DRAFT GUIDELINES
RISK BASED SITE CHARACTERIZATION AND SAMPLING GUIDANCE

MINNESOTA POLLUTION CONTROL AGENCY
SITE REMEDIATION SECTION
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EXECUTIVE SUMMARY

The Site Remediation Section (SRS) of the Minnesota Pollution Control Agency (MPCA) developed this Risk Based Site Characterization and Sampling Guidance as part of a program wide guidance development effort. The document is intended to be used for developing sampling and analysis plans at Voluntary Investigation and Cleanup (VIC) and Superfund sites.

The overall objective of this document is to provide guidance on the sampling and analysis requirements for site activities from investigation through closure at sites under the MPCA jurisdiction. This document is organized by media (soil, ground water, air, and sediments), with media-independent topics such as Quality Assurance/Quality Control (QA/QC) and target analytes discussed separately.

This document presents guidelines for collecting data of sufficient quality and quantity to facilitate risk-based site evaluation and remedy selection, as well as remedy verification. The emphasis is on collecting adequate data, while keeping in mind cost effectiveness and rapid progress in site investigation. Since sites vary widely in their size and complexity, it is not possible to present a cookbook on how to sample every site. This guidance is general and is intended to be used, with some flexibility, by competent environmental professionals in their evaluation of sites.

Generally, it is desirable to identify the overall objectives of any environmental investigation prior to collecting samples. Identifying these objectives makes it possible to design a sample plan tailored to the specific needs of a site, resulting in more efficient and cost effective investigations. The data quality objectives (DQOs) should reflect the overall sampling objectives.

In order to make appropriate remedial action decisions, it is usually necessary to evaluate the nature and extent of soil, ground water, and sediment contamination attributable to releases at the site. In addition, the air pathway may need to be evaluated, data for all chemicals of potential concern collected, and hydrogeologic conditions at the site established. The evaluation of all media should include a discussion of the concentrations of contaminants, the physical and chemical nature of the contaminants, and the lateral and vertical distribution of contaminants at the site.

Large amounts of data can be generated at relatively low cost by field screening and field analytical methods. As a result, data produced through field screening and field analytical techniques are becoming increasingly significant in many site decisions. Therefore, it is critical to implement consistent and appropriate QA/QC measures for field techniques. Many of these field methods can be supplemented with laboratory analyses to achieve higher DQOs. In the interest of cost-effectiveness and timeliness, the MPCA is now advocating the use of field labs where appropriate and where an adequate level of QA/QC can be attained. Mobile labs must have a current QA/QC plan on file with the MPCA.

The three main reasons for conducting soil sampling are to evaluate potential human health and ecological risks on the site and in the vicinity of the property in question, to determine the potential for soil contaminants to leach into ground water, and to assess the need and extent of potential remedial actions. The choice of a soil sampling method is based on many factors, including accessibility, cost, soil conditions, and type of data desired.

Verification sampling strategies for soil remediation depend on the type of remediation -- excavation or in-situ treatment. The minimum number of samples and sampling locations are different for each type. While the minimum number of samples required is easily determined for both situations, determining the sampling locations is more complex and requires some professional judgment. The sampling strategies are outlined in the guidance document.

Ground water quality data have traditionally been obtained at permanent monitoring wells constructed to MDH well code specifications. Properly constructed permanent wells produce the highest quality data, and multiple sampling events from the same sampling point are the best way to track temporal changes in water quality. However, ground water monitoring using direct-push techniques may be more appropriate than permanent monitoring wells at some sites. Regardless of the method used, two rounds of ground water samples will generally be required. Detailed guidance on tools and methods for sampling wells is given in the MPCA Example Ground Water Sampling Protocol, which is an Appendix to this guidance document.

Sampling to demonstrate aerobic or anaerobic natural attenuation of contaminants can be accomplished through laboratory and field data collection. Field collection of many parameters can be accomplished without laboratory analysis using field titration or colorimetric kits. The conditions that must be demonstrated before approval of a natural attenuation remedy for ground water are a stable plume, and an appropriate aquifer environment for (bio)chemical degradation. Natural attenuation must be clearly demonstrated on a site-by site basis.

To assure that air sampling efforts provide adequate data for the risk assessment, the sampling and analysis plan should be developed in consultation with the MPCA Risk Assessor. It is recommended that air sampling be planned and conducted by specialists who have a thorough understanding of air sampling theory and technology.

When conducting sediment sampling, the top two- to six inches of sediment is generally considered to be the portion of the sediment column which is available for exposure to ecological receptors. Samples from deeper in the sediment column are also collected for estimates of contaminant volume for remediation or sediment management.