



# Terra Systems NutriPlus™ a Proprietary Nutrient Package For Aquifer Remediation and Conditioning

Emulsified Vegetable Oil Substrates, lactate and other carbon substrates are added to the groundwater to rapidly generate reducing conditions and provide the necessary carbon and hydrogen to support native or introduced microorganisms (*Dehalococcoides*) for the biodegradation of chlorinated solvents such as tetrachloroethene (PCE) and trichloroethene (TCE) to innocuous end products including ethene and ethane.

## Key Communication Points

- NutriPlus™ is a standalone package that includes nutrients and Vitamin B<sub>12</sub>, a micronutrient, which has been statistically demonstrated to support biodegradation of chlorinated solvents with soluble substrates like lactate and emulsified vegetable oil (He et al 2007 and Harkness et al 2012).
- NutriPlus™ is an ideal supplement for fast-track projects when demonstrating short-term results are critical.
- NutriPlus™ can be added to other carbon substrates like lactate, molasses, and emulsified vegetable oil substrates to enhance in-situ bioremediation.

**Table I:** NutriPlus™ Specifications

Ingredient	Percent	Benefit
Liquid Yeast Extract	97.49	Liquid yeast extract provides nitrogen and phosphorus for enhanced in-situ bioremediation.
Vitamin B <sub>12</sub>	0.01	He et al. 2007 demonstrated that VB <sub>12</sub> is an important micronutrient to enhance dechlorination activity.
DAP	2.5	Diammonium phosphate provides additional nitrogen and phosphorus for enhanced in-situ bioremediation.
<b>Total</b>		

## **Technical References for the benefits of using a nutrient package for in-situ bioremediation.**

He, J., V. F. Holmes, P. K. H. Lee, and L. Alvarez-Cohen. 2007. Influence of Vitamin B<sub>12</sub> and cocultures on the growth of *Dehalococcoides* isolates in defined medium. *Appl. Environ. Microbiol.* 73(9):2847-2853.

Harkness, M., A. Fisher, M. D. Lee, E. E. Mack, J. A. Payne, S. Dworatzek, J. Roberts, C. Acheson, R. Herrmann, and A. Possolo. 2012. Use of statistical tools to evaluate the reductive dechlorination of high levels of TCE in microcosm studies. *Journal of Contaminant Hydrology* 131(1-4):100-118.