

March 8, 1999

Mr. Melvin Bernstein
Advanced Solutions for Environmental Treatment
726 Loma Verde Avenue
Palo Alto, CA 94303

Re: X-19 Bioremediation Product

Dear Mr. Bernstein:

The Bureau of Waste Cleanup hereby accepts X-19 as an innovative product for the remediation of many types of organically based contaminated soils. From the information provided, this product is microbiological humic polymer consisting of a proprietary combination of naturally occurring, non-engineered, non-pathogenic bacteria, fungi and other soil microorganisms, with nutrients of nitrogen, phosphorus, potassium and other plant food elements.

It is our understanding that this product will be used only for soil remediation projects in the vadose zone and will not be applied onto or injected into the groundwater. The process consists of excavating soils, mixing X-19 product with these excavated soils and creating soil piles approximately 4 feet in height. The soil piles are covered with visqueen and are allowed to incubate until the applicable soil cleanup target levels have been achieved.

The department has no objection to the use of X-19 for the remediation of contaminated soils in Florida. There are three chapters of the Florida Administrative Code (F.A.C.) that are worth mentioning with respect to soil remediation and soil cleanup goals. Chapter 62-770, F.A.C., sets forth cleanup criteria for petroleum contaminated sites, Chapter 62-785, F.A.C., sets forth cleanup criteria for brownsfield sites, and Chapter 62-775, F.A.C., sets forth clean soil criteria for soil thermal treatment facilities. Although Chapter 62-775, F.A.C. is not directly applicable to this treatment technology, this rule may be helpful as a reference. Please note that treated soil which will be used as clean fill may be subject to local requirements that may be more stringent than those set forth by the department.

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While the 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, safety, and welfare. Vendor's must then market the products and processes on their own merits regarding performance, cost, and safety in comparison to competing alternatives in the marketplace.

Department acceptance of any particular remediation product or process does not imply it has been deemed applicable for all cleanup situations, or that it is preferred over others in any particular case. A site specific evaluation of applicability and cost-effectiveness must be considered for any product or process each time a remedial action plan is prepared for a site, regardless of whether conventional or innovative methods will be used. The plan should also include adequate site specific design details.

Preparers of remedial action plan documents may wish to include a copy of this letter in the appendix of plans they submit 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 environmental acceptability of this process. To aid those reviewers some pertinent items are listed below. All of these items are conditional and may or may not be applicable to each specific remedial action plan. It is the responsibility of the preparer and reviewer of a remedial action plan to determine the applicability and necessity of each of these items.

- a. Concentration of applied X-19: Typical treatment percentages include roughly a 30 percent mix ratio of X-19 additive to contaminated soil. The expected volume increase by the addition of X-19 is around 5 percent.
- b. Impermeable liner: Depending on site conditions, it may be necessary to include an impermeable liner below the soil piles. This liner will act to inhibit any leachate from migrating to the surface soils and will separate the clean virgin soils on the surface from the contaminated soils in the soil piles.

- c. Groundwater monitoring: The department may require groundwater monitoring of certain primary and secondary drinking water parameters around the treatment cells. This requirement will vary depending on factors such as: potential for leaching, depth to groundwater, and any other pertinent conditions.
- d. Byproducts of bioremediation process: Petroleum contaminants are expected to be completely mineralized to carbon dioxide and water. In the case of chlorinated compounds, the byproducts are carbon dioxide, water and a chloride salt or mineral.
- e. Fate of X-19 with respect to final disposition of treated soil: In the interest of protecting the groundwaters of the state, it shall be the responsibility of the users of X-19 to ensure that appropriate quantities of this product will be used so as to not cause a leachability threat to groundwater upon final disposition of the treated soil. No regulated ingredients of the product or contaminants of concern shall leach into the underlying groundwater in concentrations that cause a violation of the primary and secondary drinking water parameters set forth in Chapter 62-550, F.A.C., or the minimum criteria for groundwater set forth in Chapter 62-520, F.A.C.
- f. Moisture content: The X-19 product is shipped at a moisture content of about 25 percent. After X-19 is added to the soil piles, the moisture content is increased to 28-30 percent. This may vary, depending upon the nature of the soil at the site. Sandy soils will have a lower moisture content than soils with a high organic content.
- g. Runoff: As a matter of good practice, the necessary and appropriate steps shall be taken to ensure that stockpiles of contaminated soil treated with the X-19 product will not cause a runoff problem. A visqueen cover is recommended by the manufacture to preclude stormwater runoff and to maintain optimal operating conditions.
- h. Air emissions: Since the degree of contamination will vary from site to site, the need for air emissions control may need to be assessed on a site to site basis. However, the bureau believes that air emissions for the X-19 treatment process are not likely to be a problem at most sites. The soil treatment

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pile will be covered with a visqueen cover to minimize air emissions.

The department reserves the right to revoke its acceptance of this process if the nature or composition of either or any of its principal or proprietary ingredients, or the performance of the process, has been falsely represented. You may contact me at 850/488-3935.

Sincerely,

Bill Neimes, P.E.
Bureau of Waste Cleanup

cc: Rick Ruscito - Innovative Technology Coordinator
Bureau of Petroleum Storage Systems

Paul Gill - X-19 Biological Products
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