UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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MAY 27 1992

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

MEMORANDUM

SUBJECT: Considerations in Ground-Water Remediation at Superfund Sites and RCRA Facilities -- **Update**

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To: Waste Management Division Directors
Regions I, IV, V, VII
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Purpose

This updated Directive clarifies and expands OSWER's general policy concerning remediation of contaminated ground water, especially with regard to nonaqueous phase liquid (NAPL) contaminants. This document promotes a consistent and sound approach to ground-water remediation at both Superfund sites and RCRA facilities and reinforces OSWER's commitment to cleanup ground-water contamination at these sites to the fullest extent possible.

Background

This Directive does **not** supersede or replace previous Superfund or RCRA Directives regarding ground-water remediation policy.[1] [2] The 1989 and 1990 Directives address Superfund sites only and should continue to be consulted with regard to Superfund policy and Record of Decision (ROD) language. This updated

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[1] U.S. EPA. Considerations in Ground-Water Remediation at Superfund Sites. Directive 9355.4-03, Office of Solid Waste and Emergency Response(OSWER), October 18, 1989.

[2] U.S. EPA. Suggested ROD Language for Various Ground-Water Remediation Options. Directive 9283.1-03, OSWER, October 10, 1990.

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Directive reiterates and clarifies technical recommendations from prior Directives and expands upon them to address remediation problems associated with NAPLs. Also, this Directive is consistent with the principles of the 1991 EPA Ground-Water Protection Strategy[3], but does not specifically address how ground-water remedial activities are to be prioritized.

Ground-water contamination is one of the most prevalent and challenging problems at hazardous waste sites in both the Superfund and RCRA Corrective Action programs. Ground-water contamination is present at more than 70% of the sites on the National Priorities List and almost 50% of the permitted RCRA land disposal facilities. The Office of Emergency and Remedial Response (OERR) completed a study in 1989[4] which evaluated the performance of ground-water extraction systems operating at 19 sites. Recently, an update and expansion of this study has been completed for 17 of the original and five additional sites[5]. These evaluations identified hydrogeologic and contaminant characteristics as well as system design factors that **may** impede the ability of extraction systems to achieve appropriate cleanup levels over the entire area of contamination. These characteristics, listed below, are probably more common at hazardous waste sites than previously realized and **should be considered** during site characterization and conceptual model development.

1. Hydrogeologic factors: such as significant subsurface heterogeneity, numerous low permeability layers, fractured or karst aquifers, or other hydrogeologic complexities.

2. Contaminant factors: such as continued leaching of contaminants from source areas, partitioning of contaminants between ground water and aquifer solids, or presence of NAPL in the subsurface.

3. System design factors: such as poorly designed or improperly located extraction wells, or inefficient pumping schemes.

In particular, this Directive addresses EPA's approach at sites involving nonaqueous phase liquid (NAPL) contamination. Virtually all NAPLs are organic compounds (or mixtures of compounds) that are immiscible (resistant to mixing) with

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[3] U.S. EPA. Protecting the Nation's Ground Water: EPA's Strategy for the 1990's, Final Report of the EPA Ground-Water Task Force. Publication 21Z-1020, Office of the Administrator, July 1991.

[4] U.S. EPA. Evaluation of Ground-Water Extraction Remedies. Publication EPA/540/2-89/054, OERR, September 1989.

[5] U.S. EPA. Evaluation of Ground-Water Extraction Remedies: Phase II, Pre-print. Publication 9355.4-05 and 05A, OERR.

water.[6] [7] The distinct interface resulting from the water-NAPL contact does allow some NAPL to dissolve, with the degree of aqueous solubility varying dramatically among NAPL compounds. The term NAPL refers to the undissolved liquid phase of a compound, such as Trichloroethylene (TCE), and not to the aqueous phase dissolved in water. NAPL usually enters the subsurface as a separate liquid phase, and may penetrate to significant depths. As NAPL moves through the subsurface, a portion becomes trapped in soil pore spaces (or rock fractures) and a portion may continue to migrate. "Free-phase NAPL" is the migrating portion, which can flow into a well. "Residual NAPL" is that portion trapped in pore spaces by capillary forces, which can not generally flow into a well or migrate as a separate phase.

In the unsaturated zone (subsurface zone above the water table), NAPLs may release vapor phase organic contaminants to soil pore spaces and dissolved contaminants to infiltrating waters. In the saturated zone, NAPLs that are less dense than water (light NAPLs or LNAPLs) will tend to float on the water table while those more dense than water (DNAPLs) sink downward, through ground water. DNAPLs may exhibit varying behavior depending on local geologic conditions. For example, DNAPLs can move downslope along the upper surfaces of low permeability layers or along fractures, can form pools in stratigraphic or structural depressions, and can sometimes penetrate low permeability layers via fractures. Since DNAPLs are driven by gravity, they may move across or in the opposite direction from ground-water flow. LNAPLs tend to migrate along the water table surface. Both residual and free-phase NAPLs dissolve slowly, supplying potentially significant concentrations of contaminants to ground water over very long time periods. **Therefore, the presence of NAPLs will have a significant influence on the time frame required or likelihood of achieving cleanup standards, and should be evaluated when selecting appropriate remedial actions.**

Cleanup standards for contaminated ground water are generally based on protection of human health and the environment. For Superfund sites, site-specific ground-water cleanup standards are established based on applicable or relevant and appropriate requirements (ARARs) for the use classification of the ground water and/or acceptable human health and environmental risk levels for current and future pathways of exposure. (ARARs include standards established under the Safe Drinking Water Act, Clean Water Act, or applicable State standards.) Under RCRA, facility-specific "media cleanup standards" for ground water are established for Corrective Action

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[6] U.S. EPA. Ground Water Issue: Dense Nonaqueous Phase Liquids. Publication EPA/540/4-91-002, Office of Research and Development(ORD)/OSWER, March 1991.

[7] U.S. EPA. Dense Nonaqueous Phase Liquids -- A Workshop Summary. Publication EPA/600/R-92/030, ORD, February 1992.

facilities using applicable human health and environmental standards and/or acceptable health/environmental risk levels. In this Directive the term "cleanup standards" will be used in reference to appropriate cleanup levels for both the Superfund and RCRA programs.

Objective

Recommendations are provided for investigation and remediation of contaminated ground water for both Superfund sites and RCRA Corrective Action facilities. This recommended guidance is presented for each response stage, including investigation, early or interim action and remedy implementation. **Actions at each site should be tailored to the specific conditions and applicable requirements at that site.**

In addition to data collected during site investigation, data obtained during response actions (interim and final) should be considered for use in: 1) further characterizing the site and refining the conceptual model for site contamination; and 2) evaluating the design and operation of remedial actions for the site.

Implementation

I. OSWER GROUND-WATER POLICY

A. Investigation

The following recommended activities focus on identifying the nature and extent of ground-water contamination; contaminant sources; the conceptual model for contaminant migration and fate; potentially appropriate early response actions; and site factors that may affect the time frame or likelihood of achieving cleanup standards. These activities should generally be performed at Superfund sites or RCRA facilities by EPA, potentially responsible parties, owner operators or other entity responsible for such activities.

1. **The likelihood of subsurface NAPL contamination should be evaluated as a part of all site investigations.** The potential presence or absence of LNAPL or DNAPL should influence the methods chosen for site characterization and remediation, particularly in the case of DNAPL. Certain site factors (such as the types of chemicals released, types of industrial processes, chemical storage and waste disposal practices at the site) can indicate the potential likelihood of NAPL occurrence. These factors should be evaluated (see EPA Fact Sheet)[8] from site

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[8] U.S. EPA. Fact Sheet: Estimating Potential for Occurrence of DNAPL at Superfund Sites. Publication 9355.4-07FS, OSWER/R.S. Kerr Environmental Research Laboratory (RSKERL), January 1992.

historical information and other data prior to initiating field investigatory work.

2. **If NAPL contamination is likely, characterization of the potential nature and extent of such contamination is recommended to determine appropriate remedial actions.** For these sites, a review of existing data and collection of subsurface information should be performed to:

a) suggest areas where LNAPL and/or DNAPL may be present;

b) to confirm the presence or absence of NAPL in these areas, to the extent practicable; and

c) if NAPLs are present, to estimate their extent.

Such information could include delineation of NAPL source areas; delineation of the types of subsurface features that could act as DNAPL conduits or traps (in order to determine where it may have accumulated); measurement of vertical variation in aqueous contaminant concentration, especially above low permeability layers; and inspection of soil samples (or rock cores) for NAPL, both above and below the water table. For DNAPL contamination, the subsurface stratigraphy and structural geology can play a more important role than ground-water flow in controlling gravity-driven DNAPL transport. **If planned from the beginning, collection of this information can be combined with other efforts such that investigation costs and time frames should not be greater than current levels, for most sites.**

The degree of effort expended in locating DNAPL accumulations should be based on the degree of characterization necessary for remedy selection. Locating DNAPL in small stratigraphic or structural discontinuities is generally not possible. However, efforts should be made to identify subsurface geologic environments where DNAPL accumulations may be present, such as topographic valleys in the bedrock surface or other potential traps formed by soil layers, by (lithologic or structural) geologic boundaries or by other features. It is recommended that characterizing efforts focus on those locations where DNAPL accumulations are more likely to be present and which are more likely to be found using applicable exploration methods (conventional or innovative). Characterizing the potential nature and extent of DNAPL contamination will provide a better understanding of the sources of contaminants to ground water and of contaminant flow paths from these sources. Also, characteristics that influence travel times for aqueous contaminants, such as partitioning between soil and ground water, should generally be estimated. **This additional information can**

facilitate selection of appropriate remedial actions[9] and can provide a more reliable basis for estimating time frames for various ground-water remedial action alternatives and the likelihood of achieving cleanup standards.

3. **Caution should be exercised to prevent further migration of contaminants via boreholes, especially DNAPL migration.** A recommended investigation strategy is to drill in expected DNAPL zones after subsurface conditions have been characterized by drilling in surrounding DNAPL-free areas (the "outside-in" strategy). In DNAPL zones, drilling should generally be minimized and should be suspended when a potential trapping layer is first encountered. Drilling through DNAPL zones into deeper stratigraphic units should be avoided. Also non-invasive methods, such as geophysical or geochemical surveys, can be useful at some sites to roughly define subsurface geologic or contaminant conditions.

B. Early or Interim Action

The following recommended activities focus on preventing/minimizing further migration of contaminants as early as possible, preferably before a final remedy is selected. These activities should generally be performed at Superfund sites or RCRA facilities by EPA, potentially responsible parties, owner operators or other entity responsible for such activities.

1. **Contain the plume early.** Aqueous phase contaminant plumes should generally be contained early, while determining what further remedial action is needed. A containment system, such as pumping to control hydraulic gradients or other method, should be implemented expeditiously in order to prevent/minimize migration of contaminants. Early containment may limit the area over which future restoration is required and is especially important at sites where the plume is migrating rapidly or may contaminate water supply wells or environmental resources. The system should be monitored to determine the effectiveness of containment and changes in contaminant concentrations. Monitoring data can provide information useful for further site characterization and also for remedial design. In addition to containment, extraction systems can be used to remove dissolved contaminants in zones of high concentration or "hot spots", although this may not be effective in zones containing NAPL. Treatment of ground water extracted for plume containment may be required, if contaminant concentrations are above standards appropriate for the type of discharge selected, such as NPDES permit requirements.

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[9] U.S. EPA. Fact Sheet: Information Required to Evaluate Remedial Activities for DNAPL at Superfund Sites. In preparation, by OSWER/RSKERL.

2. **Extract free-phase NAPL early, where possible.** Free-phase NAPL should generally be removed from the subsurface as an early action to minimize further migration and to remove sources of further contaminants to ground water. Free-phase NAPL can be very mobile in the subsurface environment. Where free-phase DNAPL is encountered in routine excavations or boreholes, it should be removed expeditiously by pumping or other direct extraction methods. Where accumulations of free-phase DNAPL are confirmed, additional efforts should generally be undertaken to estimate their extent and to implement removal. Knowledge of structural geologic features which trap or limit DNAPL migration can be useful for design of removal methods. LNAPLs are somewhat easier to locate and remediate than DNAPLs because they tend to float on the water table. Expeditious removal of free-phase LNAPL is also recommended.

For Superfund sites where NAPL contamination is suspected, EPA should include a free-phase NAPL removal provision in the Remedial Investigation/Feasibility Study (RI/FS) Statement of Work for Fund-lead sites, or in the Work to be Performed section of the RI/FS consent order for Enforcement-lead sites. At sites with ongoing RI/FS work, this would require modifying the existing consent order or Statement of Work. Another option available at Enforcement-lead sites is for EPA to issue a separate removal order (consent or unilateral) requiring a PRP to extract free-phase NAPL expeditiously after discovery. At all sites, the on-site contractor should be required to notify the EPA Remedial Project Manager within 24 hours after the initial discovery of free-phase NAPL. For RCRA Corrective Action facilities where NAPLs are suspected, EPA should include a free-phase NAPL removal provision either in the Corrective Action Permit, or in the Interim Measures portions of the RCRA Facility Investigation/Corrective Measures Study (RFI/CMS) Order, and/or require that NAPLs be addressed expeditiously in the context of Additional Work Provisions in the order, throughout corrective measures implementation. If a permitted facility will not address free-phase NAPL removal voluntarily, a permit modification may be necessary.

3. **Initiation of early actions should take place as soon as possible after a problem is identified that either requires an expeditious response or for which an early action is appropriate.** Early refers to the timing of the action with respect to other site response actions. For Superfund sites, early actions may include removal actions, interim actions, or early final actions. Superfund interim actions are remedial responses that are initiated prior to final remedy selection, which should be consistent with and not preclude implementation of the final remedy. For RCRA Corrective Action facilities, interim measures can be used as early actions. RCRA interim measures are those required to mitigate or eliminate releases, or to prevent "further degradation of the medium which may occur if remedial

action is not initiated expeditiously"[10]. More frequent use of interim measures has been recommended by the recently adopted RCRA Stabilization Effort[11]. Stabilization includes mitigating releases and preventing the further spread of contamination as the first phase of RCRA corrective action. **For both programs, early actions should be coordinated with final remedies such that they are the first phase of the overall remedial action.**

Determination of whether and when to implement the early response actions recommended above should be based on existing information concerning the location of contaminant sources, location of and risk to human health or environmental resources, rate of plume expansion, stage of plume or NAPL characterization, nature and location of free-phase NAPLs, potential for inducing undesired movement of dissolved or NAPL contaminants, subsurface geologic conditions, feasibility of the action, and best professional judgement. Caution should be exercised to prevent drilling or pumping operations from inducing further migration of free-phase DNAPL. Care is especially important in fractured or karst media because DNAPL can penetrate fine fractures or solution channels.

4. **Early or interim actions should be appropriately documented.** For Superfund sites, the need and rationale for selecting a removal action should be documented in an Action Memorandum. The need and rationale for selecting actions under remedial authority (interim actions, early interim actions, or early final actions) should be documented in a Record of Decision. For RCRA facilities, interim measure decisions should be documented in the enforcement order, in the negotiations section of the facility's Administrative Record and in the Statement of Basis. Some interim measures (as determined by EPA) at RCRA facilities may require an approved interim measures work plan under the enforcement order, a permit modification, or an additional order. For both RCRA and Superfund actions, a brief summary of site data collected during field investigations should be sufficient to document a problem in need of an expeditious response. In addition, a concise description and comparative analysis of the alternatives considered should be prepared in accordance with existing guidance.[12]

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[10] Corrective Action for Solid Waste Management Units (SWMUs) at hazardous waste management facilities; (proposed Subpart S Rule 40 CFR 264.540, (a) and (b)).

[11] U.S. EPA. Memorandum: Lowrance (Office of Solid Waste) and Diamond (Office of Waste Programs Enforcement) to Regions I-X Waste Management Division Directors, "Managing the Corrective Action Program for Environmental Results: The RCRA Facility Stabilization Effort," October 25, 1991.

[12] U.S. EPA. Fact Sheet: Guide to Developing Superfund No Action, Interim Action, and Contingency Remedy RODs. Publication 9355.3-02FS-3, OSWER, April 1991.

C. Remedy Implementation

While early response actions should focus on preventing/minimizing further contaminant migration, the following recommendations focus on restoring ground-water quality, to the extent practicable, after a final remedy is selected.

1. **Remedial actions/measures for contaminated ground water should generally be implemented in a phased approach.** In a phased remedial approach, actions are modified or are succeeded by different (but compatible) or more comprehensive actions in subsequent phases. This approach can improve the effectiveness and efficiency of cleanup. The first phase could include containment or source removal actions and should be implemented as early as possible in the site response process, preferably as an early response action. A phased approach is especially useful where uncertainty exists regarding the ability of the selected remedy to meet cleanup standards, such as in areas of complex hydrogeology or contaminant distribution, or where DNAPL has been confirmed or is strongly suspected.

2. **Ground-water remedial actions should be designed to include careful monitoring and provisions for modifying them over time to improve their effectiveness and efficiency.** For ground-water extraction (or gravity drainage) systems, performance monitoring data should be collected to define changes in aqueous concentrations within and outside the general plume area, as well as responses in the potentiometric surface. For extraction systems, concentration data should be obtained from non-pumping wells, and potentiometric data from both pumping and non-pumping wells. Monitoring data should be periodically assessed and should generally be used to suggest system modifications which provide more effective or efficient attainment of cleanup standards.[13] (For these evaluations, ground-water flow and contaminant transport models can be very useful.) Such modifications may include: increasing or decreasing the extraction rate, initiating a pulsed pumping schedule, installing additional extraction wells (or drains), or ceasing extraction at wells where the aquifer has been restored. Monitoring should be used to assess the effectiveness of the modifications implemented and can be used to re-assess the time frame required to achieve cleanup standards. Such changes may need to be reflected in appropriate decision documents, depending on the specific requirements of each program.

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[13] U.S. EPA. General Methods for Remedial Operation Performance Evaluations, Pre-print Draft. RSKERL.

3. **After a ground-water remedy is implemented, modification of remedial action objectives <u>may</u> be warranted where cleanup standards cannot be achieved, due to technical impracticability from an engineering perspective.** There are three overall requirements for such modification:

a) demonstration of technical impracticability to the satisfaction of EPA (or other entity responsible for making decisions at the site);

b) EPA issuance of a technical impracticability waiver (40 CFR 300.430 (f)(1)(ii)(C)(3)) for Superfund sites, or a permit or order modification for RCRA facilities (Proposed 40 CFR 264.525 (d)(2) (iii) and 264.531)[14]; and

c) EPA determination of alternative remedial action objectives.

Also for Superfund sites, an Explanation of Significant Differences (ESD) or Record of Decision (ROD) Amendment will be required to document the changed remedial action objectives. A ROD Amendment is required if the remedy used to meet the alternative remedial action objectives is **fundamentally different** from either the remedy selected or the contingent remedy defined in the ROD. It is highly recommended that the public be given an opportunity to comment if an ESD is used for this type of change.

4. **EPA will make its determination on whether or not aquifer restoration to cleanup standards is technically impracticable for a given site based upon EPA approved data, supporting analysis and site characterization which justifies such a determination.** This information should include some or all of the following: contaminant characteristics; hydrogeological conditions; contaminant distribution and potential subsurface migration; performance of aquifer restoration or other response actions attempted; availability of alternative technologies; an estimate of the degree of restoration that will be achievable at the site, where applicable; and additional information deemed necessary by EPA.[15]

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[14] Although not final, most of the proposed Subpart S Rule, including these sections, may be used as guidance. The specific requirements must generally be imposed in the permit or order and justified on a case-by-case basis. (See: U.S. EPA Memo, "Use of Proposed Subpart S Corrective Action Rule as Guidance Pending Promulgation of the Final Rule," Friedman (Office of General Counsel) to Regional Counsel RCRA Branch Chiefs, March 27,1991.)

[15] Further guidance concerning technical and administrative requirements and other issues related to technical impracticability of ground-water restoration is currently under development by an OSWER workgroup.

In characterizing site hydrogeology and contamination, EPA will consider both aqueous and nonaqueous phase contaminants, as discussed in Section I.A.2., above. Evaluation of the performance of aquifer restoration or other response actions should generally include a description of each implemented restoration, source control, or other action; and a discussion of results achieved and modifications made to improve the effectiveness of the action, as discussed in Section I.C.2. In evaluating the availability of other technologies (which may include field testing if required by EPA), EPA will consider new conventional and/or innovative technologies which could practicably achieve compliance with cleanup standards. Estimation of the degree of restoration achievable, when applicable, should be based on the results of aquifer restoration efforts over a sufficiently long time frame to allow meaningful predictions for that particular site.

5. **If a determination of technical impracticability is made, EPA will also determine alternative remedial action objectives which protect human health and the environment and are appropriate, based on site conditions.** EPA will require that exposure to contaminated ground water be prevented, and to the extent practicable, that further contaminant migration be prevented. Where applicable and to the extent practicable, EPA will generally also require reduction of the areal extent of the dissolved contaminant plume and removal of subsurface NAPLs.

Alternative remedial actions that prevent exposure to contaminated ground water and those which prevent contaminant migration will be required to continue for as long as contaminant concentrations remain above cleanup standards. Operation and maintenance of these systems may be required for very long or indefinite time frames. Exposure prevention actions may include alternative water supplies or institutional controls. Migration prevention actions may include hydraulic gradient control by pumping or physical containment measures, which should address both aqueous and nonaqueous contaminants. Containment systems must also be monitored to demonstrate their effectiveness. New conventional and/or innovative containment technologies should be considered where they have the potential to provide long term cost savings and effectiveness.

Where applicable and to the extent practicable (as determined by EPA), reduction of the areal extent of the dissolved contaminant plume should be an alternative remedial action objective. Evidence from operating systems indicates that ground-water extraction systems can substantially reduce the areal extent of dissolved contaminant plumes. Thus, restoration (to cleanup standards) over portions of the contaminated aquifer can be achieved, even if restoration of the entire aquifer is not possible. Shrinking the plume will reduce the area over which health/environmental protection is dependent on the maintenance of engineered systems and institutional controls. This will increase the reliability of the remedy and decrease long term operating costs. Monitoring will be required in order to demonstrate the extent of plume reduction achieved.

Where applicable and to the extent practicable (as determined by EPA), removal of subsurface NAPLs should be an alternative remedial action objective. NAPLs dissolve slowly, supplying potentially significant concentrations of contaminants to ground water over very long time periods. Removal of these sources, from both the unsaturated and saturated zones, will abate continued aquifer contamination. In some cases, remedial actions to remove these sources will be more economical than long term extraction and treatment of the contaminated ground water. Source removal could include excavation, in-situ soil treatment, extraction of free-phase NAPL, or enhanced recovery of residual NAPL. Accumulations of free-phase LNAPL and DNAPL, which were not removed as an early action, should generally be removed during the final remedy, to the extent practicable. Furthermore, because the mass proportion and spatial extent of residual NAPL is usually much greater than that of the free-phase, new conventional and/or innovative technologies should be considered for enhanced recovery of residual LNAPL and DNAPL from the subsurface.

II. ON-GOING PROJECTS

Through the Technical Support Program, the Office of Solid Waste and Emergency Response (OSWER) is supporting a long-term research effort by the Robert S. Kerr Environmental Research Laboratory (RSKERL) to evaluate innovative technologies that will improve our ability to remediate contaminated ground water. This will include technologies with potential for removing NAPL from the subsurface. OSWER will also be working closely with RSKERL to develop fact sheets and guidance on site characterization, remediation, and performance monitoring for DNAPL-contaminated sites. Additionally, the Office of Emergency and Remedial Response (OERR) has initiated a survey to determine the potential number of existing Superfund sites where DNAPL contamination is likely. This year-long survey will help to assess the significance of this problem for the Superfund program. OERR is also supporting a National Research Council (NRC) study, "Alternatives for Reducing Risk from Existing Ground-Water Contamination" that will assess the current state-of the-science concerning ground-water remediation and look at alternative approaches for addressing ground-water contamination. The NRC study is scheduled for completion by September 1993.

A technical workgroup has recently been established within OSWER to develop further guidance concerning waivers due to technical impracticability for ground water. Participants include OERR, Office of Solid Waste (OSW), Office of Waste

Programs Enforcement (OWPE) and the Ground Water Forum. One or more guidance documents are planned for development in 1992. Another workgroup, led by the Office of Enforcement, is developing model consent decree language addressing a technical impracticability waiver process for implemented pump and treat remedies at Superfund sites.

Finally, OSWER will continue to learn from program experience. Many ground-water remediation systems are now in either the design or the construction phase, so our data base will grow significantly over the next few years. We will be monitoring these systems closely and will continue to improve EPA's approach to assessing and remediating contaminated ground water.

If you would like additional information please contact Ken Lovelace (Hazardous Site Control Division/OERR) at FTS 678-8362, Dave Bartenfelder (Permits and State Programs Division/OSW) at FTS 260-9828 or Matt Charsky (CERCLA Enforcement Division/OWPE) at FTS 260-9805.

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