SRS®-Z_{VI} Small Droplet Emulsified Vegetable Oil (EVO) Substrate Combined With Zero Valent Iron (ZVI) for DNAPL and Biobarrier Applications
United States Patent# RE40,448

What Is SRS®-Z_{VI}?

Terra Systems SRS®-Z_{VI} uses our state of the art manufacturing facility to produce a unique oil/iron product that combines patented emulsified vegetable oil substrate technology (SRS®) with zero valent iron (ZVI), which results in a product that provides better flow characteristics and higher carbon and hydrogen yield than other commercially available ZVI and organic products.

Why Combine Emulsified Vegetable Oil Substrate and Zero Valent Iron?

- Terra Systems patented, nutrient enriched, proven slow release SRS® family of emulsified vegetable oil substrate is used extensively by the Air Force, DOD, Navy, EPA, drycleaners and private firms to remediate chlorinated solvent sites.
- SRS®-Z_{VI} is formulated under NASA's EZVI patent.
- Zero Valent Iron can promote the abiotic dechlorination of solvents including tetrachloroethene (PCE), trichloroethene (TCE), 1,1,1-trichloroethane (1,1,1-TCA), and Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane).
- SRS®-Z_{VI} contains approximately 31.3 percent carbon.
- Terra Systems core competence in manufacturing produces a stable combined product that provides good flow characteristics, which makes it easier to inject and distribute in the aquifer.
- SRS®-Z_{VI} arrives at the project site injection ready and does not require on-site mixing.

What Are the Best Applications SRS®-Z_{VI}?

- High concentrations of chlorinated solvents
- Biobarriers to prevent migration across property boundaries
- Freon 113

Why Terra Systems, Inc.?

- Terra Systems holds United States Patent# RE40,448 for the use of emulsified vegetable oil for remediation of chlorinated solvents and is a licensee of NASA for EZVI.

130 Hickman Road – Suite 1 – Claymont – Delaware – 19703
Phone; 302-798-9553 – Email: mfree@terrasystems.net

- Terra Systems owns and operates a US based manufacturing plant with an in-house quality control laboratory for strict quality assurance and our products are manufactured using Terra Systems full time employees, not toll producers.

- Terra Systems has been in continuous operation for 21 years supplying aerobic and anaerobic remediation solutions to environmental consultants.

- The soy bean oil provided is grown in the United States and provides a slow release biodegradable carbon source, which promotes long-term biological activity.

SRS®- Z_{VI} Oil/Iron Substrate Specifications

Ingredient	Percent by Weight/ Attributes	Description
Food Grade U.S. Grown Soybean Oil	36%	Terra Systems operates its own state-of-the-art manufacturing facility for SRS®-SD production and can custom blend substrate packages as site conditions require.
Zero Valent Iron	40%	Micro-scale zero valent iron (nano/micro scale iron available at a higher cost)
Proprietary Food Grade Additives/ Preservatives/Proprietary Nutrients, Vitamin B_{12}, Soluble Substrate and Emulsifiers	6%	Proprietary organic and inorganic nutrients such as yeast extract, nitrogen and phosphorus. Organic and inorganic nutrients have been shown to support the growth of the anaerobic microbial population.
pH	6.5 – 7.5	Neutral pH
Specific Gravity	12 pounds/ gallon	Denser than water
Viscosity	3,306 centi-poises	Non-Newtonian fluid with 3,300 centipoise plateau with constant speed spindle and 2,300 centipoise with increasing speed spindle
Organic Carbon	31.3%	Theoretical carbon yield

Packaging: Terra Systems patented SRS®- Z_{VI} is shipped in 275-gallon IBC totes.

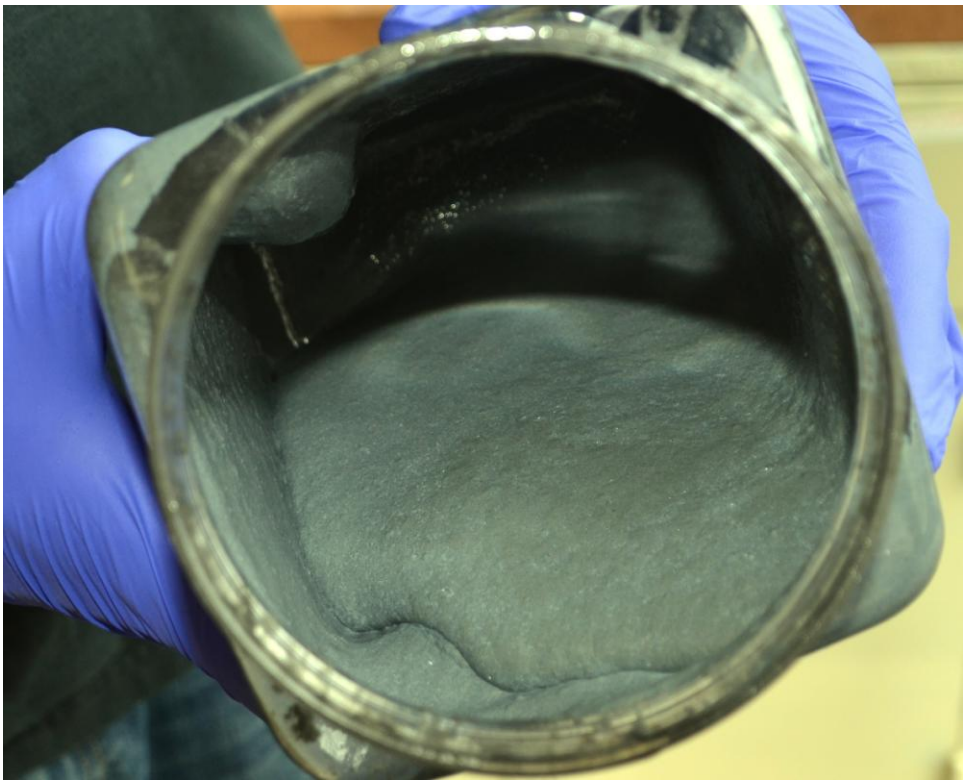
Delivered Injection Ready: Terra Systems patented SRS®- Z_{VI} is shipped ready-to-inject.

Injection Method: Direct Push. SRS®- Z_{VI} is not recommended for injection into screened wells.

Shelf-Life: SRS®- Z_{VI} is designed to be injected within 2-weeks of being received.

130 Hickman Road – Suite 1 – Claymont – Delaware – 19703
Phone; 302-798-9553 – Email: mfree@terrasystems.net

Photo of SRS® - Z_{VI} Sample:



130 Hickman Road – Suite 1 – Claymont – Delaware – 19703
Phone; 302-798-9553 – Email: mfree@terrasystems.net