



**FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION**

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

RICK SCOTT
GOVERNOR

CARLOS LOPEZ-CANTERA
LT. GOVERNOR

HERSCHEL T. VINYARD JR.
SECRETARY

February 24, 2014

Via Electronic Mail

BrianChew@GeologicRestoration.com

Brian E. Chew, Sr., P.G.
Geologic Restoration, PLLC
11160 Downs Road
Pineville, North Carolina 28134

Re: GR-320-IRC Carbon-Based Injectate (CBI)

Dear Mr. Chew:

The Florida Department of Environmental Protection's Division of Waste Management (Division) hereby accepts GR-320-IRC carbon-based injectate for in situ biodegradation of petroleum hydrocarbons and other suitable contaminants in groundwater and soil. GR-320-IRC is a finely ground activated carbon that does not contain additives. It is typically injected into the subsurface as an aqueous slurry. As you have indicated, GR-320-IRC sequesters the hydrocarbons on contact, and then serves as a substrate for their biodegradation by indigenous bacteria at the cleanup site. The carbon's active surface area is regenerated as the biodegradation process destroys the sequestered hydrocarbons. There are no objections to the use of GR-320-IRC provided the considerations of this letter are taken into account, and a site-specific Remedial Action Plan is submitted for review and approval by the Department. Regulatory information is provided in Enclosure 1.

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 the product or processes 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.

It is not a requirement that a remediation product or process obtain an acceptance from the Department in order to be proposed for use 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 GR-320-IRC, 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 Rick Ruscito at (850) 877-1133, extension 3722, through Mail Station 4590 at the letterhead address or by E-mail at RRuscito@ene.com.

Sincerely,



Rick Ruscito, P.E.
Ecology & Environment, Inc.
Petroleum Restoration Program - Section 6



Sally McGregor
Petroleum Restoration Program

Enclosure: (1) Regulatory Information

c: Robert Cowdery – MS 4575

REGULATORY INFORMATION

- a. Groundwater cleanup standards: The onus shall be on users of GR-320-IRC 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 the GR-320-IRC. The following chapters of the Florida Administrative Code (F.A.C.) are cited: 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; 62-780, 62-782, and 62-785 F.A.C., for cleanup criteria; and Chapter 62-777, F.A.C., for cleanup target levels.
- b. Injection well permit: The issuance of a site-specific Remedial Action Plan Approval Order by the Department for injection of GR-320-IRC into an aquifer constitutes the granting of a Class V injection well permit. [62-528.630(2)(c) and 62-528.640(1)(c), F.A.C.]
- 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 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 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 concentration of the aqueous GR-320-IRC slurry that will be injected.
- f. Specific ZOD information for GR-320-IRC manufactured from Geologic Restoration's source of virgin carbon: From a regulatory standpoint, there is no upper limit to the concentration of aqueous GR-320-IRC slurry that may be injected when the slurry is prepared using Geologic Restoration's source of virgin carbon. There are no ZOD parameters associated with the virgin source of the carbon, and there are no monitoring requirements for the receiving groundwater for ZOD purposes. Nevertheless, it is necessary for reviewers of Remedial Action Plans proposing the injection of virgin GR-320-IRC to notify the UIC Section about the injection by using the UIC Notification memorandum. In the section of the memorandum titled "Temporary Injection Zone of Discharge (ZOD)", reviewers should check the box labeled "No ZOD needed".
- g. Specific ZOD information for GR-320-IRC manufactured from Geologic Restoration's source of re-activated carbon: The maximum concentration of GR-320-IRC slurry that may be injected when the slurry is prepared using Geologic Restoration's source of re-activated carbon is 10.7% (1 pound of GR-320-IRC per gallon of water). Aluminum, a secondary drinking water contaminant in Florida, shall be monitored in the receiving groundwater for ZOD purposes. For the aluminum, reviewers of Remedial Action Plans, when filling out the UIC Notification memorandum, should check the box labeled "*ZOD permission by rule 62-520.310(8)(c), F.A.C., for reagent chemical species and/or parameter(s) in the fluid to be injected (or re-injected) that exceed secondary groundwater standards*". GR-320-IRC slurry prepared using the re-activated source of carbon shall not be injected at concentrations greater than 10.7%, unless a variance as indicated in above paragraph *d* is obtained for heavy metals.
- h. ZOD monitoring advice for GR-320-IRC manufactured from the re-activated source of carbon: For the ZOD parameter aluminum discussed in above paragraph *g*, quarterly monitoring of groundwater should suffice in most cases. The current secondary groundwater standard for is aluminum is 0.2 milligrams per liter (mg/L). Upon expiration of the time period granted for the ZOD by way of rule 62-520.310(8)(c), F.A.C., the concentration of aluminum must meet its groundwater standard or its natural-occurring background value at the specific cleanup site, whichever is less stringent.
- i. 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 GR-320-IRC slurry 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 GR-320-IRC. 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.

j. Three 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.
3. Monitoring of UIC zone of discharge parameters associated with GR-320-IRC: When GR-320-IRC slurry prepared from the virgin source of carbon is used to remediate a site, there are no ZOD parameters associated with GR-320-IRC itself that must be monitored in the groundwater in order to comply with Rule 62-520.310(8)(c), F.A.C. When GR-320-IRC slurry prepared from the re-activated source of carbon is used, aluminum, as discussed in above paragraphs g and h must be monitored.

k. Operation:

1. Avoidance of migration: For injection-type, in situ aquifer remediation projects, injection of GR-320-IRC shall be performed in such a way, and at such a rate and volume that no undesirable migration of either the GR-320-IRC or the contaminants of concern in the aquifer results, pursuant to Rule 62-528.630(3), F.A.C. Geologic Restoration has indicated that unwanted migration can be minimized during a typical application of GR-320-IRC by beginning the application at the exterior of the contamination plume and working inward.
 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.
- l. 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.

- m. Open-pit application: There is no objection to the introduction of GR-320-IRC carbon to an open excavation pit in which the groundwater has been exposed, or to a dry pit whose depth is such that the GR-320-IRC could percolate into the underlying groundwater. 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 zone of discharge parameters that would have been monitored (if any) had the application actually been an injection.
- n. Limitation: Geologic Restoration PLLC does not recommend the use of GR-320-IRC for bulk removal of free product. It is recommended that the bulk of the free product be removed by other means prior to the use of GR-320-IRC.