

Increasing Bio-Availability of Contaminant in Groundwater Using Surfactant Enhanced Bioremediation (SEB)

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This paper will focus on the application of non-ionic surfactants to improve the “bio-availability” of many higher molecular weight (HMW) compounds such as F3 (C₁₆-C₃₄), F4 (C₃₄-C₅₀), polycyclic aromatic hydrocarbons (PAH), for microbial bioremediation.

During the past decade, much discussion has centered on the unavailability of absorbed compounds to soil and groundwater microorganisms. It is generally now assumed that desorption and diffusion of bound contaminants to the aqueous phase is required for microbial degradation (W.P. Inskeep, J.M. Wraith, C.G. Johnston, Hazardous Substance Research Center, 2005).

It had been well established in literature that >90% of LNAPL and DNAPL contaminants prefer to sorbed (i.e., absorbed or adsorbed) on surfaces such as soil and bedrock, versus being in the dissolved groundwater (aqueous) phase. The sorption of contaminants to substrates is often considered the principal limiting factor affecting many groundwater remediation technologies (i.e., pump and treatment, oxidation, bioremediation, etc.). This fact limits the effectiveness of many bioremediation processes, as the targets contaminants are not “bio-available”. Surfactants enhance bioremediation (SEB) involves the use of surfactants to desorb the contamination and significantly improve the bio-availability of many recalcitrant compounds in the Groundwater phase. In doing so this allows for their improved microbial mineralization through directly increasing the bio-availability of these contaminants.

Darren Kostiw

Mr. Kostiw has been working in the chemical industry for 10 years and with Canada Colors & Chemicals for the past 2 years. He has a Bachelors of Science in Physics and a Bachelors of Science in Environmental Physical Sciences, both from the University of Alberta in Edmonton. He has worked in Sweden, the US, Canada, Germany, Norway and China. Presently he is the Regional Team Leader and Account Manager for the Environment and Resource Divisions of Canada Colors for Western Canada. Canada Colors & Chemicals is one of Canada's largest independent chemicals distributors with over 5000 products and 13 warehouse, blending and manufacturing operations across Canada.

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Mr. Ivey is the President and Senior Remediation Specialist with Ivey International Inc. He has over twenty years of environmental experience, and has worked on more than 1200 projects worldwide. His background includes: Organic Chemistry, Geological Engineering, and a Master's Certification in Project Management.

Among some of his more recent accomplishments include his being awarded:

- The 2007 Environmental Business Journal Business Achievement Award Bronze Medal, February 20, 2008;
- The 2006 North American Frost & Sullivan Award for Technology Innovation, February 7, 2007;
- The 2006 Environmental Business Journal Remediation Technology Merit Award, February 28, 2007; and
- The 2006 Globe Award for Environmental Innovation & Application, on March 31, 2006.

He holds several international patents; continues to conduct applied soil, solid waste, waste water, and groundwater research, and is currently working on several remediation projects around the world.