UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

OSWER Directive 9283.1-03

MEMORANDUM

SUBJECT: Suggested ROD Language for Various Ground Water Remediation Options

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Purpose

The purpose of this memorandum is to provide supplemental guidance to the October 18, 1989, OSWER Directive 9355.4-03, entitled "Considerations in Ground Water Remediation at Superfund Sites," which examines the role of ground water remediation in Superfund cleanups and recommends modifications to the current approach.

Background

A recent study conducted by the Office of Emergency and Remedial Response (OERR) assessed the effectiveness of nineteen operating ground water extractions systems in achieving specified goals. The study found that ground water extraction was effective in containing contaminant plumes and achieving significant mass removal of contaminants. However, in many cases, contaminant concentrations did not decrease linearly over time to reach desired remediation goals. After significant initial decreases, concentrations typically leveled off, often at concentrations higher than the cleanup levels. Factors

which may explain this phenomenon include the extent of source removal, hydrogeological characteristics of the aquifer, the physico-chemical nature of the contaminants, and extraction system design parameters.

Based on these findings, OSWER recommended consideration of the following approaches to planning and implementing ground water remediation: 1) initiation of early or interim response measures designed to prevent further migration of contaminants during the remedial investigation, and/or until sufficient information about system response has been obtained to allow final remedy selection; 2) provision for changes in the remedy during implementation in the Record of Decision, either by specifying a contingency remedy or by selecting an interim remedy and goal; and 3) collection of additional or supplemental information with which to better assess contaminant mobility and system effectiveness, such as data related to vertical changes in hydraulic conductivity, contaminant partitioning between soil and ground water, and the presence of non-aqueous phase liquids.

Objective

The objective of this memorandum is to provide suggested language for Records of Decision corresponding to recommendations 1 and 2 from the OSWER Directive.

Recommended Language

Study findings indicate that it is often difficult to predict the ultimate concentration to which contaminants in ground water may be reduced until an extraction system has been operating for some period of time. Records of Decision should reflect the amount of relative uncertainty believed to be associated with achieving remediation goals in ground water at a particular site. Corresponding to recommendations 1 and 2 from OSWER Directive 9355.4-03, RODs may be structured in several ways to reflect purpose of a selected remedy: 1) as final actions, intended to restore ground water quality; 2) as final actions, with a provision for establishing contingency goals; or 3) as interim actions, intended to promote plume containment and generate additional performance data, to be followed by final decisions. The following standard language may be employed, when appropriate, to correspond to site-specific remediation scenarios.

1. FINAL ACTION (low uncertainty, restoration actions)

In some cases, there may be little uncertainty that the remedy will be able to achieve the remediation goals specified in

the ROD throughout the area of attainment. Under these circumstances, a final remedy, designed to restore the aquifer, may be specified without a contingency. The following type of statement should appear in the **Selected Remedy** section of the ROD:

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The goal of this remedial action is to restore ground water to its beneficial use, which is, at this site, (specify whether this is a potential or actual drinking water source, or used for (non-domestic purposes). Based on information obtained during the remedial investigation and on a careful analysis of all remedial alternatives, EPA < (optional) and the State/Commonwealth of _____> believe that the selected remedy will achieve this goal. It may become apparent, during implementation or operation of the ground water extraction system and its modifications, that contaminant levels have ceased to decline and are remaining constant at levels higher than the remediation goal over some portion of the contaminated plume. In such a case, the system performance standards and/or the remedy may be reevaluated.

The selected remedy will include ground water extraction for an estimated period of _____ years, during which the systems performance will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. Modifications may include any or all of the following:

a) at individual wells where cleanup goals have been attained, pumping may be discontinued;

b) alternating pumping at wells to eliminate stagnation points;

c) pulse pumping to allow aquifer equilibration and to allow adsorbed contaminants to partition into ground water; and

d) installation of additional extraction wells to facilitate or accelerate cleanup of the contaminant plume.

To ensure that cleanup goals continue to be maintained, the aquifer will be monitored at those wells where pumping has ceased on an occurrence of every ----- years following discontinuation of ground water extraction.

If it is determined that drinking water is not the beneficial use of the aquifer, as in a Class III aquifer, then the preceding language should be modified to reflect alternative uses and remediation goals.

2. CONTINGENCY MEASURES/GOALS (high to moderate uncertainty, potential ARARs waiver, potential containment goal)

In many cases, information may emerge during implementation and monitoring of the recovery system which strongly suggests that it is technically impracticable to restore the aquifer, or achieve remediation goals throughout the area of attainment (e.g., in the entire ground water plume; or, if waste is left in place, the area of the plume excluding the waste management unit). If it is likely that such information will emerge, the Region has the option of anticipating future changes in the Record of Decision by providing for contingency measures. The ROD should explain those measures in sufficient detail (i.e., in the Comparative Analysis of Alternatives and Selected Remedy sections), so that the public has ample opportunity to review and comment on the contingency as well as the selected remedy. The Selected Remedy section should also specify the criteria under which the contingency measures would be implemented.

A. Suggested Language for the <u>Selected Remedy</u> Section of the ROD

The following type of language should appear in the Selected Remedy portion of the ROD, corresponding to situations in which it is anticipated that it may be technically impracticable to reach MCLs/MCLGs or other goals as discussed in the ROD. An ARARs waiver will be invoked, accompanied by an Explanation of Significant Difference (ESD), if it is determined, on the basis of the stated criteria, that MCLs/MCLGs or other ARARs cannot be achieved within all portions of the area of attainment.

> The goal of this remedial action is to restore the ground water to its beneficial use, which is, at this site, (specify whether this is a drinking water aquifer or used for non-domestic purposes). Based on information obtained during the remedial investigation, and the analysis of all remedial alternatives, EPA < (optional) and the State/Commonwealth of _____ > believe that the selected remedy may be able to achieve this goal. Ground water contamination may be especially persistent in the immediate vicinity of the contaminants' source, where concentrations are relatively high. The ability to achieve cleanup goals at all points throughout the area of attainment, or plume, cannot be determined until the extraction system has been implemented, modified as necessary, and plume

response monitored over time. If the selected remedy cannot meet the specified remediation goals, at any or all of the monitoring points during implementation, the contingency measures and goals described in this section may replace the selected remedy and goals for these portions of the plume. Such contingency measures will, at a minimum, prevent further migration of the plume and include a combination of containment technologies < typically, ground water extraction and treatment > and institutional controls. These measures are considered to be protective of human health and the environment, and are technically practicable under the corresponding circumstances.

The selected remedy will include ground water extraction for an estimated period of _____ years, during which time the system's performance will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. Modifications may include any or all of the following:

a) at individual wells where cleanup goals have been attained, pumping may be discontinued;

b) alternating pumping at wells to eliminate stagnation points;

c) pulse pumping to allow aquifer equilibration and encourage adsorbed contaminants to partition into ground water; and

d) installation of additional extraction wells to facilitate or accelerate cleanup of the contaminant plume.

To ensure that cleanup goals continue to be maintained, the aquifer will be monitored at those wells where pumping has ceased on an occurrence of every ----- years following discontinuation of ground water extraction.

If, in EPA's judgment, implementation of the selected remedy clearly demonstrates, in corroboration with strong hydrogeological and chemical evidence, that it will be technically impracticable to achieve and maintain remediation goals in the plume or a portion of the plume, a contingency will be implemented. For example, a contingency may be invoked when it has been demonstrated that contaminant levels have ceased to

decline over time, and have remained constant for a specified period of time at some statistically significant level above remediation goals, as verified by multiple monitoring wells. Where such a contingency situation arises, ground water extraction and treatment would typically continue as necessary to achieve mass reduction and remediation goals throughout the rest of the area of attainment. The following suggested language describes the recommended contingency measures:

> If it is determined, on the basis of the preceding criteria and the system performance data, that certain portions of the aquifer cannot be restored to their beneficial use, all of the following measures involving long-term management may occur, for an indefinite period of time, as a modification of the existing system:
>
> a) engineering controls such as physical barriers, or long-term gradient control provided by low level pumping, as containment measures;
>
> b) chemical-specific ARARs will be waived for the cleanup of those portions of the aquifer based on the technical impracticability of achieving further contaminant reductions;
>
> c) institutional controls will be provided/maintained to restrict access to those portions of the aquifer which remain above remediation goals;
>
> d) continued monitoring of specified wells; and
>
> e) periodic reevaluation of remedial technologies for ground water restoration.
>
> The decision to invoke any or all of these measures may be made during a periodic review of the remedial action, which will occur at _____ year intervals < at least, every five years, in accordance with CERCLA section 121 (c) >.

Where the contingency implemented differs significantly from that described in the ROD, an **Explanation of Significant Differences** will be issued or it may be necessary to do a ROD amendment. Even where the contingency implemented does not differ significantly from that described in the ROD, it would be advisable to issue an ESD to inform the public of these actions.

Where RODs have been issued prior to this guidance, and information emerges during the implementation and operation of the ground water extraction system which indicates that restoration of the aquifer will not be practicable, these RODs may in some cases have to be amended to accommodate the changes in goals and remedy design suggested by this document.

B. Supporting Language

If a contingency remedy is presented in the ROD, the preceding language should be accompanied by supporting language in the **Comparative Analysis of Alternatives** section of the ROD, which indicates:

a. that both the primary remedy and the contingency measures provide overall protection of human health and the environment, either by reducing contaminants to MCLs/MCLGs or other remediation goals, or through a combination of mass reduction, institutional and/or engineering controls;

b. that chemical-specific ARARs will either be attained or waived.

The **Statutory Determinations** section should establish that both the selected remedy and the contingency measures fulfill CERCLA section 121 requirements. In addition, any ARARs waiver must be justified under the **Compliance with ARARs** determination.

3. INTERIM ACTIONS (moderate to substantial uncertainty, or early action containment measures)

Interim actions may be specified under two scenarios: 1) to prevent further plume migration and initiate cleanup while RI/FS and post-RI/FS activities are being completed; and 2) to obtain information about the response of the aquifer to remediation measures in order to define final cleanup goals that are practicable for the site. Where there is substantial uncertainty regarding the ability of a remedy to restore ground water to drinking water quality (i.e., MCLs/MCLGs) or other beneficial uses, which could be reduced by further information obtained during implementation of a remedial action, it will often be appropriate to select an interim remedial action to prevent further plume migration and initiate ground water restoration.

A. Interim Actions

The purpose of the interim action, as discussed in the Scope and Role of the Operable Unit section, may be to initiate restoration while additional information is collected to better assess the practicability of aquifer restoration prior to the determination of final cleanup levels. Preliminary cleanup levels may be identified, but this section should emphasize that while the purpose of the action is to work toward the goal of restoration, it does not constitute a final action for the ground water. All interim action RODs should specify, to the extent possible, the period of operation that will occur before a final decision is made regarding the practicability of aquifer restoration. At the end of this time, a final action ROD should be prepared which specifies the final remedy goals and timeframe, for the contaminated ground water at the site.

An interim action ROD should include the following type of language in the **Selected Remedy** section.

> This alternative calls for the design and implementation of an interim remedial action to protect human health and the environment. The goal(s) of this remedial action is(are) to (specify interim goals, e.g., halt the spread of a contaminant plume, remove contaminant mass, etc.) and to collect data on aquifer and contaminant response to remediation measures. The ultimate goal of remediation will be determined in a final remedial action for this site. This remedial action will be monitored carefully to determine the feasibility of achieving this goal with this method and to ensure that hydraulic control of the method and plume is maintained. After the period of time necessary, in EPA's judgment, to arrive at a final decision for the site, a final ROD for ground water, which specifies the ultimate goal, remedy and anticipated remediation timeframe, will be prepared. Upon completion of the RI/FS, this interim system may be incorporated into the design of the site remedy specified in the final action ROD.

B. Early Interim Actions

As discussed in the National Contingency Plan (NCP) (55 FR 8846, March 8, 1990), EPA is encouraged to initiate interim actions early in the process, i.e., during the RI/FS. An early interim action may be used to restrict plume migration until an RI/FS for a final remedial action is completed. Information collected during implementation will also be used to evaluate aquifer response to remediation. This purpose should be discussed In the **Scope and Role of the Operable Unit** section.

Early interim action RODs should not specify final cleanup levels because such goals are beyond the limited scope of the action. These will be addressed by the final remedial action ROD.

Both the **Early Interim Action and Interim Action options** should be supported by language in the **Comparative Analysis of Alternatives** section which indicates that these actions may not achieve final cleanup levels for the ground water at the site, although it is effective in the short term in preventing further degradation and initiating reduction in toxicity, mobility or volume. MCLs/MCLGs or state cleanup standards will not be ARARs for these actions because they are beyond the scope of the interim action. The nine-criteria evaluation should focus on those criteria most pertinent to short-term effectiveness and reduction of toxicity, mobility or volume, consistent with the scope and purpose of the interim action. In addition, the **Statutory Determinations** section should discuss the ways in which the interim action satisfies the CERCLA section 121 requirements within the scope of the action (i.e., protectiveness of the remedy).

Action Requested

Language like that provided in this memorandum should be incorporated, where appropriate, in Records of Decision which address contaminated ground water. For additional guidance on preparing Records of Decision for Superfund sites, please refer to OSWER Directive 9355.3-02, “Guidance on Preparing Superfund Decision Documents” (October, 1989).

If you have any questions about this material, please contact your OERR or OWPE Regional Coordinator, Alison Barry at FTS 398-8366 or (703) 308-8366, or Jennifer Haley at FTS 398-8363 or (703) 308-8363, in OERR’s Hazardous Site Control Division.

cc: Superfund Branch Chiefs, Regions I - X
Superfund Section Chiefs, Regions I - X

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