

Florida Department of Environmental Protection

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

Rick Scott
Governor

Jennifer Carroll
Lt. Governor

Herschel T. Vinyard Jr.
Secretary

January 30, 2012

Tom L. Maleck
Cross-Fire Soil Remediation, LLC
1012 Frank Street
Galesburg, Illinois 61401

Re: Cross-Fire Thermal Destruction Technology

Dear Mr. Maleck:

The Bureau of Petroleum Storage Systems hereby accepts mobile Cross-Fire Thermal Destruction Technology for the onsite, ex situ, thermal treatment of petroleum contaminated soil. As you have indicated, the patented Cross-Fire system brings petroleum contaminated soil directly into contact with the 2,000-2,900 degree Fahrenheit flame of 8 propane burners. Under these conditions, the petroleum is not just volatilized but also destroyed by burning, thereby eliminating the need for afterburners. In this way, in a single step, the Cross-Fire system serves as both a soil treatment system and its own air emissions control device. Regulatory information is provided in Enclosure 1, and supplemental information is provided in Enclosure 2.

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

The Department of Environmental Protection does not provide endorsement of specific remediation products or processes, but it does recognize the need to determine their acceptability from a regulatory standpoint. Acceptance shall not be construed as Department approval or certification of performance, or as an exemption from marketplace competition in which products and processes must be sold on their own merits regarding performance, cost, and safety.

Remedial Action Plans proposing the use of the Cross-Fire system should include a copy of this letter in the appendix, and reference it in the text of the document.

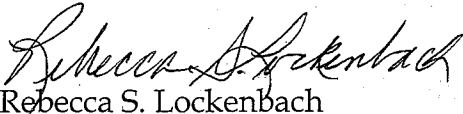
It is not a requirement that a particular remediation product or process have an official acceptance letter in order for it to be proposed in a site-specific Remedial Action Plan, but the plan must contain sufficient information to show that it meets all applicable and appropriate rules and regulations.

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 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) Regulatory Information

(2) Supplemental Information

c: T. Conrardy - FDEP, Tallahassee

REGULATORY INFORMATION

1. Applicability and permits: This acceptance applies only to the use of the Cross-Fire system for onsite, ex situ treatment of petroleum-contaminated soil under the authorization of a Department-approved site-specific Remedial Action Plan pursuant to Section 62-770.700, F.A.C. The Approval Order issued for such a plan also serves as permission for use of the Cross-Fire system.

This acceptance does not apply to the use of the Cross-Fire system as either a commercial stationary or commercial mobile treatment facility pursuant to Chapter 62-713, F.A.C., for which permits are required, and it does not apply to Interim Source Removal pursuant to Section 62-770.300, F.A.C., because onsite thermal oxidation is not a soil treatment technique allowed by rule 62-770.300(3)(c), F.A.C., without prior approval of a site-specific Remedial Action Plan.

2. Cleanup targets: For the onsite treatment of excavated soil by the Cross-Fire system during the active remediation phase of a cleanup pursuant to Section 62-770.700, F.A.C., the soil cleanup goals of Chapter 62-777, F.A.C., as referenced by Chapter 62-770, F.A.C., apply. The unconditional cleanup target level for each contaminant is the lower of its direct exposure residential cleanup target level and its leachability-based cleanup target level specified in Chapter 62-777, F.A.C., Table II.
3. Air emissions control: The ex situ Cross-Fire system, which treats petroleum contaminated soil by exposing it directly to the flame of propane-fired burners as it passes through a pug mill, is inherently its own air emissions control device. That is, immediately after its heat has desorbed the hydrocarbon contaminants from the soil and transformed them to vapors, its flames burn those vapors to carbon dioxide and water end products at greater than 99.9% efficiency, just as a thermal oxidizer burns the vapors collected by an in situ soil vapor extraction system. For that reason, it is consistent with the "high removal efficiency" sought by interagency agreement between the Bureau of Petroleum Storage Systems and the Division of Air Resources Management when air emission controls are used. Additionally, the high removal efficiency of the Cross-Fire system extends throughout its entire period of operation at a cleanup site, not just the first 30 days of treatment, as may be the case for other air emissions controls when they are required by rule 62-770.700(5), F.A.C., for in situ soil cleanup methods that produce petroleum vapors. Lastly, it appears to the Bureau of Petroleum Storage Systems that the high removal efficiency of the Cross-Fire system in regard to air pollution control is such that the quantity of total hazardous air pollutants (HAPs) emitted on any given day will be significantly less than 13.7 pounds, which is a daily maximum rate based on a 5,000-pound per year maximum for total HAPs for a specific emission source.

4. Soil sampling: Even though Chapter 62-713, F.A.C., does not apply to onsite treatment of soil at a contaminated site if the method of treatment is approved by the Department as part of a site-specific Remedial Action Plan, there are aspects of that chapter that may serve as suitable guidance in regard to the pretreatment and post treatment sampling of soil when the Cross-Fire system is used for a site-specific cleanup. For that reason, much of the soil sampling advice provided below is based on the sampling requirements of Chapter 62-713, F.A.C.
 - a. Pretreatment sampling of soil: If contaminated soil analytical data are available from a completed Site Assessment, then that data can also be used as pretreatment data for the site's soil that will be excavated and fed to the Cross-Fire system. The parameters are as follows: volatile organic halocarbons (VOH), total recoverable petroleum hydrocarbons (TRPH), arsenic, cadmium, chromium, and lead. If the contaminated soil contains used oil, then add total organic halogens (TOH), and if used hydraulic oil or used mineral oil is present then add polychlorinated biphenyls (PCBs) as well. If the concentrations of the above metals or the halogens are such that the soil is not suitable for treatment by the Cross-Fire system, then consider a different strategy for the cleanup of the soil.
 - b. Post treatment sampling of soil processed by Cross-Fire system: Collect at least one (1) discreet sample every 400 tons of treated soil or daily, whichever is less, and analyze for volatile organic aromatics (VOA), total recoverable petroleum hydrocarbons (TRPH), and polynuclear aromatic hydrocarbons (PAH). For total arsenic, cadmium, chromium, and lead, collect a sample at least hourly and composite it over an eight (8) hour maximum time interval or at least once every 400 tons, whichever is less. If the treated soil is going to be returned to the same excavation pit from which it originated, and not all of the foregoing parameters were present in excess of their soil cleanup target parameters prior to treatment, then judgment can be used in determining which parameters may not need to be included in the post treatment sampling. Some judgment can also be used in regard to the sampling frequency of the hydrocarbons, since the frequency cited from Chapter 62-713, F.A.C., is only being used as a guide in this case. The reason for suggesting that some judgment might be necessary is that requirements of Chapter 62-713, F.A.C., for larger commercial facilities accepting soil from multiple sources might not always be appropriate for lower throughput, single, onsite applications of the Cross-Fire system.
5. Confirmatory sampling of the excavation pit sidewalls and bottom: Even though Section 62-770.300, F.A.C., does not include thermal oxidation as an allowable onsite soil treatment technique during Interim Source Removal, there are aspects of

that section that may serve as suitable guidance in regard to the confirmatory sampling of soil at the limits of the excavation pit during a cleanup pursuant to Section 62-770.700, F.A.C. Confirmatory sampling of the excavation pit sidewalls and bottom, as required by rule 62-770.300(3)(a)4, F.A.C., during an Interim Source Removal, is also a confirmatory soil sampling that should be conducted on the sidewalls and bottom of the pit from which soil is taken for treatment by the Cross-Fire system. If the bottom of the pit has filled with groundwater, then take only sidewall samples for analysis of the site's petroleum contaminants of concern.

Other aspects of Section 62-770.300, F.A.C., cited in Rule 62-770.300(3)(a)5, F.A.C., for Interim Source Removal, even though they are not part of Section 62-770.700, F.A.C., for site-specific remedial action, are also worth taking into account for an excavation involving the Cross-Fire system. They are: (a) the stockpiling of soil on an impermeable surface to prevent leachate infiltration; (b) prevention of human exposure to contaminated soil; (c) prevention of runoff; (d) prevention of public entry; and (e) the length of time that untreated, stockpiled soil remains idle at the site.

SUPPLEMENTAL INFORMATION

1. Description and operation: Soil to be treated by the mobile, trailer-mounted Cross-Fire system is first fed to a screening hopper that removes rocks and other oversize material greater than 2 inches in diameter. It is then conveyed into a twin-screw pug mill that is covered by a gabled roof, through which the propane burners are mounted. As the soil travels through the mill, it is exposed to burner flames ranging from 2,000-2,900 °F in order to burn the hydrocarbon contaminants to carbon dioxide and water end products. The burners are not blown but rather naturally aspirated with atmospheric air. No purge air or other gas is introduced to the mill. The residence time in the pug mill is variable, and depends of the throughput rate. The discharge temperature of the soil is 130-180 °F. The treated soil, as it exits the mill, drops into a waiting hopper and conveyor, container, or a truck. The treatment rate typically ranges from 20-45 tons of soil per hour, and varies with the moisture content of the soil. The rate of propane consumption typically ranges from 13.2-15.8 gallons per hour.
2. Limitations: The Cross-Fire system is intended for the treatment of non-hazardous petroleum contaminated soil, not heavy metals, hazardous wastes, chlorinated hydrocarbons, and pesticides.