

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

August 8, 2007

Erik R. Piatt
EN Rx Incorporated
16350 Park Ten Place, Suite 221
Houston, Texas 77084

Re: **CHEMRED**

Dear Mr. Piatt:

The Florida Department of Environmental Protection (Department) hereby reaffirms and updates its original June 2, 2006 acceptance of an EN Rx Incorporated in situ groundwater and soil remediation product for the immobilization of metals and treatment of other suitable contaminants. The formulation of the product has not changed, only its name: it is now known as **CHEMRED**. As EN Rx has indicated, **CHEMRED** is a proprietary multi-cationic, polysulfide solution that reacts with metals to form, in most cases, an immobile metal sulfide that is essentially insoluble over the pH range of 4 to 10. In the case of Chrome (VI), a reduction to Chrome (III) occurs first, and is followed by the production and precipitation of immobile chromium hydroxide. Also, as EN Rx has indicated, **CHEMRED** can be used for the remediation of perchlorates such as ammonium perchlorate and sodium perchlorate. Enclosure 1 is a voucher for the confidential disclosure of the proprietary proportions of the ingredients in **CHEMRED**.

Since **CHEMRED** contains some chemical species that are themselves subject to groundwater quality regulations, it will be necessary to monitor the groundwater for these species when **CHEMRED** is used. Depending on the chemical constituents of the contaminants being treated, it may also be necessary to monitor the groundwater for by-products. For example, the monitoring of chloride when perchlorate-type contaminants are being treated. Additionally, if **CHEMRED** is injected, then underground injection control regulations apply. Since most applications are anticipated to be of the injection type, the bulk of the regulatory requirements discussed herein are associated with underground injection control.

The Department recognizes **CHEMRED** as a viable product for the immobilization of metals and the remediation of other suitable contaminants. 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 addresses the requirements of Rule 62-522.300(2)(c), Florida Administrative Code (F.A.C.), to permit a temporary zone of discharge for **CHEMRED** ingredients that do not meet injection standards; and (c) the Remedial Action Plan is approved by the Department. For **CHEMRED**, the major regulatory considerations are set forth in Enclosure 2, and supplemental information is provided as Enclosure 3.

While the Florida Department of Environmental Protection does not provide endorsement of specific or brand name remediation products or processes, it does recognize the need to determine their

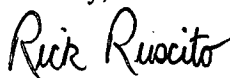
acceptability from an environmental standpoint with respect to applicable rules and regulations, and the interests of public health and safety. Vendors must then market the products and processes on their own merits regarding performance, cost and safety against competing alternatives in the marketplace. In no way, however, shall this regulatory letter of acceptance be construed as certification of product performance. Additionally, the Department emphasizes a distinction between its regulatory "acceptance" and an approval. Products and processes are accepted, not approved.

Those who prepare Remedial Action Plans may include a copy of this letter in the appendix of plans they submit. In this way, reviewers throughout the state will be informed that you have requested a regulatory evaluation of CHEMRED. The Department, however, would like to emphasize that such an evaluation prior to the preparation and submittal of a site-specific Remedial Action Plan proposing the use of any product or process is not a requirement. However, the plan must identify and address all applicable and appropriate rules and regulations to which the product or process is subject.

This letter is not intended to imply, and nothing should be construed from it, that a site at which this product is used could qualify for final closure without institutional and/or engineering controls being applied to the property. Such controls would pertain to the contaminants in soil or groundwater that are the intended targets of this stabilization product.

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 Remedial Action Plans proposing the product or process. You may contact me 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



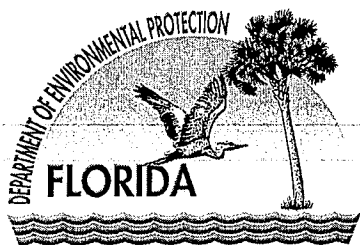
Rebecca S. Lockenbach
FDEP Section Leader
Bureau of Petroleum Storage Systems
Petroleum Cleanup Section 6

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

c: Tom Conrardy - FDEP/Tallahassee

History:
ppl #298
inn_147.doc
6/2/06

ppl #331
inn_147a.doc
8/8/07



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Erik R. Piatt
EN Rx Incorporated
16350 Park Ten Place, Suite 221
Houston, Texas 77084

Re: Voucher for Disclosure of Proprietary CHEMRED Information

Dear Mr. Piatt:

The Florida Department of Environmental Protection hereby re-acknowledges a May 2, 2006 confidential disclosure by EN Rx Incorporated, describing the proprietary aspects of an in situ groundwater and soil remediation product for the immobilization of metals and treatment of other suitable contaminants. The formulation of the product has not changed, only its name: it is now known as CHEMRED. Having reviewed the disclosure, the Department hereby vouches for its content.

Without divulging any proprietary aspects of the product, we now provide the minimum amount of information necessary to prospective users, in order for them to meet the requirements of Rule 62-522.300(2)(c), Florida Administrative Code (F.A.C.). This rule requires that a Department-approved Remedial Action Plan, for injection-type aquifer remediation, indicate an injection zone of discharge size and duration for any primary and secondary groundwater standards, and any minimum groundwater criteria that will not be met by the fluid to be injected. It also requires that the Department-approved Remedial Action Plan include groundwater monitoring of those chemical species that do not meet their standards.

For the ingredients of CHEMRED itself, the chemical species and parameters to be monitored are pH and total dissolved solids. For sodium hydroxide, which may be used, depending on site conditions, to temporarily raise the pH of the groundwater, sodium and pH must be monitored. Additionally, depending on the type of contaminants being remediated at a site, and the by-products of the reaction between those contaminants and CHEMRED, it may be necessary (or at least prudent) to monitor the concentration of any by-product of regulatory interest whose concentration could temporarily exceed its respective groundwater standard. The onus shall be on EN Rx Incorporated and those who submit Remedial Action Plans proposing CHEMRED to identify such by-products and to propose groundwater monitoring for them.

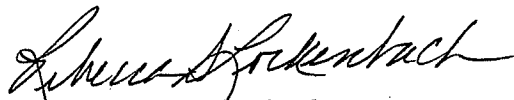
For underground injection control purposes, aquifer remediation plans proposing the use of CHEMRED must indicate the volume and composition of the fluids to be injected. Since the proportions of the ingredients are proprietary, it will suffice to indicate just the overall volume of CHEMRED to be injected (and the overall volume of sodium hydroxide as well, if it will be used) and provide a footnote indicating that a one-time confidential disclosure dated May 2, 2006, identifying the upper limits of their concentrations, has already been submitted to the Department.

This voucher is issued solely for the purposes of the Florida Department of Environmental Protection, for the remediation of contaminated sites. Other state agencies and local governments may choose to recognize this voucher if their needs are similar. This Department, however, is not responsible for applications beyond its jurisdiction. Please direct any questions regarding this voucher to 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

- a. Groundwater regulations affecting the execution of a cleanup: The onus shall be on users of CHEMRED to ensure that all applicable and appropriate groundwater rules and regulations are observed during the cleanup of a site. Applicable chapters of the Florida Administrative Code include but are not necessarily limited to Chapter 62-522, F.A.C., Groundwater Permitting and Monitoring Requirements, and Chapter 62-528, F.A.C., Underground Injection Control, particularly Part V, for Class V, Group 4 aquifer remediation projects.
- b. Cleanup criteria and cleanup program rules: In regard to cleanup criteria, one or more chapters of the Florida Administrative Code may apply, depending on the type of contaminants being remediated, the type of program under which they are being remediated, whether unconditional cleanup criteria will apply, or whether conditional cleanup criteria involving institutional and/or engineering controls will apply. Applicable chapters of the code include but are not necessarily limited to the following: Chapter 62-520, F.A.C., Groundwater Classes, Standards and Exemptions; Chapter 62-550, F.A.C., Drinking Water Standards, Monitoring and Reporting; Chapter 62-770, F.A.C., Petroleum Contamination Site Cleanup Criteria; Chapter 62-777, F.A.C., Contaminant Cleanup Target Levels; Chapter 62-780, F.A.C., Contaminated Site Cleanup Criteria; Chapter 62-782, F.A.C., Dry Cleaning Solvent Cleanup Criteria; and Chapter 62-785, F.A.C., Brownfields Cleanup Criteria.
- c. Injection well permit: The issuance of a site-specific Remedial Action Plan Approval Order by the Florida Department of Environmental Protection for the injection of CHEMRED into an aquifer constitutes the granting of a Class V injection well permit. [62-528.630(2)(c) and 62-528.640(1)(c), F.A.C.]
- d. Groundwater injection standards: For in situ aquifer remediation, pursuant to Chapter 62-528, F.A.C., the composition of an injected fluid must meet the drinking water standards set forth in Chapter 62-550, F.A.C., and the general minimum groundwater criteria described in Chapter 62-520, F.A.C. The minimum groundwater criteria for specific chemical species set forth in Chapter 62-777, F.A.C., also apply. The Department, having considered the chemical constituents and physical properties of CHEMRED, has determined that Rule 62-522.300(2)(c), F.A.C., should apply to pH and total dissolved solids. For sodium hydroxide, which may also be used, depending on site conditions, to temporarily raise the pH of the groundwater, the rule shall apply to pH and sodium.

In order to comply with rule 62-522.300(2)(c), F.A.C., a site-specific remediation plan proposing CHEMRED must be submitted to the Department for approval and must: (a) for the CHEMRED itself, identify pH and total dissolved solids as parameters that may temporarily exceed their groundwater standards; (b) for sodium hydroxide, if it will be used, identify pH and sodium as parameters whose groundwater standards could be temporarily exceeded; (c) indicate the size and duration of the temporary zone of discharge for the preceding parameters; and (d) propose groundwater monitoring for those parameters. Additionally, depending on the particular contaminant(s) being remediated, it

may be necessary (or at least prudent) to monitor the groundwater for by-products of regulatory interest. For example, the monitoring of ammonia, sulfate and chloride when ammonium perchlorate is being remediated, or the monitoring of sodium and chloride when sodium perchlorate is being remediated using CHEMRED. Since the Department cannot foresee every conceivable contaminant that may be suitable for remediation by CHEMRED, and their by-products of regulatory interest, the onus shall be on EN Rx and those who submit Remedial Action Plans proposing CHEMRED to identify such by-products and to propose groundwater monitoring for them.

- 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 for the application of CHEMRED. However, no "designated" monitoring well, dedicated to the tracking of remediation progress (by sampling) shall be used to apply CHEMRED. 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. Groundwater monitoring:
 - 1. Active remediation monitoring for contaminants of concern: Active remediation groundwater monitoring should be conducted in accordance with the provisions of an approved site-specific Remedial Action Plan for the contaminants of concern.
 - 2. Post remediation monitoring for contaminants of concern: During the period of post active remediation, groundwater monitoring for contaminants of concern shall be conducted in accordance with the provisions of an approved site-specific Remedial Action Plan.
 - 3. Monitoring of CHEMRED ingredient parameters for underground injection control purposes: Pursuant to Rule 62-522.300(2)(c), F.A.C., the monitoring of pH, total dissolved solids, and sodium as well, if sodium hydroxide is used to raise the pH of the groundwater, must be addressed in a site-specific, Department-approved Remedial Action Plan, and those parameters monitored, as discussed in paragraph *d* above.
- g. Underground injection control inventory: Remedial Action Plans proposing injection-type, in situ, injection-type 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 plans, to be transmitted by Department reviewers to the Underground Injection Control Section, is provided as Enclosure 4.

- h. Avoidance of migration: For injection-type, in situ aquifer remediation projects, injection of CHEMRED 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, pursuant to Rule 62-528.630(3), F.A.C.
- i. Abandonment of wells: Upon issuance of a Site Rehabilitation Completion Order, or a declaration of "No Further Action", injection wells shall be abandoned pursuant to Section 62-528.645, F.A.C. The Underground Injection Control Section of the Department shall be notified so that the injection wells can be removed from the inventory-tracking list.
- j. Institutional and/or engineering controls: This letter is not intended to imply, and nothing should be construed from it, that a site at which this product is used could qualify for final closure without institutional and/or engineering controls being applied to the property. Such controls would pertain to the contaminants in soil or groundwater that are the intended targets of this stabilization product.

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 fill in the blanks on the Enclosure 4 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. Dosage and parameters: Site-specific information about groundwater chemistry, dissolved metals, natural-occurring background demand, and other contaminants of concern is needed to calculate a CHEMRED dosage. It is therefore advised that prospective users of CHEMRED contact EN Rx in regard to determination of a site-specific dosage and application rate.

Memorandum**Florida Department of
Environmental Protection**

TO: Richard Deuerling, Mail Station 3530
Division of Water Resource Management
Underground Injection Control Section
Florida Department of Environmental Protection
2600 Blair Stone Road, Tallahassee, FL 32399-2400

FROM: _____ [see 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.

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

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

Well contractor's name: _____ [see Note 2.]

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 [see Note 3.]

(ingredient, wt. %): _____

Injection volume per well (gallons): _____

Single or multiple injection events: _____

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

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 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: _____

The in situ injection-type aquifer remediation plan for this contaminated site is intended to meet the groundwater cleanup criteria set forth in Chapter 62-777, 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 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 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.

Note 1. Local programs are not authorized to approve underground injections into aquifers. Reason: Per agreement with the USEPA, the FDEP cannot delegate this authority. Local programs, after reviewing a Remedial Action Plan or an injection proposal document, should prepare the Approval Order and route it to Tallahassee for Bureau Chief's signature, and then complete this form. This form is primarily for use by state and local program 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. Those blanks should be completed only by a state or local program reviewer.

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 injected fluid is required by Chapter 62-528, F.A.C. Proprietary formulations shall make confidential disclosure. Injected fluids must meet drinking water standards of Chapter 62-550, F.A.C., unless a zone of discharge is permitted by way of rule 62-522.300(2)(c), F.A.C., or a variance.