Florida Department of

Memorandum — Environmental Protection

TO: Hazardous Waste Cleanup Section
Contractors

FROM: Brent Hartsfield, PE Brent Hartsfield

DATE: December 21, 1999

SUBJECT: Remedial Alternatives Evaluation

This memo provides updated guidance for evaluation of remedial alternatives at drycleaning sites. The following revisions were made to the previous guidance memo dated 9/24/98:

1- Terminology changes to be consistent with the new drycleaning cleanup rule (Chapter 62-782, FAC).

2- Addition of in-situ thermal processes as a DNAPL remediation technology.

A remedial alternatives evaluation will not be required for every site having contamination. For example, at many sites natural attenuation can be selected without an alternatives evaluation. The need for an alternatives evaluation may also be waived in those situations where the most cost-effective remedial alternative is obvious and is agreed upon by the necessary DEP personnel. For example, the alternatives evaluation can sometimes be skipped at sites with soil contamination limited to beneath a building. In those cases, excavation is not possible, potentially leaving vacuum extraction as the only viable remedial alternative. In such cases, a summary of the proposed remedy with supporting cost estimate and schedule from the contractor is adequate. When the SAR and RBCA worksheet are sufficiently completed for a site, we can decide whether or not an evaluation of remedial alternatives is necessary.

When a remedial alternatives evaluation is required, it should be performed in accordance with the attached procedures. To facilitate this process, it is recommended that DEP and contractor project staff meet to accomplish the following tasks when initiating a site alternatives evaluation:

1- Identify cleanup target levels (CTLs) for soil and groundwater contaminants of concern.

2- Determine the goal of the active (i.e., engineered) remediation system.

3- Perform technology screening.

4- Determine the need for laboratory and/or field pilot studies to evaluate the **feasibility** of remedial technologies. Studies needed for design can be completed during the RAP phase.

This meeting will lay the foundation for the contractor's detailed evaluation of a limited number of remedial technologies and alternatives.

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Attachment

DRYCLEANING SITES
GUIDELINES FOR REMEDIAL
ALTERNATIVES EVALUATION

The objective of the remedial alternatives evaluation is to evaluate a limited number of the most appropriate remedial technologies and remedial alternatives to identify the most environmentally sound and cost-effective remedial action to achieve clean up of a site to the required levels. The following procedures should help streamline this process.

Cleanup Criteria

List the cleanup target levels for soil and groundwater **contaminants of concern**. Identify the goal of the active (i.e., engineered) remediation system (e.g., CTLs or natural attenuation default source concentrations for groundwater).

Site Conditions

Briefly summarize key data and conclusions from the SAR and RBCA worksheet that have a **significant effect** on the selection and evaluation of remedial technologies and alternatives (depth to water table, aquifer permeability, presence of DNAPL, etc.).

Technology Screening

Based on **site specific conditions**, perform a limited screening of the technologies listed on the attached table, as a minimum. The screening should be documented by noting on the table the justification for eliminating specific technologies from further consideration. Technology screening will result in the limited number of the most appropriate remedial technologies for full evaluation. In most cases, a minimum of two technologies for both DNAPL and the plume should be fully evaluated. The actual number will depend on the site specific conditions. (If additional technologies are proposed or considered, provide a brief description of technologies not well known.)

Technology Evaluation

Complete all sections of the attached table for technologies not previously eliminated. The details provided for each of the criteria should be based on the application of the technology to the **site specific conditions**. Estimates of costs should typically be within a +/- 50% accuracy.

Alternative Selection

Provide a recommendation for the most environmentally sound and cost-effective remedial action to achieve cleanup of the site. Combinations of technologies should be considered. Provide the rationale for the recommended alternative and why it is considered most appropriate for the site. Document the assumptions that led to the +/-50% cost estimate (e.g., chemical oxidant and number of injection points). The estimated cleanup time and costs on the Technology Screening and Evaluation table should be further broken down into pilot studies, design, construction and O&M.

NOTES: If laboratory or field pilot studies have been conducted, summarize the results.

For the time being, it is not required that a professional engineer (PE) certify the remedial alternatives evaluation. The DEP is currently evaluating if PE certification of feasibility studies (FS) will be required. A remedial alternatives evaluation is generally classified as an FS and, as such, will follow future DEP guidelines on FS certification. However, regardless of the need for PE certification, the remedial alternatives evaluation must be conducted by an engineer, and reviewed and professionally evaluated by a PE. It is expected that these personnel have the professional expertise to recommend what they believe is the most appropriate remedial alternative to be applied at a site.

TECHNOLOGY SCREENING AND EVALUATION

Remediation Technology	Feasibility	Implementability	Reliability	Adverse Impacts	O&M Requirements	Cleanup Time	Cost Estimate
Soils							
Removal							
Vacuum Extraction							
Groundwater - Plume							
Natural Attenuation							
Permeable Treatment Wall							
Pump & Treat							
Multi-phase Extraction							
Air Sparging							
Recirculating Wells							
In-situ Bioremediation							
In-situ Chemical Oxidation							
Groundwater - DNAPL							
Multi-phase Extraction							
Air Sparging							
Recirculating Wells							
In-situ Bioremediation							
In-situ Chemical Oxidation							
In-situ Flushing							
In-situ Thermal Processes							

TECHNOLOGY SCREENING AND EVALUATION TABLE

DEFINITIONS

Technologies

In-situ bioremediation- includes oxygen release compound (ORC), hydrogen release compound (HRC), methane, etc.

In-situ chemical oxidation- includes potassium permanganate, hydrogen peroxide, ozone, etc.

In-situ flushing- includes surfactants, co-solvents, etc.

In-situ thermal processes- includes steam injection, six-phase heating, etc.

Evaluation Criteria

Feasibility- is the technology applicable based on the site specific conditions (contaminants of concern, depth to water table, depth of plume, aquifer permeability, lithology, etc.)?

Implementability- ability to implement the technology based on permitting requirements, site access requirements, available space and infrastructure compatibility (buildings, highways, underground utilities, etc.).

Reliability- dependability of the technology to achieve the goals of the active remediation system.

Adverse impacts- potential for the application of the technology to result in short-term or long-term adverse human health or environmental impacts (air emissions, groundwater discoloration, exceeding the secondary standard for iron, etc.).

O & M requirements- to give an indication of how "O & M intensive" the technology will be, provide a few key details on the type and frequency of operation and maintenance activities expected for the remediation system.

Cleanup time- provide the estimated number of years required to achieve the goal of the active remediation system.

Cost estimate- provide the estimated costs for capital (includes pilot studies, design and construction), annual O & M, and present worth (based on the projected cleanup time).