



Florida Department of Environmental Protection

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

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Mimi A. Drew
Secretary

November 29, 2010

Robert Chickering
Advanced BioCatalytics Corporation
18010 Skypark Circle, #130
Irvine, California 92614

Re: **Accell Clean™**

Dear Mr. Chickering:

The Bureau of Petroleum Storage Systems (the Bureau) hereby accepts Accell Clean™, an oil dispersant that accelerates the biodegradation of petroleum and other organic contaminants by indigenous microorganisms in groundwater and soil, in situ and ex situ. As Advanced BioCatalytics Corporation has indicated, Accell Clean™ is a combination of yeast-derived low molecular weight proteins, and anionic and nonionic surfactants. The proteins alter the functionality of the surfactants to: (1) reduce their surface tension; (2) reduce their interfacial tension; (3) enhance their ability to solubilize oil and grease; and (4) convert a portion of the solubilized oil and grease to surfactant-like compounds. The overall result is an improvement in the cleaning power of the surfactants. Enclosure 1 is a voucher for the confidential disclosure of Accell Clean's proprietary ingredients; Enclosure 2 contains regulatory information; Enclosure 3 contains supplemental information; and Enclosure 4 is an Underground Injection Control Notification

The Bureau of Petroleum Storage Systems does not provide endorsement of specific or brand name remediation products or processes. It does, however, recognize the need to determine their acceptability in the context of environmental regulations, safety and the protection of public health. For that reason, the Bureau issues an "acceptance" letter, not an approval. Such acceptance shall not be construed as a certification of performance, nor shall it be construed as approval for uses that are beyond the Bureau's jurisdiction, which is the cleanup of petroleum pursuant to Chapter 62-770, Florida Administrative Code (F.A.C.). Other government agencies and local governments may choose to recognize this acceptance if their needs and regulations are similar, but this Bureau does not accept responsibility for any applications beyond its own jurisdiction. 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.

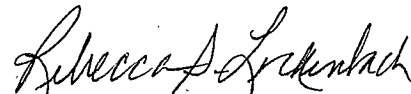
Remedial Action Plans that propose the use of an accepted product or process should include a copy of the acceptance letter in the plan's appendix, and reference it in the text of the document. It is not a requirement that a particular remediation product or process have an official acceptance letter 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 Bureau reserves the right to revoke its acceptance of a product or process if it has been falsely represented. Additionally, Bureau 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. Please contact Rick Ruscito 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

- enc: (1) Proprietary Chemical Ingredients Voucher
(2) Regulatory Information
(3) Supplemental Information
(4) Underground Injection Control Notification

c: T. Conrardy - FDEP/Tallahassee

PROPRIETARY CHEMICAL INGREDIENTS VOUCHER



Florida Department of Environmental Protection

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

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Robert Chickering
Advanced BioCatalytics Corporation
18010 Skypark Circle, #130
Irvine, California 92614

Re: Proprietary Chemical Ingredients Voucher

Dear Mr. Chickering:

The Bureau of Petroleum Storage Systems (the Bureau) hereby acknowledges receipt of a confidential disclosure on July 26, 2010 from Mr. Carl Podella of Advanced BioCatalytics Corporation, identifying the proprietary ingredients and their proportions in Accell Clean™, an oil dispersant that accelerates the biodegradation of petroleum and other organic contaminants by indigenous microorganisms in groundwater and soil, in situ and ex situ. In general, without divulging any of the proprietary information, Accell Clean™ is a combination of yeast-derived low molecular weight proteins, and anionic and nonionic surfactants.

Having reviewed the disclosure, the Bureau hereby vouches for its content, and provides advice in Enclosure 2 on how to comply with applicable groundwater sampling and analytical requirements when Accell Clean™ is used for the cleanup of petroleum pursuant to Chapter 62-770, F.A.C. The Bureau, in offering its advice, mentions only that the surfactants are, in general, of the anionic and nonionic types. As for the required groundwater sampling and analysis of other "ingredients of concern" in Accell Clean™, the Bureau mentions only the ionic species that must be monitored, but not any of the specific information that would compromise the identity of the proprietary molecules that are the source of those ions of regulatory concern.

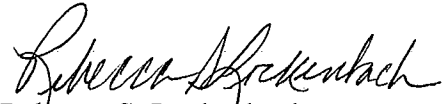
In order to comply with underground injection control requirements, injection-type aquifer remediation plans must specify both the volume and the complete chemical composition of the fluid to be injected. But since the details of the ingredients and their proportions in Accell Clean™ are proprietary, it will suffice to indicate just the total volume of the fluid to be injected, along with the overall concentration of Accell Clean™ in it, and then provide a note to indicate 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 there are any questions, please contact Rick Ruscito at (850) 877-1133, extension 3722.

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

REGULATORY INFORMATION

Since remediation products like those offered by Advanced BioCatalytics Corporation are most often applied by injection for the cleanup of petroleum pursuant to Chapter 62-770, F.A.C., the bulk of the regulatory advice offered below is focused on injection.

- a. Rules: Advanced BioCatalytics Corporation and users of Accell Clean™ shall comply with all applicable regulations. This includes meeting applicable groundwater cleanup target levels during the timeframe of a cleanup project for the contaminants of concern, the residual concentrations of Accell Clean™ ingredients, and any byproducts of concern produced by chemical and biological reactions induced by those ingredients.

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, 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; Chapter 62-550, F.A.C., for primary and secondary drinking water quality standards; Chapter 62-770, F.A.C., for petroleum cleanup criteria; and Chapter 62-777, F.A.C., for cleanup target levels.

- b. Pilot study: For petroleum cleanup, pursuant to Rule 62-770.700(2), F.A.C., it is required that a pilot study proposal be submitted for review, and that a pilot test be performed prior to the design of a full-scale treatment system. If conditions at a site do not warrant a pilot study, then a proposal explaining the rationale to forego it must be submitted for review.
- c. Underground Injection Control permit: 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. Also 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.
- d. Underground Injection Control notification: Remedial Action 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 the Underground Injection Control program. Reviewers of those plans, upon issuance of an enforceable Remedial Action Plan Approval Order by the Department, must submit this inventory information to the Underground Injection Control Section by using the notification memorandum in Enclosure 4.
- e. Temporary injection zone of discharge (ZOD): Permission must be obtained for a temporary injection zone of discharge for Accell Clean™, unless the fluid to be injected contains

0.00018% or less Accell Clean™ by weight (or by volume since the 1.03-1.05 specific gravity of Accell Clean™ is close to that of water, which has a value of 1.0).

Permission for the temporary injection ZOD in the case of Accell Clean™ can be obtained by way of Rule 62-520.310(8)(c), F.A.C., (formerly listed as Rule 62-522.300(2)(c), F.A.C.). Depending on the concentration of Accell Clean™ in the fluid to be injected, ZOD permission may be needed for as many as four parameters: surfactant, ammoniacal nitrogen, sulfate, and sodium. Accell Clean™ itself does not contain any sulfates, but rather sulfonate, all of which the Bureau of Petroleum Storage Systems, for conservative regulatory zone of discharge monitoring purposes, assumes will biodegrade to sulfate. Sodium is listed as a primary groundwater contaminant in Florida, but its permission for a temporary ZOD can be granted by way of Rule 62-520.310(8)(c), F.A.C.; because it is a prime constituent of the reagents used to remediate site contaminants in the case of Accell Clean™. The table below indicates the ZOD trigger concentrations for each of the four parameters of regulatory concern.

Table 1. ZOD Trigger Concentrations for Accell Clean™

If the overall concentration of Accell Clean™ in the fluid to be injected is greater than...	...then ZOD permission via Rule 62-520.310(8)(c), F.A.C., and groundwater monitoring is required for...			
	Surfactant	Ammonia	Sulfate†	Sodium
1.8 mg/L (0.00018% by weight or volume)	X			
2,100 mg/L (0.21% by weight or volume)	X	X		
16,800 mg/L (1.68% by weight or volume)	X	X	X	
38,200 mg/L (3.82% by weight or volume)	X	X	X	X

mg/L denotes milligrams per liter

† Accell Clean™ does not contain sulfates, but rather sulfonate, all of which the Bureau of Petroleum Storage Systems, for conservative regulatory zone of discharge monitoring purposes, assumes will biodegrade to sulfate.

In order to obtain ZOD permission, each site-specific Remedial Action Plan proposing the use of Accell Clean™ must: (a) indicate, per the above table, whether or not the concentrations of surfactant, ammonia and sodium in the fluid to be injected will be in excess of their groundwater standards, and that sulfate, a potential biodegradation product could later be present in the groundwater in excess of its groundwater standard; (b) specify a temporary injection zone size; (c) specify the period of time for which the temporary zone will be needed; and (d) propose groundwater monitoring of the ZOD parameters in accordance with the table above. In most cases, monitoring on a quarterly basis should be sufficient. The number of monitoring wells to be sampled will depend on the size of the area treated, but for most applications a minimum of two (2) wells should suffice: one in the center of the treatment area, the other near the downgradient edge. Zone size for a single injection point, in most cases, is likely to be the same as the point's injection radius of

influence. And for a cluster of injection points, the overall zone size can be defined as the agglomeration of all its individual points.

The current groundwater standards for the Accell Clean™ zone of discharge parameters of interest are: surfactant, 0.5 milligrams per liter (mg/L); ammonia, 2.8 mg/L; sulfate, 250 mg/L; and sodium 160 mg/L. Upon expiration of the time requested for the ZOD, the concentration of any of these four parameters that required a ZOD must meet its respective groundwater standard, or its natural-occurring background value at the site, whichever is less stringent. For the analysis of surfactant, Chapter 62-550, F.A.C., cites Standard Method SM 5540, under which the specific method for anionic surfactant is SM 5540 C, and the specific method for nonionic surfactant is SM 5540 D.

Department issuance of an enforceable, site-specific Remedial Action Plan Approval Order for a Remedial Action Plan that meets the requirements of Rule 62-520.310(8)(c), F.A.C., constitutes the granting of permission for the temporary injection zone of discharge.

- f. Utilization of wells: If a remediation site happens to have an abundance of monitoring wells, then the Bureau of Petroleum Storage Systems has no objection to the use of some wells for the application of Accell Clean™. However, no "designated" monitoring well, dedicated to the tracking of remediation progress (by sampling) shall be used to apply Accell Clean™. This will avoid premature conclusions 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.
- g. Avoidance of migration: Pursuant to Rule 62-528.630(3), F.A.C., for in situ injection-type aquifer remediation projects, injection of remediation fluids such as Accell Clean™ shall be performed in such a way, and at such a rate and volume, that no undesirable migration of either the product's ingredients or the contaminants of concern in the aquifer results.
- h. Abandonment of wells: Upon issuance of a petroleum 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.
- i. Open-pit application: Open-pit application is not an injection, and notification of the Underground Injection Control Section is not required, but the user must still be mindful of groundwater quality. Therefore, for open-pit application, the Bureau suggests that groundwater in the application area be monitored for the same parameters that would have required zone of discharge monitoring, had the application actually been an injection.
- j. Soil-only remediation: There could be situations in which Accell Clean™ might be used for the remediation of cleanup sites where contaminants are located only in the soil above the water table. In those cases, regardless of the method by which Accell Clean™ is applied (injection, tilling, etc.) consideration should be given to the potential for both the Accell Clean™ and the contaminants of concern to percolate or leach into the underlying

groundwater. If the depth of the Accell Clean™ soil application is close to the water table, or the vadose conditions are such that it could percolate or leach into the underlying groundwater, even when the depth of application is shallow with respect to the water table, then the underlying groundwater should be monitored for Accell Clean™ ingredients of concern and the site's contaminants of concern as if the application had actually been a direct injection into the groundwater.

ENCLOSURE 3

Accell Clean™
November 29, 2010

SUPPLEMENTAL INFORMATION

- a. Microorganisms: Accell Clean™ does not contain microorganisms. It is an oil dispersant that accelerates the biodegradation of petroleum and other organic contaminants by indigenous microorganisms that are already present in groundwater and soil at a cleanup site.
- b. pH: As indicated by the Material Safety Data Sheet, the pH of Accell Clean™, as shipped, is in the range of 7.5-8.5.
- c. Dosage and application rate: Contact Advanced BioCatalytics Corporation for advice on site-specific dosages and application rates for Accell Clean™ when using it for the remediation of petroleum and other suitable organic contaminants in groundwater and soil.
- d. Biodegradation: Advanced BioCatalytics Corporation indicates that the ingredients of Accell Clean™ are deemed readily biodegradable.

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: _____ (Note 1.)

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: _____ (Note 2.)

Well contractor's address: _____

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): _____

FLUID TO BE INJECTED

Composition of injected fluid:
(ingredient, wt. %) (Note 3.): _____

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 62-520.310(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. 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 62-520.310(8)(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 62-520.310(8)(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.

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Note 1. This notification memorandum is primarily for use by state technical reviewers, but remediation contractors may fill in all blanks except those labeled "FROM" and "DATE" on page 1, and the "approval date", and "telephone number" blanks in the last paragraph on page 4. Those blanks are filled only by the regulator. In the case that the memorandum form is partially completed by the remediation contractor, the FDEP technical reviewer must verify that the information provided by the contractor is accurate and complete. Local programs are not authorized to approve underground injections into aquifers. Reason: Per agreement with EPA, the FDEP cannot delegate this authority. Local programs, after reviewing a Remedial Action Plan or an injection proposal document, should follow the instructions in the March 16, 2000, memorandum to arrange for Department headquarters' execution of an approval order, and then complete this memorandum.

Note 2. If an injection well installation contractor has not yet been selected, then indicate the name and address of the project's general remediation contractor/consultant.

Note 3. Complete chemical analysis of the fluid to be injected is required by Chapter 62-528, F.A.C. Some remediation products and processes may have already submitted this information at the time of application for acceptance by the Innovative Technology Acceptance Program. For those situations, when completing the Fluid To Be Injected section of this memorandum, it will suffice to indicate: (1) an Innovative Technology Acceptance letter has been issued; (2) the date of the acceptance letter; (3) the acceptance letter contains the chemical analysis, or a voucher for the confidential disclosure of the injected fluid's chemical composition if it is a proprietary formulation; and (4) the fluid will be injected at concentrations that are less than or equal to those cited in the acceptance letter. For products and processes that do not hold an Innovative Technology Acceptance letter, but for which the site-specific Remedial Action Plan provides a complete description of the chemical composition of the fluid to be injected, it will be necessary to enter this information into the Fluid To Be Injected section of this memorandum.