



# 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

December 14, 2009

Brian Timmins  
Etec, LLC  
6635 Northeast 59<sup>th</sup> Place  
Portland, Oregon 97218

## Re: **Etec Bioremediation Enhancements**

Dear Mr. Timmins:

The Bureau of Petroleum Storage Systems (the Bureau) hereby updates its acceptance of enhancers offered by Etec LLC (formerly Enzyme Technologies Incorporated) for the bioremediation of petroleum and other suitable contaminants in groundwater and soil, in situ and ex situ. This acceptance is for the Dissolved Oxygen In Situ Treatment (DO-IT) system and four proprietary bioremediation products. Depending on the situation, the items covered by this acceptance may be used either individually or in combinations with each other.

This updated acceptance supersedes all earlier versions. The regulatory advice it offers for compliance with applicable regulations is based on a July 26, 2009 updated confidential disclosure of a proprietary chemical analysis, and an October 9, 2009 supplemental communication by Etec LLC regarding EZT-CBN Custom Blended Nutrients. Enclosure 1 is a voucher for the disclosure.

As Etec has indicated, the DO-IT system is a mechanism for the delivery of oxygen and bioenhancement products to the subsurface for in situ remediation, or to a reactor or soil pile for ex situ applications. The system generates dissolved oxygen levels as high as 40 parts per million. The four bioenhancement products below can be used in conjunction with the DO-IT system.

- o **Custom Blended Nutrients (EZT-CBN)**, per the October 2009 formulation that serves as a blend of macronutrients.
- o **Petroleum Hydrocarbon Bacterial Consortium (EZT-A2)**, a mixture of natural-occurring, non-pathogenic microorganisms.
- o **PetroSolv (EZT-PS)**, a concentrated, biodegradable, fatty-acid based, nonionic biosurfactant.
- o **Enzyme Accelerator (EZT-EA)**, a biosurfactant with the same constituents as EZT-PS but less concentrated.

Brian Timmins  
December 14, 2009  
Page 2

Etec, LLC


To clear up some confusion that has occasionally arisen, the Bureau would like to indicate that a combination known as the **PetroBac bundle** is just a combination of EZT-A2 microbes and EZT-EA biosurfactant, and that a combination known as **EZT-BST** is just a combination of EZT-A2 microbes, EZT-EA biosurfactant and EZT-CBN nutrients.

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.). 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.

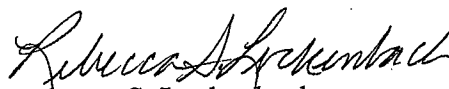
Remedial Action Plans that propose the use of an accepted product or process should include a copy of the acceptance letter in the plan's appendix, and reference it in the text of the document. It is not a requirement that a particular remediation product or process have an official acceptance letter 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. Enclosure 2 contains regulatory information that is applicable to Etec's bioremediation enhancers; Enclosure 3 contains supplemental information; and Enclosure 4 is an Underground Injection Control Notification. 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

Brian Timmins  
December 14, 2009  
Page 3

Etec, LLC

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

c: T. Conrardy - FDEP/Tallahassee

History

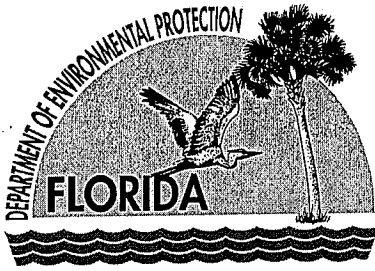
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Inn\_027c.doc - 12/14/09

PROPRIETARY CHEMICAL ANALYSIS VOUCHER



Florida Department of  
Environmental Protection

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

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December 14, 2009

Brian Timmins  
Etec, LLC  
6635 Northeast 59<sup>th</sup> Place  
Portland, Oregon 97218

Re: **Proprietary Chemical Analysis Voucher**

Dear Mr. Timmins:

The Bureau of Petroleum Storage Systems (the Bureau) hereby acknowledges receipt of confidential disclosures containing proprietary information about the biological enhancement products associated with the Dissolved Oxygen In Situ Treatment (DO-IT) system, and a supplemental communication.

The first disclosure of proprietary information, dated March 8, 1999, was submitted by Enzyme Technologies Incorporated, which as of September 8, 2006 became known as Etec LLC. The second disclosure, dated June 26, 2009, is updated information about EZT-A2 Petroleum Hydrocarbon Bacterial Consortium; EZT-PS PetroSolve and EZT-EA Enzyme Accelerator biosurfactants; and a more comprehensive chemical analysis of the original nutrient formulation that is now known as NutriMax. Per an October 9, 2009 supplemental communication from Etec, the new nutrient formulation will be known as EZT-CBN Custom Blended Nutrients, and it has been formulated to serve solely as a source of macronutrients. This supplemental communication identified the ingredients of the new EZT-CBN macronutrients, and their proportions.

Having reviewed the confidential disclosures and the supplemental communication, the Bureau hereby vouches for their content, and provides advice in Enclosure 2 on how to comply with applicable regulations of the Florida Administrative Code (F.A.C.) when Etec's products are used for the cleanup of petroleum pursuant to Chapter 62-770, F.A.C. The Bureau, in offering its advice, has been careful to mention only enough information about the ionic species that must be monitored by users in order to comply with regulations, but not so much information as to compromise the identity of the proprietary molecular ingredients that are the source of the ions of regulatory interest.

For underground injection control purposes, 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 the Etec bioremediation enhancement products are proprietary, it will suffice to indicate just the volume of the fluid to be injected, along with the overall concentration of each Etec product in that fluid, and then provide a note 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.

Reviewers of Remedial Action Plan's proposing the use of Etec's Bioremediation Enhancement products for the cleanup of petroleum-contaminated sites may contact Rick Ruscito at (850) 877-1133, extension 3722.

Sincerely,

*Rick Ruscito*

Rick Ruscito, P.E.  
Ecology and Environment, Inc.  
Bureau of Petroleum Storage Systems  
Petroleum Cleanup Section 6

*Rebecca S. Lockenbach*

Rebecca S. Lockenbach  
FDEP Section Leader  
Bureau of Petroleum Storage Systems  
Petroleum Cleanup Section 6

## REGULATORY INFORMATION

Since chemical and biological remediation products like those offered by Etec LLC are most often applied by injection, the bulk of the regulatory advice offered below is focused on injection.

- a. Rules: Etec LLC and users of Etec's bioremediation enhancement products 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 Etec 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. 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): It is not necessary to seek permission for a temporary zone of discharge for the injection of Etec's Petroleum Hydrocarbon Bacterial Consortium (EZT-A2), and its PetroSolv (EZT-PS) and Enzyme Accelerator (EZT-EA) biosurfactants, but it in most cases it will be necessary to seek such permission for the

injection of its EZT-CBN Custom Blended Nutrients, since the fluid to be injected may not always meet the injection criteria for ammonia, nitrate and total dissolved solids.

Permission for a ZOD for the injection of EZT-CBN Custom Blended Nutrients can be obtained via Rule 62-522.300(2)(c), F.A.C. Depending on the concentration of EZT-CBN in the fluid to be injected, ZOD permission may be needed for as many as three parameters: ammonia, nitrate, and total dissolved solids. The table below indicates the ZOD trigger concentrations for each of the three parameters for the October 2009 formulation of EZT-CBN.

<u>Table 1. ZOD Trigger Concentrations for EZT-CBN</u>			
<u>If the overall concentration of EZT-CBN in the fluid to be injected is greater than...</u>	<u>...then ZOD permission via Rule 62-522.300(2)(c), F.A.C., and groundwater monitoring is required for...</u>		
	<u>Ammonia</u>	<u>Nitrate</u>	<u>Total Dissolved Solids</u>
15.5 mg/L (0.0015% CBN by weight)	X		
71.4 mg/L (0.0074% CBN by weight)	X	X	
500 mg/L (0.05% CBN by weight)	X	X	X

mg/L denotes milligrams per liter

In order to obtain ZOD permission, each site-specific Remedial Action Plan proposing the use of EZT-CBN Custom Blended Nutrients must: (a) indicate, per the above table, whether or not the concentrations of ammonia, nitrate, and total dissolved solids in the fluid to be injected will be in excess of their groundwater standards; (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 EZT-CBN zone of discharge parameters are: ammonia, 2.8 milligrams per liter (mg/L); nitrate, 10 mg/L; and total dissolved solids (500 mg/L). Upon expiration of the time requested for the ZOD, the concentration of any of these three parameters that required a ZOD must meet its respective groundwater standard, or its natural-occurring background value at the site, whichever is less stringent.

Department issuance of an enforceable, site-specific Remedial Action Plan Approval Order for a Remedial Action Plan that meets the requirements of Rule 62-522.300(2)(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 Etec bioremediation enhancements. However, no "designated" monitoring well, dedicated to the tracking of remediation progress (by sampling) shall be used to apply Etec enhancements. 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 Etec's bioremediation enhancement products 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. Phosphate: This element is present in Etec's EZT-CBN Custom Blended Nutrients. It is essential for life, and occurs naturally in Florida's groundwater. It is not regulated as a groundwater contaminant, but it is regulated as a surface water contaminant. At a Panama City, Florida site, total phosphorus in the groundwater was measured at 800 to 1,100 micrograms per liter (ug/L). At a Volusia County site in Florida, it was measured at 1,200 ug/L, as PO<sub>4</sub>. For comparison purposes, the European Community Guide level for phosphorus in drinking water is 400 ug/L, as P<sub>2</sub>O<sub>5</sub>. While phosphorus may not be a matter of great toxicological concern for in situ injection-type groundwater remediation projects, the Bureau of Petroleum Storage Systems would like to remind users of the Etec's EZT-CBN Custom Blended Nutrients that it could become an environmental concern if a surface water body is very close to the treatment area of a remediation site. In such a case, if there is a potential for interaction between the groundwater being treated and the nearby surface water body, then the state's surface water regulations should be reviewed first for requirements regarding phosphorus.
- k. Micronutrient option: For remediation sites at which it has been determined that micronutrients are lacking, the use of the original nutrient formulation that is now known as NutriMax, for which a more comprehensive chemical analysis was provided on June 26, 2009, is still a viable option. Depending on the concentration of NutriMax in the

fluid to be injected, ZOD permission by way of Rule 62-522.300(2)(c), F.A.C., may be needed for as many as eight parameters. The table below indicates the ZOD trigger concentrations for each of these parameters, based on the more comprehensive June 2009 chemical analysis of the original nutrient formula that is now known as NutriMax.

Table 2. ZOD Trigger Concentrations for NutriMax

If the overall concentration of NutriMax in the fluid to be injected is greater than...

...then ZOD permission via Rule 62-522.300(2)(c), F.A.C.; and groundwater monitoring is required for...

		<u>Ammonia</u>	<u>Nitrate</u>	<u>Total Dissolved Solids</u>	<u>Manganese</u>	<u>Iron</u>	<u>Molybdenum</u>	<u>Zinc</u>	<u>Copper</u>
17.3 mg/L (0.0017 wt%)		X							
70.0 mg/L (0.0070 wt%)		X	X						
500 mg/L (0.05 wt%)		X	X	X	X				
3,000 mg/L (0.3 wt%)		X	X	X	X	X			
3,500 mg/L (0.35 wt%)		X	X	X	X	X	X		
50,000 mg/L (5 wt%)		X	X	X	X	X	X	X	
100,000 mg/L (10 wt%)		X	X	X	X	X	X	X	X

mg/L denotes milligrams per liter

Any parameter listed in the table above, for which a temporary ZOD is permitted by way of Rule 62-522.300(2)(c), F.A.C., must, upon expiration of the temporary time period meet its Florida groundwater standard, or the natural-occurring background value of that parameter at the site, whichever is less stringent. The Florida groundwater standard for each micronutrient parameter of concern in NutriMax is listed below.

Table 3. Florida Groundwater Standards for Micronutrient Chemical Species of Concern in NutriMax

<u>Ammonia</u>	<u>Nitrate</u>	<u>Total Dissolved Solids</u>	<u>Manganese</u>	<u>Iron</u>	<u>Molybdenum</u>	<u>Zinc</u>	<u>Copper</u>
2.8	10	500	0.05	0.3	0.035	5	1

Units associated with values in this table are milligrams per liter (mg/L).

1. Advice on identifying zone of discharge (ZOD) parameters for direct injection and re-injection of EZT-CBN Custom Blended Nutrients and NutriMax nutrients.
  - a. Direct injection: A direct injection, in the context of this discussion, is the injection of a remediation fluid into the subsurface for the purpose of performing groundwater and/or

soil remediation as it travels away from the point of injection, with no intention of recovering either some or all of that fluid and bringing it back to the surface. For a direct injection of EZT-CBN Custom Blended Nutrients (or NutriMax) at a given concentration, the user needs only to look up in Tables 1 and 2 above the parameters for which a temporary injection zone of discharge is required.

- b. Re-injection: A re-injection loop (or recirculation loop) consists of one or more re-injection wells and one or more recovery wells and pumps, configured in such a way that they form a hydraulic circuit in which groundwater recirculates. The aboveground portion of the circuit, in its simplest form, may be nothing more than a pipe that connects the recovery wells to the re-injection wells, and in more complicated arrangements it might contain process equipment items such as air strippers, granulated activated carbon vessels, oxygen infusers, and metering pumps for the introduction of fresh remediation reagents. The underground portion of the circuit is formed by the aquifer itself.

The number of parameters for which a temporary zone of discharge is required during a re-injection will depend on the composition of the fluid to be re-injected. In the case of Etec's bioremediation enhancements, it is the concentration of the EZT-CBN Custom Blended Nutrients (or NutriMax) and the concentrations of any petroleum or other contaminants of concern that are present in excess of their cleanup target levels. A number of factors, however, can affect the composition; for example: whether the petroleum or other contaminants of concern in the recovered fluid are fully, partially, or not at all removed by an aboveground treatment system prior to re-injection; whether the recovered fluid is amended by a metering pump that continuously adds a small volume of fresh EZT-CBN Custom Blended Nutrients (or NutriMax) prior to re-injection, or whether it is amended only periodically by adding a large batch of fresh EZT-CBN Custom Blended Nutrients (or NutriMax); and whether the EZT-CBN Custom Blended Nutrients (or NutriMax) are totally consumed by the time they have completed their travel through the underground portion of the circuit, thereby affecting the concentrations of them that will be present in the recovered and re-injected fluids.

If the concentrations of EZT-CBN Custom Blended Nutrients (or NutriMax) and the petroleum or other contaminants of concern in the fluid to be re-injected are known with certainty, then use the known composition to determine which chemical species are in need of a temporary zone of discharge.

But if the chemical composition of the fluid to be re-injected cannot be known with certainty, or it may vary, then it might be necessary to make some simplifying assumptions in order to conservatively identify the chemical species that might be in need of a temporary zone of discharge. For example, for the re-injection of EZT-CBN Custom Blended Nutrients, given that the only parameters of concern are ammonia, nitrate, and total dissolved solids, the simplest approach might be to conservatively assume that all three will be present, at concentrations in excess of their groundwater standards, in the fluid to be re-injected, and to seek a temporary zone of discharge for the re-injection of all three of them, and also for the re-injection of all the petroleum or other contaminants of concern at the site. A similar simplified approach can be taken for the re-injection of

NutriMax, albeit there are seven parameters in that case, plus all of the petroleum or other contaminants of concern that might be re-injected.

Lastly, if a simplifying approach other than that of the example above is used to conservatively identify the number of chemical species for which a temporary injection zone of discharge is sought, then the site-specific Remedial Action Plan proposing the simplified approach should indicate the assumptions on which it is based, and explain how those assumptions produce a conservative list of chemical species for which a temporary zone of discharge will be sought pursuant to Rule 62-522.300(2)(c), F.A.C.

## SUPPLEMENTAL INFORMATION

- a. Distinguishing features: In order to ensure that sufficient oxygen is available for in situ biodegradation to occur, Etec's Dissolved Oxygen In Situ Treatment system (DO-IT) uses an aboveground air separator to produce pure oxygen, to saturate its injection fluids with as much as 40 parts per million oxygen.
- b. Microorganisms: Etec LLC, formerly Enzymes Technologies Incorporated, has indicated that its Petroleum Hydrocarbon Bacterial Consortium product EZT-A2 contains only microorganisms that are naturally-occurring (not genetically engineered) and non-pathogenic (do not cause disease).
- c. Dosage: Etec has indicated that the exact dosage of its products will vary from site to site, depending on the volume of contaminated media and the mass of contaminants present. Therefore, no rule-of-thumb guidance is offered by the Bureau of Petroleum Storage Systems on this subject in the case of these products. Each site-specific Remedial Action Plan proposing the use of the Etec products, however, must indicate the amount and overall concentrations of the products to be injected, and must reference this acceptance letter and its voucher for the disclosure of proprietary ingredients, in order to comply with underground injection control requirements.
- d. Limitations: Direct application of the Etec products for in situ treatment of free product is not recommended, although they may be used to augment free product recovery efforts and to treat water which has become contaminated as a result of contact with free product. Also, the DO-IT system may not be suitable for in situ treatment of low permeability clay. If there are any doubts about the suitability of the process for a particular site, then a measurement of the permeability or a pilot test may be helpful in making a decision. Etec has also indicated that permeability is not a factor in the ex situ treatment of clay since excavation increases the porosity.

**Florida Department of  
Environmental Protection**  
**Memorandum**

TO: Cathy McCarty, P.G.  
Bureau of Water Facilities Regulation  
Underground Injection Control Section – MS 3530

FROM: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

DATE: \_\_\_\_\_

SUBJECT: **Proposed Injection Well(s) for In Situ Aquifer  
Remediation at a Petroleum 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 petroleum-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: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**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 petroleum 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. %): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**TEMPORARY INJECTION ZONE OF DISCHARGE (ZOD)**

(check those that apply)

- No ZOD needed. The fluid to be injected meets the primary and secondary drinking water standards set forth in Chapter 62-550, F.A.C., and the minimum groundwater quality criteria set forth in Chapters 62-520 and 62-777, F.A.C.
- ZOD permission by paragraph 62-522.300(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 paragraph 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 remediation plan identifies zone size, duration and groundwater monitoring are as follows:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- ZOD permission by paragraph 62-522.300(2)(c), F.A.C., for the following petroleum products' 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 remediation plan identifies zone size, duration and groundwater monitoring:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- ZOD permission by variance because the 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 concentrations 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 (square feet): \_\_\_\_\_

Duration (months): \_\_\_\_\_

- If ZOD permission by paragraph 62-522.300(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: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Cathy McCarty, P.G.  
Page 4 of 4  
Date: \_\_\_\_\_

Facility name: \_\_\_\_\_  
FDEP facility no.: \_\_\_\_\_

### **CLEANUP CRITERIA AND ENFORCEABLE APPROVAL ORDER**

The in situ injection-type aquifer remediation plan for this petroleum contaminated site is intended to meet the groundwater petroleum cleanup criteria referenced in Chapter 62-770, F.A.C. 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 contaminating petroleum product 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.