Department of
Environmental Protection

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Jeb Bush
Governor

Colleen M. Castille
Secretary

April 12, 2005

Ms. Lisa Rains
Nature's Finest
853 Mullins Cove Road
Whitwell, Tennessee 37397

Re: **Genisis ™**

Dear Ms. Rains:

The Bureau of Petroleum Storage Systems hereby accepts Genisis ™ WE/F (Water Enzymes) for the bioremediation of petroleum contaminants in soil and groundwater, in situ or ex situ. As you have indicated, Genisis ™ is a three-part system, consisting of natural-occurring microorganisms, macronutrients, and an oxygen boosting biocatalyst.

This acceptance applies only to the regulatory jurisdiction and the remediation needs of the Bureau of Petroleum Storage Systems, which is primarily the cleanup of subsurface petroleum contamination pursuant to Chapter 62-770, Florida Administrative Code (F.A.C.). Other state agencies and local governments may choose to recognize this acceptance if their needs and regulations are similar. This Bureau, however, is not responsible for applications beyond its jurisdiction.

For vadose remediation, where the underlying groundwater will not be affected by the leaching of Genisis ™, there are no special concerns beyond those that would normally need to be addressed in preparing a Remedial Action Plan and conducting a cleanup in accordance with Chapters 62-770 and 62-777, F.A.C. However, for in situ groundwater remediation, via direct injection of Genisis ™ into an aquifer, there are underground injection control regulations that must be observed. Since injection-type, in situ aquifer remediation is likely to be a common application of Genisis ™, the bulk of the regulatory requirements discussed herein will be directed to that topic.

The Bureau recognizes Genisis ™ as a viable product for the remediation of petroleum contaminated sites in Florida. There are no objections to its use provided: (a) the considerations of this letter are taken into account; (b) a site-specific Remedial Action Plan is submitted pursuant to Chapter 62-770, F.A.C., and approved by the Department for each site where the use of Genisis ™ is proposed; and (c) a variance is granted to permit a temporary injection zone of discharge for ammonia nitrogen. The variance is necessary only for those Genisis ™ projects that include the application of macronutrients close to, or below the water table. Additionally, when macronutrients are used close to, or below the water table, the Bureau, as a prudent measure, recommends that the

groundwater be monitored for phosphorus. Some major regulatory considerations that apply to Genisis ™ are discussed in Enclosure 1.

While the Department of Environmental Protection does not provide endorsement of specific remediation products or processes, it does recognize the need to determine their acceptability from an environmental regulation standpoint, and the interests of public health and safety. Vendors must then market the products and processes on their own merits regarding performance, cost, and safety in comparison to competing alternatives in the marketplace. In no way, however, shall this regulatory acceptance letter be construed as Department certification of performance. Additionally, the Department emphasizes a distinction between its regulatory "acceptance" letters and an approval. Products and processes are accepted but they are not approved.

Also, 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 and appropriate rules and regulations, especially those of the Florida Administrative Code pertaining to underground injection control.

Those who prepare Remedial Action Plans are advised to include a copy of this letter in the appendix, and call attention to it in the text of their document. In this way, technical reviewers throughout the state will be informed that you have contacted the Department of Environmental Protection to inquire about the acceptability of Genisis ™. To aid those reviewers, the Bureau of Petroleum Storage Systems provides supplemental information as Enclosure 2.

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. Please contact Rick Ruscito at (850) 877-1133, extension 29, 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

c: T. Conrardy – FDEP, Tallahassee/MS 4530

ENCLOSURE 1

ENVIRONMENTAL AND REGULATORY INFORMATION

a. Groundwater regulations and cleanup standards: The onus shall be on users of Genisis ™ to ensure that all applicable groundwater standards are met at the time of project completion, for the contaminants of concern, any residuals associated with the ingredients of Genisis ™, and any byproducts produced as a result of chemical or biochemical reactions involving those ingredients. The following chapters of the Florida Administrative Code 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; 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; and Chapter 62-777, F.A.C., for cleanup target levels.

   A noteworthy aspect of the minimum criteria set forth in Chapter 62-520, F.A.C., is that it requires groundwater to be free from substances that are harmful to plants, animals, and organisms, and free from substances that are carcinogenic, mutagenic, teratogenic or toxic to human beings. In effect, these "free from" requirements form a catchall. They close what would otherwise be a loophole in the regulations by preventing injection of a potentially harmful product in the event that any of its ingredients is not regulated as a specific primary or secondary drinking water contaminant.

b. Zone of Discharge for ammonia nitrogen macronutrient: As Nature's Finest indicates, Genisis ™ is a three-part system, consisting of natural-occurring microorganisms, macronutrients, and an oxygen boosting biocatalyst. Depending on the specific conditions at a cleanup site, the use the macronutrients component may (or may not) be necessary. Furthermore, as Nature's Finest indicates, the macronutrients can be either Genisis ™ brand or a generic water-soluble 20-10-20 fertilizer, provided the nitrogen source is not urea.

   The Bureau of Petroleum Storage Systems would like to indicate -- regardless of whether the macronutrient source is Genisis ™ or generic -- that a variance must first be granted to permit a temporary injection zone of discharge, <u>if</u> the nitrogen source is ammoniacal, <u>and</u> <u>if</u> it will be applied close to, or below the water table. Instructions and a petition format for a variance that grants a temporary injection zone of discharge for aquifer remediation can be obtained at web page www.dep.state.fl.us/waste/categories/pcp/pages/innovative.htm. The current groundwater standard for ammonia nitrogen, per Chapter 62-777, F.A.C., is 2.8 milligrams per liter.

   If, however, the nitrogen is not ammoniacal, then a variance may not be necessary, but Rule 62-522.300(2)(c), F.A.C., may apply, depending on the type of nitrogen and its concentration. For example, nitrogen introduced in the form of a nitrate must be permitted a temporary zone of discharge by way of Rule 62-522.300(2)(c), F.A.C., <u>if</u> the concentration of the nitrate in the fluid to be injected is greater than the primary drinking water standard of 10 milligrams per liter.

c. Phosphorus and potassium: These macronutrients, which are also present in a 20-10-20 fertilizer, are not regulated groundwater contaminants, but this does not give a user carte blanche to

introduce them to an aquifer without any consideration at all; the minimum groundwater requirements of Chapter 62-520, F.A.C., as mentioned in paragraph *a* above, still apply.

In the case of phosphorus and potassium, the Bureau of Petroleum Storage Systems recognizes that both are essential for life, and that they are relatively benign from a toxicological standpoint. Phosphorus, however, can be a concern from an environmental standpoint when surface waters are nearby, because it can cause excessive undesirable growth of algae.

The Bureau, having given consideration to phosphorus, recommends, as a prudent measure, that it be monitored in the groundwater when macronutrients are applied close to, or below the water table at a remediation site, and that surface water regulations be observed when the situation is such that a nearby surface water body could be affected.

In regard to potassium, another element essential for life, and relatively benign from a toxicological standpoint, the Bureau believes it should not be necessary to monitor its concentration in the groundwater when Genisis ™ brand or a 20-10-20 water-soluble fertilizer is applied close to, or below the water table.

d. Injection well permit: The issuance of a site-specific Remedial Action Plan Approval Order by the Department for injection-type aquifer remediation via Genisis ™ constitutes the granting of a Class V injection well permit. [Ref. Chapter 62-528, F.A.C.]

e. Utilization of wells: If a remediation site happens to have an abundance of monitoring wells, then the Department has no objection to the use of some wells as injection points for Genisis ™. However, no "designated" monitoring well, dedicated to the tracking of remediation progress (by sampling) shall be used as a Genisis ™ injection point. 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.

f. Underground injection control inventory: Remedial Action Plans proposing injection-type, in situ aquifer remediation shall include information pursuant to Rule 62-528.630(2)(c)1 through 6, F.A.C., for the inventory purposes of underground injection control. Per Rule 62-528.630(2)(c), F.A.C., aquifer remediation projects involving injection wells may be authorized under the provisions of a Remedial Action Plan, provided the construction, operation, and monitoring requirements of Chapter 62-528, F.A.C., are met. A memorandum outlining the inventory information about injection-type aquifer remediation projects to be transmitted by Department reviewers to the Underground Injection Control Section is provided as Enclosure 3.

g. Avoidance of migration: For injection-type, in situ aquifer remediation projects, injection of Genisis ™ shall be performed in such a way that no undesirable migration of either its ingredients or the contaminants of concern in the aquifer results, pursuant to Rule 62-528.630(3), F.A.C.

h. 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 Genisis ™ injection wells can be removed from the inventory-tracking list.

ENCLOSURE 2

SUPPLEMENTAL INFORMATION

a. Department of Environmental Protection reviewers of injection-type, in situ aquifer remediation plans, regardless of whether in Tallahassee or district offices, must complete the Enclosure 3 memorandum, whose subject is "Proposed Injection Well(s) for In Situ Aquifer Remediation at a Remedial Action Site". The completed form must be submitted to the Underground Injection Control Section at 2600 Blair Stone Road, Tallahassee, Florida, 32399-2400.

b. General information: The microorganisms component of Genisis ™ are provided in a powdered form; the oxygen boosting catalyst is provided as a liquid; and the Bureau of Petroleum Storage Systems assumes that the water-soluble nutrients are in a dry form. The oxygen boosting catalyst is a concentrate, and the user is directed to first dilute it in the ratio 3 gallons of water to 1 gallon of oxygen booster.

c. Application modes: Nature's Finest indicates that Genisis ™ can be applied in different ways, as long as the method of application is capable of effectively bringing it into contact with the contaminants to be remediated. Genisis ™ can be applied in situ, by direct injection, or infiltration galleries, or ex situ, by irrigation or by directly mixing it into soil that has been excavated. The Bureau of Petroleum Storage Systems would like to add that addition to an open excavation pit is also an in situ option.

d. Contaminant levels: Soils containing up to 60,000 parts per million total petroleum hydrocarbons can be treated.

e. Dosage: Per each cubic yard of contaminated soil to be treated, the components of Genisis ™ are applied as follows: 4 to 6 ounces (by weight) of the powdered microorganisms; 2 to 4 gallons of the oxygen booster; and application of macronutrients to achieve a carbon:nitrogen:phosphorus molar ratio of 100:16:1.

f. Operating conditions: Nature's Finest has provided the range of operating conditions over which Genisis ™ can function. Those conditions are tabulated below.

Parameter	Range
Dissolved Oxygen	1 milligram per liter, or greater
Temperature	35 ^{o}F to 120 ^{o}F
pH	3.0 to 10.5
Microbe count	At least 1,000,000 cells per gram of soil
Molar carbon:nitrogen:phosphorus (C:N:P) ratio	100:16:1

ENCLOSURE 3

Florida Department of

Memorandum **Environmental Protection**

TO: Richard Deuerling, Mail Station 3530
Division of Water Facilities
Underground Injection Control Section
Florida Department of Environmental Protection
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 Rule 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.

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

Site owner's name: _____
Site owner's address: _____
_____
_____
_____

Well contractor's name: _____ (Note 1.)
Well contractor's address: _____
_____
_____
_____

Brief description of the in situ injection-type aquifer remediation project:

_____
_____

Summary of major design considerations and features of the project:

Areal extent of contamination (square feet): _____
Number of injection wells: _____
Composition of injected fluid (Note 2)
(ingredient, wt. %): _____
_____
_____

Injection volume per well (gallons): _____
Single or multiple injection events: _____
Injection volume total (all wells, all events): _____

Site name: _____
FDEP facility no.: _____

A site map showing the areal extent of the groundwater contamination plume, and the location and spacing of injection wells and associated monitoring wells is attached.

The following is a summary description of the affected aquifer:

Name of aquifer: _____
Depth to groundwater (feet): _____
Aquifer thickness (feet): _____

The injection well(s) features are summarized below, and/or a schematic of the injection well(s) is attached.

Direct-push or Conventional *(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 surface
Grouted interval: _____ to _____ feet below surface
Casing diameter, if applicable (inches): _____
Cased depth, if applic.: _____ to _____ feet below surface
Casing material, if applic.: _____

The in situ injection-type aquifer remediation plan for this contaminated site is intended to meet the applicable groundwater cleanup criteria set forth in Chapter 62-777, F.A.C., for the contaminants of concern. 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 Chapter 62-520, 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 that 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.

_____

Note 1. 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 2. Complete chemical analysis of injected fluid is required by Chapter 62-528, Florida Administrative Code. Proprietary formulations shall make confidential disclosure. Injected fluids must meet drinking water standards of Chapter 62-550, F.A.C., unless an exemption or variance has been granted.