



FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

BOB MARTINEZ CENTER
2600 BLAIRSTONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

RICK SCOTT
GOVERNOR

HERSCHEL T. VINYARD JR.
SECRETARY

March 21, 2013

Via Electronic Mail
BElkins@EOSRemediation.com

Brad Elkins
EOS Remediation LLC
1101 Nowell Road
Raleigh, North Carolina 27607

Re: Three Edible Oil Substrate Products: EOS_{PRO}, EOS_{LS}, and EOS₄₅₀

Dear Mr. Elkins:

The Division of Waste Management (Division) hereby accepts three Edible Oil Substrate (EOS) products, EOS_{PRO}, EOS_{LS}, and EOS₄₅₀ for in situ anaerobic bioremediation of chlorinated hydrocarbons and other suitable contaminants in groundwater and soil. EOS is a U.S.-patented product containing vegetable oil, soluble substrate, a soluble source of hydrogen, and other additives. This acceptance supersedes the first EOS acceptance issued April 7, 2003, and an update issued May 20, 2005 for the single original product formulation known only as EOS. Enclosure 1 contains a voucher for the confidential disclosure of the specific ingredients and their proportions in the three products, and Enclosure 2 contains regulatory information.

The Division does not provide endorsement of specific or brand name remediation products or processes, but it does recognize the need to determine their acceptability in the context of environmental regulations, safety and the protection of public health. For that reason, the Division issues an "acceptance" letter, not an approval. In no way shall an acceptance be construed as a certification of performance. Additionally, vendors, upon receipt of an acceptance, must market their product or process on its own merits regarding performance, cost, and safety in comparison to competing alternatives in the marketplace.

Remedial Action Plans that propose the use of an accepted product or process should include a copy of the acceptance letter in the plan's appendix, and reference it in the text of the document. 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 rules and regulations.

The Division reserves the right to revoke its acceptance of a product or process if it has been falsely represented. Additionally, Division 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 submitted for Department review and approval. If you have any questions, please contact us at the numbers below.

Sincerely,

X *Rick Ruscito*

Rick Ruscito

Rick Ruscito, P.E.
Ecology and Environment, Inc.
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X *Gary Millington*

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Gary Millington, P.E.
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enc: (1) Proprietary Information Voucher
(2) Regulatory Information

c: Tom Conrardy, P.E. – FDEP/Tallahassee
Rob Cowdery, P.E. – FDEP/Tallahassee

History:

Rev. 0: 4/7/03
Rev 1: 5/20/05
Rev 2: 3/21/13
PPL #457
BurLab (1187)
ITR #64443
INN_195

ENCLOSURE 1

PROPRIETARY INFORMATION VOUCHER



**FLORIDA DEPARTMENT OF
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March 21, 2013

Brad Elkins
EOS Remediation LLC
1101 Nowell Road
Raleigh, North Carolina 27607

Re: Proprietary Information Voucher for
Three Edible Oil Substrate Products: EOS_{PRO}, EOS_{LS}, and EOS₄₅₀

Dear Mr. Elkins:

The Division of Waste Management (Division) is in receipt of a confidential version of a Material Safety Data Sheet (MSDS) dated November 2, 2012 that discloses all of the ingredients and the ranges of their percentages by weight in three Edible Oil Substrate products: EOS_{PRO}, EOS_{LS}, and EOS₄₅₀. Additionally, the Division hereby documents the occurrence of a private telephone conversation on November 19, 2012 in which you disclosed the exact weight percent of each ingredient, because the ranges alone in this case were not sufficient for a proper regulatory evaluation. The additional information via telephone has been recorded in written form and placed in the same secure location as the confidential MSDS.

Having reviewed the confidential disclosures, the Division hereby vouches for their content, and provides advice in Enclosure 2 on how to comply with applicable regulations of the Florida Administrative Code (F.A.C.) when each of these three EOS products is used for the cleanup of contamination in accordance with a Department-approved, site-specific Remedial Action Plan. The Department, in offering its advice, has been careful to mention only enough general information about the chemical species and parameters that must be monitored by users in order to comply with Underground Injection Control regulations, but not so much information as to compromise the proprietary aspects of the products.

The Division also notes that some information about these three products has already been made available to the public on the Internet by EOS Remediation LLC. The information already available to the public for each of the three is as follows: the weight percent vegetable oil but not the specific type of oil; the weight percent of soluble substrate but not the specific chemical name; and the number of pounds of hydrogen provided by each pound of each product.

For Underground Injection Control purposes, injection-type aquifer remediation plans must specify both the volume and the complete chemical composition of the fluid to be injected. But since the details of the ingredients and their proportions in EOS_{PRO}, EOS_{LS}, and EOS₄₅₀ are proprietary, it will suffice to indicate just the fluid volume of each EOS product to be injected, and then provide a note that a confidential disclosure of the proprietary details has already been submitted to the Department and accepted. Reference should be made to this voucher, and a copy of it should be included as an appendix to the plan. If you have any questions, please contact us at the numbers below.

Sincerely,

X *Rick Ruscito*

Rick Ruscito

Rick Ruscito, P.E.
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ENCLOSURE 2

REGULATORY INFORMATION

- a. Regulations: Chapters of the Florida Administrative Code (F.A.C.) that may be applicable, either in part or in their entirety, include but are not necessarily limited to Chapter 62-550, F.A.C., for primary and secondary water quality standards; Chapter 62-520, F.A.C. for groundwater classes and standards, and groundwater permitting and monitoring requirements; Chapter 62-528, F.A.C., for Underground Injection Control (UIC), particularly Part V, for Class V, Group 4 aquifer remediation projects; Chapters 62-770, 62-780, 62-782, and 62-785 F.A.C., for cleanup criteria; and Chapter 62-777, F.A.C., for cleanup target levels.

Users of EOS_{PRO}, EOS_{LS}, and EOS₄₅₀ shall comply with all applicable regulations. This includes meeting applicable groundwater cleanup target levels for the contaminants of concern, the residual concentrations of reagent ingredients, and any byproducts of concern produced by chemical and biological reactions induced by those ingredients during the timeframe of the cleanup project. For the ingredients of concern that are present in excess of their groundwater standards, the timeframe is that which is permitted for a temporary injection zone of discharge (ZOD) as described below.

- b. UIC and ZOD permits: Per Rule 62-528.630(2)(c), F.A.C., Class V injection-type aquifer remediation wells are exempt from the permitting requirements of Rule 62-528.635, F.A.C., when authorized by a Department-approved Remedial Action Plan or other enforceable mechanism, provided the requirements of the rules governing the remediation project, as well as the construction, operation, and monitoring requirements of Chapter 62-528, F.A.C., are met. Per Rule 62-528.630(2)(c), F.A.C., the issuance of an enforceable, site-specific Remedial Action Plan Approval Order by the Department for injection-type aquifer remediation constitutes the granting of a Class V injection well construction/clearance permit. And per Rule 62-520.310(8)(c), F.A.C., if a temporary ZOD is necessary, and permissible by way of that rule, then the issuance of the site-specific Remedial Action Plan Approval Order also constitutes the granting of permission for the temporary ZOD.
- c. UIC notification: Remedial Action Plans proposing injection-type aquifer remediation shall include information pursuant to Rules 62-528.630(2)(c)1 through 6, F.A.C., for the inventory purposes of the UIC program. Reviewers of those plans, upon issuance of an enforceable Remedial Action Plan Approval Order by the Department, must submit a completed copy of the UIC inventory notification form to the UIC program in Tallahassee.
- d. General information about temporary ZODs: For groundwater remediation, the composition of an injected material must meet the primary and secondary drinking water standards set forth in Chapter 62-550, F.A.C., and the minimum groundwater criteria of Chapter 62-520, F.A.C., pursuant to UIC Rule 62-528.600(2)(d), F.A.C. Aquifer remediation products that do not meet these requirements must seek relief from water quality criteria by one of two mechanisms. Permission for a temporary ZOD may be obtained via Rule 62-520.310(8)(c), F.A.C. If a ZOD cannot be obtained by rule, it will be necessary to seek a variance from Department rules in accordance with Section 120.542, Florida Statutes.

Rule 62-520.310(8)(c), F.A.C., allows for a temporary ZOD for closed-loop re-injection systems, for the prime constituents of the reagents used to remediate site contaminants, and for groundwater secondary standards. In order to obtain permission for a temporary ZOD by rule, a site-specific Remedial Action Plan must indicate: (a) the chemical ingredients of concern in the fluid to be injected that will be present in excess of groundwater standards; (b) the size of the ZOD that is needed; (c) the amount of time that the ZOD will be needed; and (d) a plan for monitoring the injected chemical ingredients of concern. The size of the temporary ZOD will usually be the injection well radius of influence when the treatment system is a single injection point. For a multiple point system, the ZOD can usually be expressed and illustrated as the total area of the cluster formed by all the injection points, located side-by-side with overlapping radii of influence.

- e. Specific ZOD information for EOS_{PRO}, EOS_{LS}, and EOS₄₅₀: For EOS_{PRO} and EOS_{LS}, ZOD permission and monitoring is necessary for TRPH. For EOS₄₅₀, ZOD permission and monitoring is necessary for TRPH and sodium. Site-specific Remedial Action Plans shall indicate which of the three proprietary products will be used, the volume and concentration at which it will be injected, and seek permission for a temporary ZOD by way of Rule 62-520.310(8)(c), F.A.C., as described in paragraph d above. In regard to typical injection concentrations, the manufacturer indicates that one (1) volume of the as-shipped product for each of the three EOS formulations is typically diluted with four (4) to twenty (20) volumes of water prior to injection, depending on site-specific conditions.
- f. ZOD monitoring advice for EOS_{PRO}, EOS_{LS}, and EOS₄₅₀: For the ZOD parameters discussed in above paragraph e, quarterly monitoring of groundwater should suffice in most cases. The current groundwater standard for sodium is 160 milligrams per liter (mg/L), and the current groundwater standard for total recoverable petroleum hydrocarbons (TRPH), 5 mg/L. The vegetable oil ingredient of these three EOS products is a source of TRPH, a groundwater contaminant in the State of Florida, regardless of whether the source is a petroleum contaminant or the vegetable oil ingredient of a remediation product. Chloride, with a 250-mg/L groundwater standard, is not an ingredient of the three EOS products, but rather a byproduct when EOS is used to treat chlorinated contaminants. Use site-specific conditions to estimate if there is enough potential for chloride to be produced in excess of 250 mg/L. If so, then monitor the groundwater for chloride.

Upon expiration of the time period granted for the ZOD, the concentration of each parameter discussed above must meet its respective groundwater standard or its natural-occurring background value at the specific cleanup site, whichever is less stringent.

- g. Utilization of wells: If a remediation site happens to have an abundance of monitoring wells, then the Division has no objection to the use of some wells for the application of these three EOS products. However, no “designated” monitoring well, dedicated to the tracking of remediation progress (by sampling) shall be used to apply reagents. This will avoid premature conclusion that the entire site meets cleanup goals. By making sure that designated tracking wells are not also used for treatment, there will be more assurance that the treatment process has permeated the entire site and that it did not remain localized to the area immediately surrounding each injection well.

- h. Avoidance of migration: For injection-type, in-situ aquifer remediation projects, pursuant to Rule 62-528.630(3), F.A.C., injection of these three EOS products shall be performed in such a way, and at such a rate and volume, that no undesirable migration of either the ingredients of concern, site contaminants, or remediation byproducts results.
- i. Abandonment of wells: Upon issuance of a Site Rehabilitation Completion Order, injection wells shall be abandoned pursuant to Section 62-528.645, F.A.C., and the Underground Injection Control Section of the Department shall be notified so that the treatment wells can be removed from the injection well inventory-tracking list.
- j. Open-pit application: Applications of these three EOS products to an open pit in which the groundwater is exposed is not an injection, and notification of the UIC Section is not required. However, the applied material must still meet the requirements of paragraph 62-520.310(8)(c), F.A.C., and the groundwater in the application area should be monitored in the same manner as if the material had actually been injected.
- k. Additives: If an additive is used with any of these three EOS products in the future, then a site-specific Remedial Action Plan must include a complete description of the additive's chemical composition and physical properties, the concentration of the additive in the fluid to be injected, the volume of the fluid to be injected, and seek permission for a temporary ZOD as described in paragraph d above if the fluid does not meet primary, secondary, and minimum groundwater standards.