



Florida Department of Environmental Protection

Bob Martinez Center
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Jonathan P. Steverson
Secretary

January 15, 2016

Via Electronic Mail
BElkins@EOSRemediation.com

Brad Elkins, P.G.
EOS Remediation Incorporated
1101 Nowell Road
Raleigh, North Carolina 27607

Re: **Edible Oil Substrate Quick Release: (EOS QR)**

Dear Mr. Elkins:

The Division of Waste Management (Division) hereby accepts Edible Oil Substrate Quick Release (EOS QR) as a soluble substrate and short-lived electron donor for in-situ biodegradation of chlorinated hydrocarbons and other suitable contaminants in groundwater. As you have indicated, EOS QR can be used to pre-condition an aquifer to a more highly reducing redox state to initiate enhanced anaerobic dechlorination.

The Division also notes your indication that the ingredients are food-grade substances, generally regarded as safe (GRAS) per the list of Everything Added to Food in the United States (EAFUS). The Division also notes that EOS QR is miscible in water, rapidly biodegradable, and of low toxicity to aquatic organisms. EOS QR is typically diluted volumetrically from 4:1 to 10:1 (water:EOS QR) prior to its injection into the subsurface, depending on site conditions.

The considerations of this letter should be taken into account for the use of EOS QR, and a site-specific Remedial Action Plan should be submitted for review and approval by the Department. Enclosure 1 contains a voucher for the confidential disclosure of the EOS QR ingredients and their proportions. Enclosure 2 contains regulatory information.

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, 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. This acceptance letter shall not be construed as either an approval of the product or a certification of its performance.

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Edible Oil Substrate QR
(EOS QR)

It is not a requirement that a remediation product or process obtain an acceptance from the Department in order to be proposed in a site-specific Remedial Action Plan, but the plan must contain sufficient information to show that the product or process meets all applicable and appropriate rules and regulations. For EOS-QR, a copy of this acceptance letter should be included in the appendix of each site-specific Remedial Action Plan that proposes its use.

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. If you have any questions, contact Elena Compton at (850) 245-8911, or through Mail Station 4580 at the letterhead address, or by e-mail at the address below.

Sincerely,



Elena G. Compton, M.S., P.E.
Professional Engineer II
Petroleum Restoration Program Section 2
Elena.Compton@dep.state.fl.us

Enclosure: (1) Proprietary Ingredients Voucher
(2) Supplemental Information

cc: John Wright - FDEP/Tallahassee
Kenneth Busen – FDEP/Tallahassee
Diane Pickett – FDEP/Tallahassee



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Brad Elkins, P.G.
EOS Remediation Incorporated
1101 Nowell Road
Raleigh, North Carolina 27607

Re: **Voucher for Disclosure of Proprietary Ingredients of Edible Oil Substrate
Quick Release (EOS QR)**

Dear Mr. Elkins:

The Division of Waste Management (Division) hereby acknowledges a confidential disclosure by EOS Remediation Incorporated dated November 9, 2015, regarding the proprietary ingredients of Edible Oil Substrate Quick Release (EOS QR).

Having reviewed the food-grade ingredients, which are generally regarded as safe (GRAS) per the list of Everything Added to Food in the United States (EAFUS), and having taken into consideration their low toxicity and rapid biodegradability, the Division has determined that it is not necessary to seek permission for a temporary injection Zone of Discharge (ZOD) pursuant to Rule 62-520.310(8)(c), Florida Administrative Code (F.A.C.), when EOS QR is used for in-situ remediation of contaminated aquifers.

For underground injection control purposes, aquifer remediation plans proposing the use of EOS QR must indicate the volume and complete chemical composition of the fluid to be injected. Since the identities and individual concentrations of the ingredients are proprietary, it will suffice to indicate just the volume and overall concentration of EOS QR to be injected, and provide a footnote indicating that a one-time confidential disclosure dated November 9, 2015 is already on file with the Division. Please direct questions regarding this voucher to Elena Compton at (850) 245-8911 or at Elena.Compton@dep.state.fl.us.

Sincerely,

A handwritten signature in blue ink that reads "Elena G. Compton".

Elena G. Compton, M.S., P.E.
Professional Engineer II
Petroleum Restoration Program Section 2

REGULATORY INFORMATION

- a. Groundwater cleanup standards: The onus shall be on users of Edible Oil Substrate Quick Release (EOS QR) to ensure that all applicable groundwater standards will be met at the time of project completion for the contaminants of concern being remediated, and any by-products produced as a result of chemical or biochemical reactions induced or assisted by EOS QR. 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 62-520, Ground Water Classes, Standards, and Exemptions; Chapter 62-528, Underground Injection Control (UIC), particularly Part V, for Class V, Group 4 aquifer remediation projects; Chapter 62-550, Drinking Water Standards; Chapter 62-777, Contaminant Cleanup Target Levels; Chapter 62-780, Contaminated Site Cleanup Criteria; Chapter 62-782, Dry Cleaning Solvent Cleanup Criteria; and Chapter 62-785, Brownfields Cleanup Criteria.
- b. Injection well permit: 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 [by EOS QR] constitutes the granting of a Class V injection well construction/clearance permit.
- c. Underground Injection Control (UIC): Remedial Action Plans proposing injection-type aquifer remediation shall include the information required by Rules 62-528.630(2)(c)1 through 6, F.A.C., for the purposes of the UIC program. Reviewers of those plans, upon issuance of a Department-enforceable Remedial Action Plan Approval Order must transmit this information to the UIC program in Tallahassee by submitting a completed copy of the "UIC Notification". The notification is in the form of a memorandum currently located on the Internet at www.dep.state.fl.us/waste/categories/pcp/pages/innovative.htm.
- d. General information about temporary Zones of Discharge (ZOD): For groundwater remediation, the composition of a fluid to be injected 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 as follows. Permission for a temporary ZOD may be obtained via Rule 62-520.310(8)(c), F.A.C. If permission for a ZOD cannot be obtained by rule, then 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 covered by all the injection points, located side-by-side with overlapping radii of influence.

- e. Site-specific Remedial Action Plans shall indicate the volume and overall concentration of the aqueous EOS QR that will be injected. EOS QR is typically diluted volumetrically from 4:1 to 10:1 (water:EOS QR) prior to its injection into the subsurface, depending on site conditions.
- f. Specific ZOD information for EOS QR: The Department has given consideration to the biodegradability and the low toxicity of the proprietary food grade ingredients in EOS QR, and has determined that permission for a temporary injection zone of discharge is not necessary. But the Underground Injection Control (UIC) Section still needs to be notified that the EOS QR will be injected, so reviewers, when submitting the UIC Notification (paragraph *c* above) should place a checkmark in the box shown as “☐ No ZOD needed.”
- g. Chloride by-product sampling: Chloride is not an ingredient of EOS QR but rather a by-product of the dechlorination reactions that EOS QR induces or assists (paragraph *a* above) to destroy the chlorinated contaminants of concern at a cleanup site. Sample the groundwater for chloride. By the end of the cleanup, its concentration must not exceed the 250-milligram per liter (mg/L) secondary groundwater standard for chloride.
- h. Utilization of wells: If a remediation site happens to have an abundance of monitoring wells, then the Division of Waste Management has no objection to the use of some wells for the injection of EOS QR solution if the wells are suitable for the purpose. However, no “designated” monitoring well, dedicated to the tracking of remediation progress (by sampling) shall be used to apply EOS QR. This will avoid a premature conclusion that the entire site meets cleanup goals. By making sure that designated tracking wells are not 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.
- i. Two categories of groundwater monitoring:
 - 1. Active remediation monitoring for a cleanup site’s contaminants of concern: During the period of active remediation, groundwater shall be monitored in accordance with the requirements set forth in Section 62-780.700, F.A.C.
 - 2. Post Active Remediation Monitoring for a cleanup site’s contaminants of concern: At least one (1) year of quarterly post remediation groundwater monitoring for the contaminants of concern shall be conducted at a minimum of two (2) wells: one located in the area of highest contamination, the other at the downgradient edge of the contamination plume, pursuant to Section 62-780.750, F.A.C.

j. Operation:

1. Avoidance of migration: For injection-type, in-situ aquifer remediation projects, injection of EOS QR shall be performed in such a way, and at such a rate and volume that no undesirable migration of either the EOS QR or the contaminants of concern in the aquifer results, pursuant to Rule 62-528.630(3), F.A.C.
 2. Underground Injection Control operating permit: Although an operating permit is not required for aquifer remediation wells pursuant to Rule 62-528.640(1)(b), and 62-528.640(1)(c), F.A.C., since no movement of the contamination plume is expected to accompany the treatment process, the Department requests that the information items listed in Rule 62-528.640(1)(b), F.A.C., be considered and included in Remedial Action Plan proposals as a matter of good and thorough design practice. Briefly summarized, they are: quality of water in the aquifer; quality of the injected fluid; existing and potential uses of the affected aquifer; and well construction details.
- k. Abandonment of wells: Upon issuance of a Site Rehabilitation Completion Order or a declaration of "No Further Action", injection wells shall be abandoned pursuant to Section 62-528.645, F.A.C. The Underground Injection Control Section of the Department shall be notified so that the injection wells can be removed from the inventory-tracking list.
- l. Open-pit application: There is no objection to the introduction of EOS QR to an open excavation pit in which the groundwater has been exposed. Open-pit application is not injection, and it is not necessary to notify the Underground Injection Control Section, but this should not be construed as carte blanche to introduce to the pit any substance at any concentration with no regard to potential toxicological effects. The Division of Waste Management therefore recommends that the groundwater in the area of the pit be monitored for the same parameters that would have been monitored (if any) had the application actually been an injection.
- m. Additives: If an additive is used with EOS QR product 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.