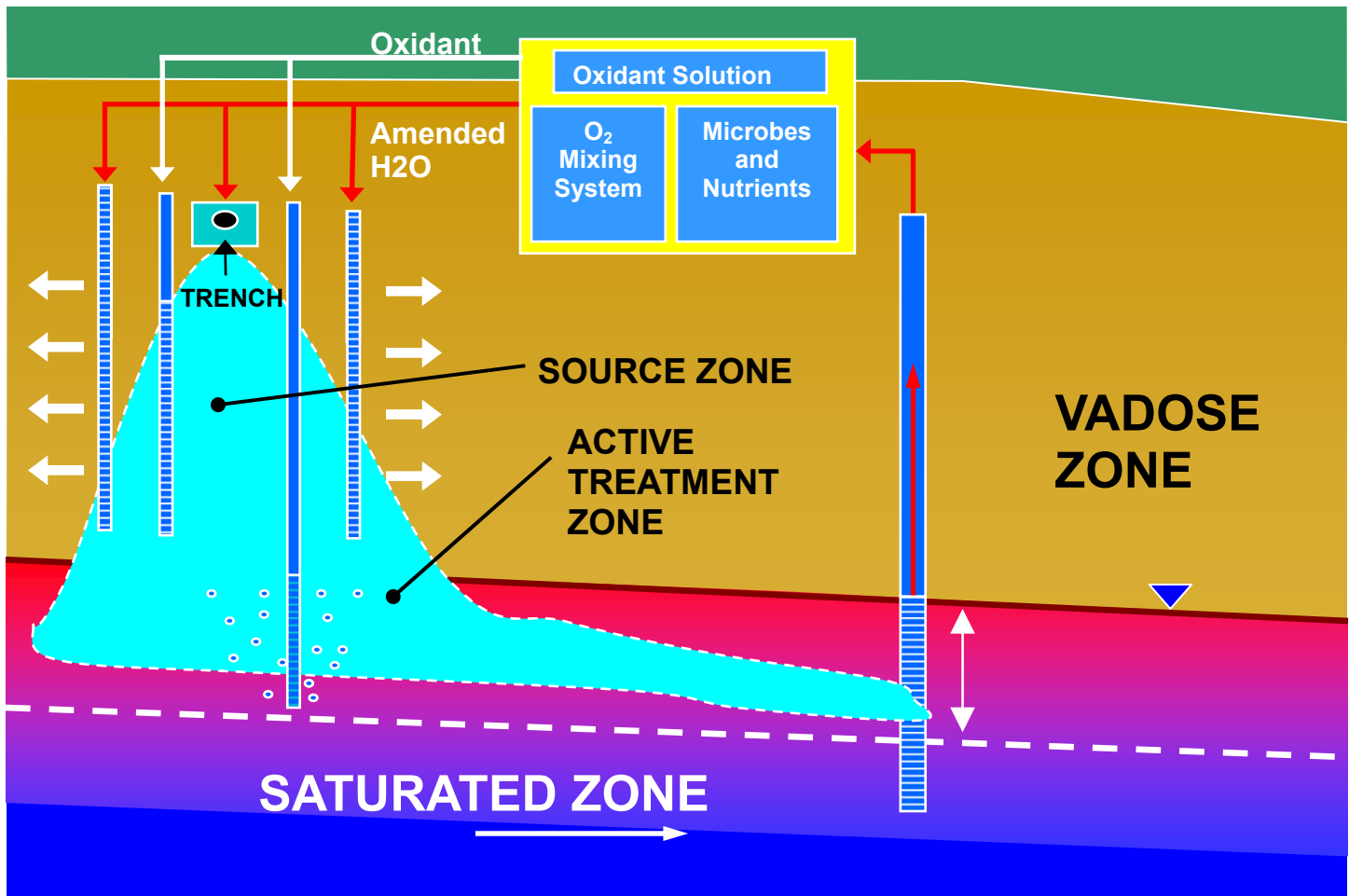
The automated, programmable Dual-Ox™ systems provide pulsed injections of chemical oxidants to source areas where microbial activity is sometimes limited due to toxicity and/or unfavorable conditions. The Dual-Ox™ systems can deliver a wide range of oxidants and catalysts, including modified Fenton's reagents, catalyzed persulfate reagents, permanganate, and other dry, liquid, or slurry mixtures.

Trailer-mounted Dual-Ox units are also available, allowing users to conduct manual injections of chemical oxidants or amended water into specific locations that may not allow the installation of a permanent system (i.e. offsite contamination, active industrial site, etc.). The Dual-Ox systems are effective in both unsaturated (vadose) and saturated (groundwater) zones.

DUAL-OX™ EQUIPMENT LINE SUMMARY

Dual-Ox Model	10-M	10-A	20-A	40-A
Max. Flow Rate, gpm	10	10	20	40
No. of Injection Stations	Varies	6	6	12
Product Injection	Manual	Automated	Automated	Automated
Mobility	Trailer	Fixed	Fixed	Fixed
Insulation/Heating	No	Yes	Yes	Yes
Length	12 ft	12 ft	14 ft	16 ft
Width	6 ft	8 ft	8 ft	8 ft
Height	5 ft	7 ft	7 ft	7 ft
Customization Available	Yes	Yes	Yes	Yes

DUAL-OX™ CHEMICAL/BIOLOGICAL PROCESS



Delivery of chemical oxidants in addition to biological products using an Dual-Ox system offers many advantages over other remedial alternatives:

- Chemical Oxidants (i.e. hydrogen peroxide, persulfate, etc.) are aggressive and are able to degrade compounds resistant to biodegradation upon contact (i.e. cPAHs, PCBs, etc.)
- Promotes aerobic/anaerobic biodegradation by generating partially oxidized organic acids/compounds that are readily degraded by microbes, and by supplying dissolved oxygen when using hydrogen peroxide
- Rapid destruction of contaminants in source zone areas (weeks to months)
- Can utilize existing infrastructure (i.e. SVE/AS, MW wells, etc.) for injections to reduce implementation costs

Selecting the most appropriate chemical oxidant for a particular contaminant is as critical as selecting the right delivery system. ETEC highly recommends conducting bench-scale tests with impacted media from the site prior to implementing this process. Many factors affect chemical oxidation (ex. type of catalyst, concentrations of oxidant, etc.) that should be evaluated. ETEC conducts thorough bench-scale experiments by evaluating different concentrations of oxidants and metal catalysts that will provide you the most cost-effective approach prior to delivery at the site. Call us for more information!