



Department of Environmental Protection

Jeb Bush
Governor

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

David B. Struhs
Secretary

January 22, 2003

Mr. Raj Mahadevaiah, P.E.
EIC Global Solutions
P.O. Box 505
Alpharetta, Georgia 30009

Re: **Non-Aqueous Extraction Technique (NET)**

Dear Mr. Mahadevaiah:

The Bureau of Petroleum Storage Systems hereby reaffirms and updates its original December 8, 1998 acceptance of an innovative mechanical device and process known as the Non-Aqueous Extraction Technique (NET) for recovery of either light or dense non-aqueous phase liquids (LNAPL or DNAPL) from groundwater. This acceptance applies to the jurisdiction of this bureau, which is the cleanup of petroleum pursuant to Chapter 62-770, Florida Administrative Code (F.A.C.). Other bureaus within the Department of Environmental Protection, or 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.

The system recovers free phase non-aqueous liquids by way of a slow-moving, fibrous, continuous loop conveyor in a well. The conveyor belt "soaks up" free phase liquid as it dips itself into the free phase product layer within the well, and then carries it to the surface where the belt is squeezed between two rollers to wring the liquid from it. The wrung out liquid drips into an aboveground collection vessel just as the conveyor belt begins its travel down the well for another cycle.

The bureau has no objections to the use of NET for recovery of free phase petroleum product in Florida, provided the applicable rules within Chapter 62-770, F.A.C., are followed. In some situations, such as source removal activities pursuant to Section 62-770.300, F.A.C., no Department approval is necessary for such a mechanical system. Other situations, however, require Department approval, such as those in which NET is proposed as part of a formal Remedial Action Plan pursuant to Section 62-770.700, F.A.C.

While the Department of Environmental Protection does not provide an endorsement of specific 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. 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

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between its regulatory "acceptance" 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.

For NET, like any other equipment items used for the remediation of petroleum contaminated sites, the Department expects that all appropriate safety precautions and codes associated with the design and operation of electrical equipment and machinery, fire safety, the use of chemicals, the compatibility of petroleum with other chemicals at a site, and the personal protection of workers and passersby will be observed. In general, the design of equipment items such as NET should include automatic shutdown features in the event of power failure or unsafe operating conditions, and other safety features as necessary.

Those who prepare remediation plans proposing the NET are advised 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 product. To aid those reviewers, supplemental information about the NET is presented in enclosure 1.

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. You may contact me at 850/245-8911 if there are any questions.

Sincerely,

Rick Ruscito, P.E.
Bureau of Petroleum Storage Systems

c: T. Conrardy - FDEP/Tallahassee

History:

inn_023.doc
ppl #015 & ppl #033
12/8/1998

inn_023b.doc
ppl #179
1/22/2003

ENCLOSURE 1

SUPPLEMENTAL INFORMATION ABOUT THE NET

1. Conveyor belt material: The fibrous conveyor belt of the NET is at the same time both oleophilic (having an affinity for oil) and hydrophobic (having a repellency to water). In this way, the amount of free phase petroleum product recovered by the belt is maximized while the amount of entrained water is minimized. The developer of the NET indicates that the recovered product contains less than 1 percent water. The fibrous belt can recover petroleum products ranging from No. 4 oil to gasoline. Most applications of the NET are for recovery of light non-aqueous phase liquids (LNAPL) but it is also capable of recovering dense non-aqueous phase liquids (DNAPL).
2. Conveyor speed: The speed of the slow-moving motor-driven conveyor belt is optimized for each application such that the removal rate of free product is approximately equal to the rate it seeps into the recovery well. The speed typically falls in the range of 0.25 to 1 feet per minute.
3. Recovery rate: The manufacturer indicates that the NET's recovery rate for NAPL can range from less than 1 gallon per hour (gph) to greater than 100 gph.
4. Maximum depth: The maximum operating depth of the NET is approximately 200 feet below ground surface. With minor modification, the NET can operate deeper than 200 feet.
5. Tail pulley submergence: A weighted tail pulley, submerged below the water table in the recovery well, serves as the turnaround point for the conveyor belt. The depth of submergence is typically set at 1 to 2 feet below the lowest seasonal or tidal groundwater elevation. In this way, the NET is effective over the entire range of groundwater fluctuations, yet it is not submerged so deep as to create an opportunity for a large amount of free product to dissolve into the groundwater as it rides the conveyor belt around the submerged pulley.
6. Recovery well diameter: The NET can be installed in wells of 2 inches in diameter and larger. The larger diameter wells have been up to 36 inches.
7. Spacing of recovery wells: The spacing of recovery wells is site-specific and depends on the hydrology and geology of the site.
8. Aboveground or below-grade: The NET unit can be installed either aboveground, or below-grade in a covered vault. In the case of below-grade installations, a transfer pump in a sump can be used to pump the recovered product to a remote storage vessel.
9. Return water: The free product collected by the NET can be routed to an oil/water separator, from which a drain hose can return water to the recovery well at the same rate it is produced. Given that the recovered product contains less than 1 percent water, it is not expected that a large volume of water will be decanted back to the well. The unit also contains a sludge basket.

10. Power: The NET has a low power requirement. It can be powered by either electric, solar, hydraulic, or wind energy. A telemetry package is available.
11. Safety: The onus shall be on users of the NET to ensure that all appropriate safety precautions and codes associated with the design and use of such a system are observed. The safety considerations below are listed as an aid to remediation system designers. This list should not be construed as exhaustive or the only safety considerations deemed appropriate for the NET.

- a. National Electrical Code (NEC): The Department expects that the electrical components of each NET installation will either meet or exceed NEC requirements for the conditions of the site. Those conditions will most often be classified either as Class 1, Group D, Division 1 or Division 2. For installations in a below-grade vault, where flammable vapors heavier than air can accumulate, it will be necessary to meet Division 1 requirements. For such locations, the NET is available as an explosion-proof/flame proof unit.

The Series 500 articles of the NEC are hereby cited and recommended by the Department as a guide. Article 501 defines hazardous locations; Article 514 is titled "Gasoline Dispensing and Service Stations"; Article 515 is titled "Bulk Storage Plants".

- b. Other fire safety considerations: Static electricity as a source of ignition and the need for grounding should be taken into consideration when designing and handling free product collection vessels. Consideration should also be given to the nature of the site at which an NET system is located, and any special fire safety concerns of the site. For example: there may be more fire safety concerns associated with the use of the NET at a bulk storage facility or a refinery than at a vacant lot.
12. Product spills and/or overflows: The Department thinks it is a good idea to have secondary containment for the free product collection vessel of a NET system, as shown in the schematics provided by the developer for some applications. For situations in which collection of a large volume of free product is expected, the environmental benefits of secondary containment are obvious. The method of secondary containment need not be elaborate or costly. In the case of a small system, the free product collection vessel may be placed within a drum or vessel of slightly larger dimensions so that the annular space between them serves as the containment zone. Secondary containment, in the case of the NET system, can serve as a backup in the event that the primary product collection vessel ruptures or as a backup in the event that the primary collection vessel overflows.
 13. Previous applications: The manufacturer indicates that the NET has been installed at a number of sites. The Bureau of Petroleum Storage Systems suggests that the manufacturer be contacted for specific details about previous applications if they are of interest.