

Florida Department of Environmental Protection

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2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

September 18, 2007

Catherine R. Miceli, P.E.
VeruTEK Technologies, Inc.
65 West Dudley Town Road, Suite 100
Bloomfield, Connecticut 06002

Re: **S-ISCO™ (Surfactant-Enhanced In Situ Chemical Oxidation)**

Dear Ms. Miceli:

The Bureau of Petroleum Storage Systems hereby accepts Surfactant-Enhanced In Situ Chemical Oxidation (S-ISCO™) for the remediation of dissolved, adsorbed and non-aqueous phase liquid petroleum contaminants in groundwater and soil. As VeruTek Technologies has indicated, S-ISCO™ is a Coelution Technology™ that utilizes VeruSOL™, a proprietary nonionic surfactant, to solubilize immiscible organic contaminants in the presence of an oxidant. A voucher for the confidential disclosure of the surfactant's constituents is provided in Enclosure 1. The oxidant, in the case of this acceptance, is FMC Corporation's Klozür™ brand sodium persulfate. The regulatory citations in the Bureau's February 25, 2005 acceptance of Klozür™ apply when it is used as the oxidant in the S-ISCO™ process, and the February 25, 2005 acceptance of it is hereby incorporated by reference.

In the S-ISCO™ process, an aqueous mix of VeruSOL™ surfactant, sodium persulfate and an activator is prepared and introduced to the subsurface, where it produces what is essentially a simultaneous dissolution and oxidation of the contaminants. It takes advantage of the fact that the oxidation reaction occurs in the aqueous phase, so it draws, by elution, NAPL and sorbed contaminants into the groundwater as a microemulsion, where they are quickly destroyed by the activated sodium persulfate. The ultimate products of the reaction are salt, sulfate, carbon dioxide and water. As indicated by the Bureau of Petroleum Storage Systems in its acceptance of the sodium persulfate, a choice of activators is available: divalent metals such as ferrous sulfate, chelated metals such as chelated iron, hydrogen peroxide, basic pH modifiers such as sodium hydroxide, or heat.

The Bureau recognizes S-ISCO™ as a viable process for the remediation of contaminated sites in Florida. There are no objections to its use provided: (a) the considerations of this letter are taken into account; (b) a site-specific Remedial Action Plan is submitted for approval by the Department for each site where the use of S-ISCO™ is proposed; and (c) the Remedial Action Plan specifies the temporary injection zone of discharge size and duration for ammonia nitrogen, iron, manganese, pH, sodium, sulfate, surfactant and total dissolved solids, and proposes adequate groundwater monitoring for them pursuant to Rule 62-522.300(2)(c), F.A.C. Some major regulatory

considerations that apply to S-ISCO™ are discussed in Enclosure 2. Since injection-type, in situ aquifer remediation is likely to be the most common application of S-ISCO™, the bulk of the regulatory requirements discussion will be directed to that topic.

While the Department of Environmental Protection does not provide endorsement of specific or brand name remediation products or processes, it does recognize the need to determine their acceptability from an environmental standpoint with respect to applicable rules and regulations, and the interests of public health and safety. Vendors must then market the products and processes on their own merits regarding performance, cost, and safety in comparison to competing alternatives in the marketplace. In no way, however, shall this regulatory acceptance be construed as Department certification of performance. Additionally, the Department emphasizes a distinction between its regulatory acceptance and an approval. Products and processes are accepted but they are not approved.

Also, it is not a requirement that a particular remediation product or process have an official acceptance letter in order for it to be proposed in a site-specific Remedial Action Plan. The plan, however, must contain sufficient information about the product or process to show that it meets all applicable and appropriate rules and regulations.


Those who prepare Remedial Action Plans are advised to include a copy of this letter in the appendix, and call attention to it in the text of their document. In this way, technical reviewers will be informed that you have contacted the Department of Environmental Protection to inquire about the environmental acceptability of S-ISCO™. To aid those reviewers, the Bureau of Petroleum Storage Systems provides supplemental information as Enclosure 3.

The Department reserves the right to revoke its acceptance of a product or process if it has been falsely represented. Additionally, Department acceptance of any product or process does not imply it has been deemed applicable for all cleanup situations, or that it is preferred over other treatment or cleanup techniques in any particular case. A site-specific evaluation of applicability and cost-effectiveness must be considered for any product or process, whether conventional or innovative, and adequate site-specific design details must be provided in a Remedial Action Plan. You may contact me at (850) 877-1133, extension 3722, if there are any questions.

Sincerely,



Rick Ruscito, P.E.
Ecology and Environment, Inc.
Bureau of Petroleum Storage Systems
Petroleum Cleanup Section 6



Rebecca S. Lockenbach
FDEP Section Leader
Bureau of Petroleum Storage Systems
Petroleum Cleanup Section 6

c: Tom Conrardy - FDEP/Tallahassee