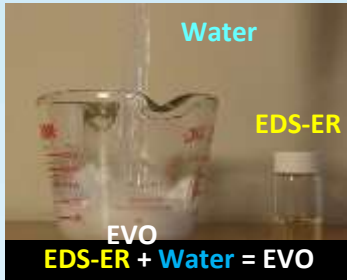




EDS-ER™

Electron Donor Solution – Extended Release

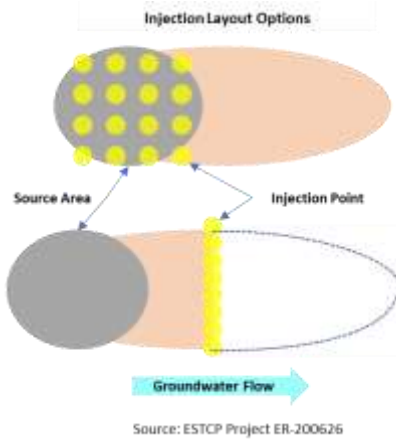


- Long-lasting carbon and hydrogen source
- Simple, safe, low-cost bioremediation solution
- Neutral pH when mixed with water
- Controlled release of electrons for up to 5 years
- Clean, non-disruptive application

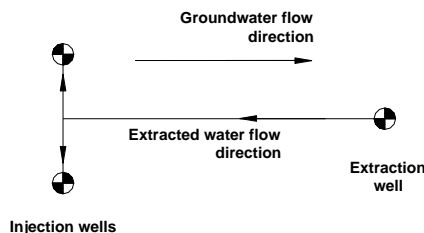
Principle: A Self-Emulsifying Electron Donor

Released in 2011, *EDS-ER™* was the first water-mixable vegetable oil based organic substrate to provide a lasting source of carbon and hydrogen for enhanced reductive dichlorination and other bioremediation processes. *EDS-ER™* is shipped as a 100% fermentable substrate concentrate to create the right aquifer conditions for anaerobic remediation. *EDS-ER™* contains refined, bleached, and deodorized soybean oil and surfactants. The main role of the surfactant is to sufficiently reduce the energy (γ o/w) required to increase the surface area so that spontaneous dispersion of oil droplets occurs, and the system is thermodynamically stable. When mixed with water, *EDS-ER™* spontaneously becomes an emulsified vegetable oil (EVO).

EDS-ER™ Generates a spontaneous emulsion



Recirculation Pattern



Advantages

- Easily mixes with water, simplifying field operations
- Spontaneously forms a high-quality, low-droplet size oil-in-water emulsion that easily and uniformly disperses in the aquifer
- 100% fermentable and contains no water
- A slowly fermenting product that can provide electrons for up to five years
- Contains refined, bleached, and deodorized (RBD) food-grade soybean oil
- Preservative free
- Long shelf life
- Lower transportation costs when compared to other EVO products
- Up to 50% less packaging material required
- Lower carbon footprint
- USDA Certified Biobased Product
- Can be injected into existing wells or via direct push
- Decreases number of necessary injection points for low permeability structures

Field Application Design

EDS-ER™ applications are easily tailored to meet site-specific conditions. Typical configurations include grid and barrier patterns and applications in excavations or trenches. The product's low viscosity allows subsurface distribution through direct-push injection points, hollow-stem augers, or pumped-through existing wells.

Uniform distribution of an electron donor is the key to successfully enhancing anaerobic bioremediation. Once mixed with water, *EDS-ER*[™] remains emulsified, even at low concentrations. The diluted emulsion has a viscosity almost equal to that of water. We therefore suggest injecting a relatively dilute emulsion in a single step, as the oil droplets move with the injected water. The oil droplets may remain suspended in the water for a few days to a few weeks after injection until it absorbs into soil surfaces to act as a long-term source of electron donor.

EDS-ER[™] can be diluted on site by adding the desired amount of product to a mixing tank and then simply adding water.

Product Content

Chemical Name	CAS Number	Composition (% wt.)
Soybean oil	8001-22-7	85 - 95
Surfactant Mixture	Proprietary	5 - 15

Product Characteristics

Parameter	Specification
Specific Gravity	0.92-0.925
Solubility in water	miscible
Flash Point	Greater than 550 °F (288 °C)
Appearance	yellowish translucent oil

Packaging Options

- 55-gallon poly drums
- 275-gallon IBC containers
- 5,000-gallon tankers

Safety

Wear impervious gloves for prolonged or repeated exposure as appropriate to task. The use of body protection appropriate to task being performed is always suggested when handling chemicals. If necessary, refer to U.S. OSHA 29 CFR 1910.138, the European Standard DIN EN 374, the appropriate Standards of Canada or other relevant standards.