



Florida Department of Environmental Protection

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

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

February 19, 2009

Don Wilshe
Biobased AG
4237 Cornelius Road
East Bend, North Carolina 27018

Re: RM-103, RM-106 and RM-107

Dear Mr. Wilshe:

The Division of Waste Management (the Division) hereby accepts three Biobased AG cleaning formulations, RM-103, RM-106 and RM-107, for the remediation of petroleum and other suitable contaminants in groundwater and soil, in situ and ex situ. The RM-103 formulation does not contain surfactant; RM-106 contains a nonionic ethoxylate surfactant; and RM-107 contains a nonionic glucoside surfactant. A voucher for the confidential disclosure of the proprietary ingredients in each of the three formulations is provided as Enclosure 1. Regulatory information regarding their use is provided in Enclosure 2, and to aid regulatory agency reviewers, supplemental information is provided in Enclosure 3.

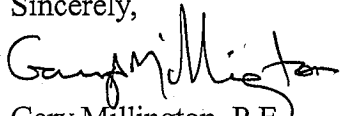
While the Division of Waste Management does not provide endorsement of specific or brand name remediation products or processes, it does recognize the need to determine their acceptability in the context of environmental regulations, protection of public health, and safety. The Division emphasizes a distinction between its regulatory acceptance and an approval, as products and processes are accepted but they are not approved. An acceptance shall not be construed as a certification of performance, nor shall it be construed as a preference on the part of the Division. As is the case with any other remediation product or process, vendors and environmental consulting companies must market them on their own merits in regard to performance, cost, and safety in comparison to competing alternatives in the marketplace.

Remedial Action Plans that propose the use of an accepted product should include a copy of the acceptance letter in the Remedial Action Plan's appendix, and reference it in the text of the document. The Division also emphasizes that it is not a requirement that a particular remediation product or process have an 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.

Don Wilshe
February 19, 2009
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The Division reserves the right to revoke its acceptance of a product or process if it has been falsely or incompletely 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 design details must be provided in a site-specific Remedial Action Plan submitted to the Department for review and approval. Questions about hazardous waste cleanup applications should be directed to Gary Millington, and questions about petroleum cleanup applications should be directed to Rick Ruscito.

Sincerely,



Gary Millington, P.E.
Division of Waste Management
Bureau of Waste Cleanup
Program and Technical Support Section
gary.millington@dep.state.fl.us
(850) 245-7502

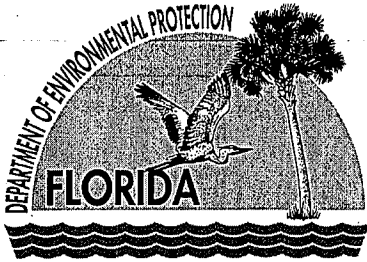


Rick Ruscito, P.E.
Ecology and Environment, Inc.
Bureau of Petroleum Storage Systems
Petroleum Cleanup Section 6
rruscito@ene.com
(850) 877-1133, extension 3722

Enclosures: (1) Proprietary Ingredients Voucher for RM-103, RM-106 and RM-107
(2) Regulatory Information
(3) Supplemental Information
(4) Underground Injection Control Notification Memorandum

c: Tom Conrardy - FDEP/Tallahassee
Rob Cowdery - FDEP/Tallahassee

PROPRIETARY INGREDIENTS VOUCHER

Florida Department of
Environmental ProtectionBob Martinez Center
2600 Blair Stone Road
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GovernorJeff Kottkamp
Lt. GovernorMichael W. Sole
Secretary

February 19, 2009

Don Wilshe
Biobased AG
4237 Cornelius Road
East Bend, North Carolina 27018**Re: Voucher for Disclosure of Proprietary Ingredients for RM-103, RM-106 and RM-107**

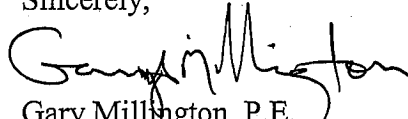
The Division of Waste Management hereby acknowledges the December 8, 2008 confidential disclosure by Biobased AG that lists proprietary ingredients and their proportions in three cleaning formulations for the remediation of petroleum and other suitable contaminants in groundwater and soil, in situ and ex situ. Without divulging any of the proprietary information, RM-103 is a cleaning formulation that does not contain surfactant; RM-106 contains a nonionic ethoxylate surfactant; and RM-107 contains a nonionic glucoside surfactant.

The Division hereby vouches for the content of the confidential disclosure, and indicates that permission for a temporary injection zone of discharge must be granted by way of Rule 62-522.300(2)(c), Florida Administrative Code (F.A.C.), for each formulation when it is used for in situ injection-type aquifer remediation by either direct injection or re-injection. The parameters for which temporary injection zone of discharge permission must be sought are pH and ammonia nitrogen in the case of RM-103, and pH, ammonia nitrogen, and surfactants in the case of RM-106 and RM-107. These parameters are for the application strength of 1.5625% by volume, for which Biobased AG instructs the user to combine 1 gallon of water with 2 liquid ounces of "as-shipped" cleaner concentrate prior to use. This is equivalent to a mixing ratio of 64 parts water to 1 part cleaner by volume prior to use.

Aquifer remediation plans proposing the injection of Biobased AG cleaners must indicate the volume and composition of the fluid to be injected. Since the individual ingredients and their proportions are proprietary, it will suffice to indicate just the overall volumetric concentration of Biobased AG cleaner in the fluid to be injected and the total volume of that fluid, and then provide a footnote indicating that a one-time confidential disclosure dated December 8, 2008 identifying the individual ingredients and their proportions has already been submitted to the Department.

This voucher is issued for the purposes of the Division of Waste Management. Other bureaus, agencies and local governments may choose to recognize this voucher if their needs are similar. The Division of Waste Management, however, is not responsible for applications beyond its jurisdiction. Questions about hazardous waste cleanup applications should be directed to Gary Millington, and questions about petroleum cleanup applications should be directed to Rick Ruscito.

Sincerely,



Gary Millington, P.E.
Division of Waste Management
Bureau of Waste Cleanup
Program and Technical Support Section
gary.millington@dep.state.fl.us
(850) 245-7502



Rick Ruscito, P.E.
Ecology and Environment, Inc.
Bureau of Petroleum Storage Systems
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REGULATORY INFORMATION

1. 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; Chapter 62-522, F.A.C., for groundwater permitting and monitoring requirements; Chapter 62-528, F.A.C., for underground injection control, 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 RM-103, RM-106 and RM107 shall comply with all applicable regulations. This includes meeting applicable groundwater cleanup target levels for the contaminants of concern at a cleanup site, the residual concentrations of the cleaners' ingredients, and any byproducts of concern produced by chemical and biological reactions induced by the ingredients during the timeframe of the cleanup project. For the "ingredients of concern" of these cleaners that are present in excess of their groundwater standards, the timeframe is that which is permitted for a temporary injection zone of discharge.

2. Temporary injection zone of discharge: Based on the information provided by Biobased AG, RM-103, RM-106 and RM-107 cleaners will need permission for a temporary injection zone of discharge. Three situations are discussed below. The first two are in regard to direct injection, and re-injection or re-infiltration of cleaner; the third is in regard to the re-injection or re-infiltration of partially treated contaminants of concern at a cleanup site.
 - a. Direct injection of cleaner: The Division of Waste Management has determined, based on information provided by Biobased AG, that permission for a temporary injection zone of discharge is needed for direct injection of cleaner when the user, prior to injection, combines one (1) volume of the "as-shipped" concentrate with 64 volumes of clean water. Permission for a temporary injection zone of discharge must be sought by way of Rule 62-522.300(2)(c), F.A.C., for pH and ammonia nitrogen when RM-103 is used, and pH, ammonia nitrogen and surfactant when RM-106 and RM-107 are used.
 - b. Re-injection and re-infiltration of cleaner: Permission for a temporary injection zone of discharge must be obtained by way of Rule 62-522.300(2)(c), F.A.C., when the re-injected or re-infiltrated fluid contains Biobased AG cleaner. The parameters associated with the temporary injection zone of discharge are the same as above for a direct injection: pH and ammonia nitrogen when RM-103 is used, and pH, ammonia nitrogen and surfactant when RM-106 and RM-107 are used.
 - c. Re-injection and re-infiltration of a cleanup site's contaminants of concern: If the groundwater contaminants of concern at a site are fully treated to the cleanup target levels of Chapter 62-777, F.A.C., by an aboveground remediation system prior to re-injection or re-infiltration, then it is not necessary to obtain permission for a temporary injection zone of discharge for the contaminants. If, however, the aboveground remediation system only partially treats these contaminants, and the effluent does not meet the cleanup target levels of Chapter 62-777, F.A.C., prior to re-injection or re-infiltration, then it will be necessary to also obtain permission for a temporary injection zone of discharge by way of Rule

62-522.300(2)(c), F.A.C., to re-inject or re-infiltrate the partially-treated contaminants of concern. This would be in addition to the permission that must be sought for the Biobased AG cleaners that will also be present in the re-injection or re-infiltration fluid in paragraph *b* above.

3. Class V injection-type aquifer remediation wells: Per Rule 62-528.630(2)(c) in the December 27, 2005 revision of Chapter 62-528, F.A.C., Class V injection-type aquifer remediation wells are exempt from the permitting requirements of Rule 62-528.635, F.A.C., provided they are authorized under the provisions of a Remedial Action Plan or other enforceable mechanism, and provided that 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. In other words, the issuance of an enforceable, site-specific Remedial Action Plan Approval Order by the Department for injection-type aquifer remediation using Biobased AG cleaners constitutes the granting of a Class V injection well construction/clearance permit.
4. Utilization of wells: If a remediation site happens to have an abundance of monitoring wells, then there is no objection to the use of some wells for the injection of Biobased AG. However, no "designated" monitoring well, dedicated to the tracking of remediation progress (by sampling) shall be used as a treatment point. This will avoid a premature conclusion that the entire site meets cleanup goals. By avoiding the use of designated wells as treatment points, there will be more assurance that cleaner permeated and treated the entire site, and that it did not remain localized just to the immediate area surrounding each treatment point.
5. Avoidance of migration: Per Rule 62-528.630(3), F.A.C., in situ, injection-type aquifer remediation projects shall be conducted in such a way that there is no undesirable migration of either the remediation agents used or the contaminants of concern.
6. 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. The Underground Injection Control Section of the Department shall be notified so that the Class V aquifer remediation wells can be removed from the inventory-tracking list.
7. Open-pit application: The introduction of Biobased AG RM-103, RM-106 and RM-107 to an open excavation pit in which the groundwater has been exposed, or to a dry open pit from which cleaner can percolate into the underlying groundwater is not an injection. For such non-injection applications, notification of the Underground Injection Control Section is not required. This, however, should not be interpreted as *carte blanche* to indiscriminately introduce remediation agents to the subsurface without first giving consideration to the toxicological impacts of their ingredients on the groundwater.

The advice offered by the Division of Waste Management for the addition of remediation reagents to an open pit is to monitor the groundwater as if the application had in fact been an injection and subject to Underground Injection Control regulations. In the case of RM-103, the groundwater should be monitored for pH and ammonia nitrogen, and in the cases of RM-106 and RM-107 it should be monitored for pH, ammonia nitrogen and surfactant. For relatively small pits, after backfilling, the installation of at least one monitoring well in the

center area, for monitoring of the foregoing parameters on a quarterly basis should suffice. Continue the monitoring until each parameter meets its respective groundwater standard or its natural-occurring background level at the site, whichever is less stringent.

SUPPLEMENTAL INFORMATION

1. Underground Injection Control notification: Remediation plans proposing in situ, 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 underground injection control. The regulatory reviewer, upon issuance of an enforceable Approval Order for an injection plan, must notify the Underground Injection Control Section about the injection by using the notification memorandum provided in Enclosure 4, regardless of whether or not the fluid to be injected requires permission for a temporary injection zone of discharge.
2. Obtaining permission for a temporary injection zone of discharge: If a fluid to be directly injected or re-injected into the subsurface is such that the concentration of any of its constituent chemical species does not meet its respective primary or secondary drinking water standard, or its respective minimum groundwater criterion, then permission must be obtained for a temporary injection zone of discharge. In most cases, including those of RM-103, RM-106 and RM-107, such permission can be obtained by way of Rule 62-522.300(c), F.A.C.

In order to obtain permission by way of Rule 62-522.300(c), F.A.C., a site-specific Remedial Action Plan submitted to the Department for review and approval must: (a) identify the chemical species and parameters in the fluid that will need permission for a temporary injection zone of discharge; (b) specify the amount of time that is requested for the temporary injection zone of discharge; (c) specify the size of the zone; and (d) provide for groundwater monitoring of the chemical species for which temporary injection zone of discharge permission is sought. The issuance of an enforceable approval order by the Department for a site-specific Remedial Action Plan that adequately addresses items (a), (b), (c) and (d) above will constitute the granting of permission.

For item (c) above, in most cases, the size of the injection zone for an individual injection point is likely to be equal to the injection radius of influence for that individual point. And when a cluster of closely spaced injection points is used, the size of the injection zone for the entire cluster can usually be illustrated as the composite of all the individual points with their overlapping radii of influence.

For item (d) above, in most cases, monitoring of groundwater on a quarterly basis should suffice. Upon expiration of the time permitted for a temporary injection zone of discharge, either by Rule 62-522.300(2)(c), F.A.C., or by variance, each chemical species and parameter for which the temporary zone was established must meet its respective groundwater water standard, or be no worse than its natural-occurring background level at the cleanup site, whichever is less stringent. The groundwater standards for the injection zone parameters associated with RM-103, RM-106 and RM-107 are as follows: pH, range 6.5 to 8.5; ammonia nitrogen, 2.8 milligrams per liter (mg/L); and surfactants (i.e. foaming agents), 0.5 mg/L.

Additional information about temporary injection zones of discharge can be found in guidance document "BPSS-10, In Situ Chemical Additives", currently located at web page www.dep.state.fl.us/waste/categories/pcp/pages/active.htm.

3. Analysis of groundwater samples for surfactant: Chapter 62-550, F.A.C., refers to surfactants as foaming agents, albeit not all surfactants cause foam. The laboratory method cited in that chapter for their measurement is Standard Method SM 5540. Since the surfactants in RM-106 and RM-107 are of the nonionic type, it is suggested that Standard Method SM 5540D for nonionic surfactant quantification be used.
4. Frequency and application amount: Biobased AG, in its submittal of information to the Division of Waste Management, indicated that the user, prior to injection, prepares a dose of either RM-103, RM-106 and RM-107 cleaner by mixing 1 volume of "as-shipped" cleaner concentrate with 64 volumes of water. The frequency and amount at which this dose is applied either per cubic yard of contaminated soil or aquifer, or per ton of contaminated soil, or per pound of contaminant was not specified. The Division therefore suggests that prospective users contact Biobased AG for advice in regard to the frequency and amount of application for the site-specific conditions of the project at hand.

Memorandum**Florida Department of
Environmental Protection**

TO: Cathy McCarty, P.G.
Florida Department of Environmental Protection
Bureau of Water Facilities Regulation
Underground Injection Control Section - MS 3530
2600 Blair Stone Road, Tallahassee, FL 32399-2400

FROM: _____

DATE: _____

SUBJ: **Proposed Injection Well(s) for In Situ Aquifer
Remediation at a Remedial Action Site**

Pursuant to paragraph 62-528.630(2)(c), F.A.C., inventory information is hereby provided regarding the proposed construction of temporary injection well(s) for the purpose of in situ aquifer remediation at a contaminated site.

Facility name: _____
Facility address: _____
City/County: _____
Latitude/Longitude: _____
FDEP Facility Number: _____

Facility owner's name: _____
Facility owner's address: _____

Well contractor's name: _____
Well contractor's address: _____

Date: _____

Facility name: _____

FDEP facility no.: _____

AFFECTED AQUIFER

Name of aquifer: _____

Depth to groundwater (feet): _____

Aquifer thickness (feet): _____

Areal extent of contamination (square feet): _____

INJECTION WELLS

A site map showing the location and spacing of injection wells, the areal extent of the groundwater contamination plume, and associated monitoring wells is attached. The injection well(s) features are summarized below, and/or a schematic of the injection well(s) is attached.

Direct-push or HSA/Mud rotary (*circle the appropriate well type*)

Diameter of well(s) (i.e., riser pipe & screen) (inches): _____

Total depth of well(s) (feet): _____

Screened interval: _____ to _____ feet below land surface

Grouted interval: _____ to _____ feet below land surface

Casing diameter, if applicable (inches): _____

Cased depth, if applicable: _____ to _____ feet below land surface

Casing material, if applicable: _____

PROJECT DESCRIPTION

The in situ, injection-type aquifer remediation product/process remediates contaminants by:
(check those that apply)

- ☐ bioremediation,
☐ chemical oxidation, or
☐ other (describe) _____

Brief description of the project:

Summary of major design considerations and features of the project:

Number of injection wells: _____

Injection volume per well (gallons): _____

Single or multiple injection events: _____

Injection volume total (all wells, all events): _____

Date: _____

Facility name: _____

FDEP facility no.: _____

FLUID TO BE INJECTED

Composition of injected fluid:

(ingredient, wt. %): _____

TEMPORARY INJECTION ZONE OF DISCHARGE (ZOD)

(check those that apply)

- ☐ No ZOD needed. The fluid to be injected meets the primary and secondary groundwater standards of Chapter 62-550, F.A.C., and the minimum groundwater criteria of Chapters 62-520 and 62-777, F.A.C.
- ☐ ZOD permission by rule 62-522.200(2)(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. ZOD permission by this rule also applies to chemical species in the fluid to be injected that exceed primary groundwater standards or minimum groundwater criteria, provided those species are prime constituents of the reagents used to remediate site contaminants. The list of chemical species and parameters for which the approved Remedial Action Plan identifies zone size, duration and groundwater monitoring are as follows:

- ☐ ZOD permission by rule 62-522.200(2)(c), F.A.C., for the following contaminants of concern that exceed their groundwater standards in the fluid to be re-injected as part of a closed-loop re-injection system for which the approved Remedial Action Plan identifies zone size, duration and groundwater monitoring:

- ☐ ZOD permission by variance because fluid to be injected contains the following impurities that are not prime constituents of the reagents used to remediate the site's contaminants, and the concentration of those impurities in the fluid to be injected are in excess of their primary groundwater standards:

☐ A variance needs to be granted before the remediation can be conducted.

☐ A variance has already been granted for the impurities listed above:

Date variance granted: _____ Zone size (feet): _____ Duration (time): _____

- ◆◆◆
- ☐ If ZOD permission by rule 62-522.200(2)(c), F.A.C., or by variance is checked above, then a figure that delineates the ZOD is attached, or ☐ the ZOD is described as follows:

CLEANUP CRITERIA AND ENFORCEABLE APPROVAL ORDER

In situ injection-type aquifer remediation of the contaminants of concern at this site is intended to meet the groundwater cleanup target levels established for them in accordance with applicable and appropriate chapters of the Florida Administrative Code and cited in the approved Remedial Action Plan. Additionally, all other groundwater standards will be met at the time of project completion for any residuals associated with the ingredients of the injected remediation products, and any by-products or intermediates produced as a result of the chemical or biochemical transformation of those ingredients or the contaminants of concern during their use. Applicable primary and secondary drinking water standards are set forth in Chapter 62-550, F.A.C., and additional groundwater quality criteria are set forth in Chapters 62-520 and 62-777, F.A.C.

The remediation plan estimates that site remediation will take _____ months. We will notify you if there are any modifications to the remediation strategy which will affect the injection well design or the chemical composition and volume of the injected remediation product(s).

The proposed remediation plan was approved on _____ by an enforceable approval order. A copy is attached. The remediation system installation is expected to commence within 60 days. Please call me at _____ if you require additional information.