

**Comments on EPA’s Groundwater Technology Forum Discussion Paper  
“Cleanup Goals Appropriate for DNAPL Source Zones” (July 2004)**

Comment Number	Location/Description	Comment
1	Suggest adding a problem statement to reflect the fact that site owners are often hesitant to commit to expensive DNAPL cleanup because of the uncertainty in technology performance.	Vendor claims of initial technology success often are not realized in subsequent field deployments due to the presence of geological and contaminant distribution heterogeneities that were not encountered during initial field trials. As a result of basing remedial designs on unproven or overstated technology performance, site owners end up over-committing to unrealistic remedial action objectives or Record of Decision (ROD) goals (e.g. reduction of source zone groundwater concentrations to prescribed levels within 2 years, 90% reduction in DNAPL mass, etc.). More independent performance assessments of DNAPL cleanup technologies under a variety of site conditions are necessary for site owners to make informed decisions on when to attempt DNAPL cleanup. Projects A and B listed on page 10 of the Discussion Paper will aid in getting more independent assessments of remedy performance, but more action by EPA is required.
2	Problem Statement no. 3, Lines 39-40 on Page 7	This approach fails to take into account that the main reason why site owners fail to delineate a source zone, which is because of the technical and financial challenges associated with it. In fact, this statement almost assumes that the DNAPL will be found in pools in most cases. The Navy ROCS survey revealed that only in 44% of the sites DNAPL was found in pools. By contrast, 83% of the sites had residual DNAPL, 61% had sorbed DNAPL, 40% had DNAPL diffused into low permeability layers, and 11% had DNAPL trapped in dead-end fractures (Assessing the Feasibility of DNAPL Source Zone Remediation: Review of Case Studies (ROCS), April 2004).
3	Problem Statement no. 4	Even established remedial approaches such as thermal and chemical oxidation also have uncertain reliability and costs. It is critical to establish a reasonable monitoring plan to ensure no rebound and this uncertainty regarding reliability and long-term costs should not hinder the use of long-term cleanup goals.
4	Problem Statement no. 5	This statement fails to credit the rising use of emerging tools to measure performance and determine the effectiveness of DNAPL mass removal. Although mass estimates carry statistical uncertainties, it is still possible to estimate mass removal by estimating mass extracted (by developing a concentration history v. cumulative groundwater pumped), mass destroyed (by measuring Cl- and stoichiometrically estimate mass destroyed, or determining ratios of carbon isotopes), and mass remaining (by collecting soil cores & quantifying mass before and after treatment or conducting partitioning tracer tests). Similarly, although it’s difficult to estimate mass flux because aquifers are not usually homogenous, mass flux can be estimated by: measuring chemicals of concern (COC) concentrations during continuous groundwater extraction, by using integrated pump tests, or by using multi-level wells to measure COC concentrations at multiple locations. In fact, it has been said “Mass flux is often the most meaningful metric in assessing progress towards remedial goals” (ITRC, 2004).
5	Option 2	Option 2 is a good idea. A comprehensive review of Federal cleanup program flexibilities and alternative cleanup goals is necessary to make site owners and the regulated community aware of their options in negotiating cleanup strategies with regulators and public stakeholders

6	Option 2	Take this a step further and do a detailed survey of the states to get a sense of the range of alternative cleanup standards states are allowing in their cleanup programs. Publish this information on a web site with links for more detailed information. Many states are now funding and administrating their own Dry Cleaning and Brownfield's remediation programs. Due to their own funding and resource limitations, states are required to prioritize their cleanups and make cleanup decisions based on alternative cleanup goals
7	Option 5	Option 5 is not required. There has been adequate guidance published on the range of DNAPL characterization technologies available. Examples include: 1) DNAPLs: Review of Emerging Characterization and Remediation Technologies (ITRC, June 2000), 2) An Introduction to Characterizing Sites Contaminated with DNAPLs (ITRC, September 2003), and 3) DNAPL Characterization Methods and Approaches: Part 1 Performance Comparisons and Part 2 Cost Comparisons (Kram et al., Ground Water Monitoring and Remediation, Winter 2002).
8	Option 6	There are several DoD projects funded by SERDP and ESTCP that are already looking into these issues, thus, coordination is essential to avoid duplication of effort.
9	Option 7	This option already been addressed in the DNAPL Remediation ITRC group final report (Draft 2004)

## 2. “Ground Water Use, Value and Vulnerability as Factors in Setting Cleanup Goals”

### Options for Addressing Problems

**Suggest taking Option 6 a step further by establishing a forum for the sharing of geographic information (e.g. ArcView shapefiles) on groundwater plumes and source water assessment areas between regulators involved in drinking water protection and hazardous waste site owners.** Sharing this information among stakeholders from different environmental programs will help in prioritizing site cleanups (i.e. based on risks to drinking water supplies) to ensure that restoration funds are being spent in the most cost-effective manner. A good place to start may be with DoD, DOE, and other federal agencies that already rely heavily on the use of Geographic Information Systems (GIS) for facilities management and planning purposes.