

COMPLETE SITE INVESTIGATION AND CLOSURE REPORTS - WHAT'S MISSING?

For many years the Remediation and Redevelopment (RR) Program has worked with its customers to turn around site investigation (SI) reports and closure requests as quickly as possible to help responsible parties move ahead with the cleanup and reuse goals for their property. In doing so, staff have noticed that, for the majority of denials for site closure, most are due to inadequate site investigation work. It is frustrating for RR staff, as well as for owners and consultants, to find out near the end of a cleanup that additional site investigation work remains to be done. This article summarizes the "puzzle pieces" that are most commonly missing when closure requests are reviewed (previous articles have also addressed this issue; please see "Case Closure With Residual Free Product – Can You Get There From Here?", page 1, *Re News*, December 2002).

1. Definition of the horizontal and vertical extent of contamination. This includes defining the extent of soil contamination, the groundwater contaminant plume, and free product.

a. Soil contamination. After tank or soil removal, soil samples should be taken on all four sides and at the base of the excavation. This information often determines whether a property is listed as a contaminated site. For site investigations, further soil sampling may be necessary to determine the extent of the release. Some soil sampling should be done within four feet of the surface so that a direct contact threat can be assessed. Soil samples should also be taken across property lines, if there is an indication that free product or other hazardous substances have migrated from the originating property.

b. Groundwater plume. Groundwater plumes should be defined vertically and horizontally. Piezometers are necessary at almost all sites to determine vertical gradients and contaminant movement at depth. Defining the edge of the plume is also critical – in fact, natural attenuation cannot be established as a remedy unless it can be shown that the plume margin is stable or receding. Too often, there are large distances between the last, often highly contaminated, well within the plume and the clean downgradient well. Without monitoring wells near the edge of the plume, it may take many years of monitoring before it can be established that the plume margin is stable. Staff recognize that monitoring wells can't always be placed in a preferred location, and that wells located across property boundaries or in rights-of-way (ROWs) can also present problems. However, consultants or owners may contact DNR staff to request agency help in gaining access to critical monitoring locations or to help determine alternative ways to establish an adequate monitoring well network.

c. Free product definition. The horizontal and vertical extent of free product – for both light and dense nonaqueous phase liquid (LNAPL and DNAPL) – needs to be established when free product is present. Free product monitoring, abatement and disposal should be described.

2. Possible receptors identified and defined. Municipal and private wells near contaminated properties need to be identified and located on maps of the contaminated site. Well construction reports and current sampling data (where available) should be included in an SI and closure report. If a surface water body is close to the contaminated site, contaminant

movement toward or into the surface water needs to be identified and possible impacts assessed. Vapor migration to buildings may also need to be investigated.

3. Utilities identified. Utility corridors on-site or near a contaminated site should be identified and their locations indicated on site maps. Site investigation reports should detail the evaluation procedure used to determine the risk of contaminant migration through or along the utility corridors.

4. Consistent groundwater monitoring data. Many contaminated sites are being evaluated for natural attenuation. A consistent monitoring program is critical to assessing contaminant trends. Other issues to be aware of regarding groundwater data include proper collection and reporting of Quality Assurance/Quality Control (QA/QC) data, and submitting data in formats that are easy to read and contain all the necessary information (including detection limits, Preventive Action Limits (PAL), Enforcement Standards (ES), and duplicate sample analyses, etc.).

The first round of groundwater monitoring for petroleum contamination should include a full volatile organic compound (VOC) scan to identify all contaminants; subsequent sampling can consist of petroleum VOCs if no other compounds of concern are identified. Similarly, for other types of contamination, start with a broad analytical protocol and ask the DNR project manager about reducing the parameters based on what turns up in the initial sampling.

5. Data presentation. "A picture is worth a thousand words" is an apt description of the importance of figures and tables to site investigation and closure reports. Accurate, legible site maps; geologic cross-sections, isoconcentration maps, and tables help speed the review process. Summary data tables should include all soil and groundwater data from the start of the project. Appendices should contain groundwater monitoring well forms with signatures and Wisconsin Unique Well Numbers (WUWN), soil boring logs (for all borings, regardless of depth), abandonment forms, chain of custody forms, and other critical information. Wells should be properly surveyed using national geodetic datum.

6. Complete closure forms and GIS packets. Status updates, including groundwater monitoring results, should be submitted to the DNR as site cleanup work progresses. However, all the data should be pulled together by the consultant into a single report when seeking a regulatory decision. A site investigation report or closure report should be a stand-alone document that contains all the information required by administrative code for a "complete" submittal. A DNR closure form should accompany each closure submittal, including resubmitted requests. The GIS packages are also stand-alone documents, even though some of the information required in the GIS packet is repeated in other sections of the closure report.