Plume Analytics in EPA Superfund Programs

- Evaluation of contaminant plume dynamics is an integral component of the EPA Superfund program.
- Understanding plume dynamics is essential for evaluating potential remedies as investigated in Feasibility Studies. Application of natural attenuation remedies require a determination of plume stability e g. plume is stable or shrinking. Alternatively, plumes which are migrating require an engineered remedy to halt migration. Centers of mass contributing to plume persistence require an engineered remedy to remove or reduce mass.
- EPA requires an evaluation of remedy performance at regular intervals and a formal review every 5 years. The 5 year review should determine if the remedy is performing as designed and is protective. An evaluation of plume dynamics is an essential component of 5 year reviews.

Methods of Plume Stability Analysis

- Multiple methods are available to interrogate contaminant plumes
- Objectives are to determine whether the plume is stable, e g. not migrating, expanding or shrinking
- Metrics to analyze are: 2D arial extent, 3D volumetric extent, concentration of contaminants, contaminant mass, center of contaminant mass, and changes in extent of 2D and 3D contaminant mass.
- Methods include statistical: Mann-Kendal, linear regression, Sens Slope to evaluate concentration changes in single and multiple wells and Method of Moments, Theissen Polygon and Triangular Network Method to evaluate changes in mass.

Methods of Plume Stability Analysis

- Changes in plume volume can be evaluated with numeric groundwater models, GIS, and others
- Changes in mass can be calculated in readily available software such as MS Excel
- Several computer software programs are available both free such as MAROS, GSI, GWSDAT and proprietary software such as SURFER, ESRI GIS among others.