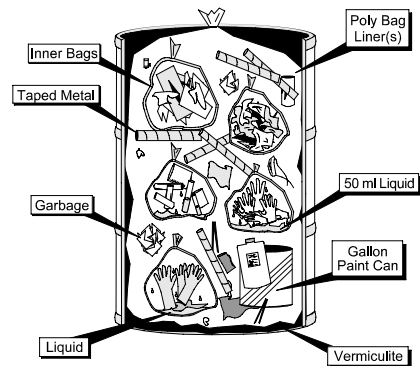




Guidance for Characterizing Heterogeneous Hazardous Wastes



Introduction

The U.S. EPA and the U.S. DOE are interested in addressing the special problems presented in sampling heterogeneous hazardous waste ranging from physically diverse samples from landfills to chemically mixed waste found at many sites. This area of sampling and analysis poses problems to field and laboratory personnel engaged in the identification, classification and

quantitation of potentially hazardous materials.

A recent workshop cosponsored by the DOE Office of Technology Development and the Environmental Sciences Division (ESD) in Las Vegas resulted in a document that provides guidance for scientists working in this challenging area. *Characterizing Heterogeneous Hazardous Wastes: Methods and*

Recommendations (EPA 600/R-92/033) is available to Agency personnel through CERL. This document contains valuable information about proven protocols as well as innovative technologies and recommendations for further research. It presents a typical case study and a survey of the statistics involved in design and analysis.

Planning the Study

This chapter establishes a rational diagram to follow in the sampling and analysis scheme. It is a five-step process: preliminary planning, DQO process, sampling and analysis design, sample collection and analysis, and data assessment. Sampling heterogeneous matrices is

complex and presents a challenge to those planning the study.

Particular stress is placed on asking the right questions at the beginning of a study, searching for any pertinent historical data, and establishing DQOs that are realistic. Examples are provided that prompt readers to look for

potential pitfalls in a sampling scheme. Guidance is provided for the use of nontraditional statistical sampling plans and recommendations are made for the establishment of appropriate confidence intervals.

QA/QC and Data Quality Assessment

In this chapter, the focus is on quality assessment strategies that can be used in the sampling of heterogeneous matrices and in the analysis of the subsequent data. The importance of *a priori* knowledge is stressed. An effective quality assessment process will provide useable data without stipulating onerous procedures upon the already

overworked sampling expert. The correct use of QA/QC samples such as replicates, duplicates, and collocated samples is discussed. Field evaluation samples and field matrix spikes are recommended. Even in unconventional methods, the use of well-planned QA/QC practices can identify random or biased

error and trace the error to its source.

The reader is referred to the document *A Rationale for the Assessment of Errors in the Sampling of Soils* (EPA/600/4-90/013) and to the software package, ASSESS, available through CERL to Agency users.

Sample Acquisition

This chapter specifies sampling procedures that should be followed when sampling heterogeneous hazardous waste – whether contained or uncontained. Contained waste is that found in drums or boxes. Uncontained waste is landfill litter and debris piles that exist at some sites. The monitoring of regulated landfills is required by law. Sometimes state monitoring

requirements are more rigorous than federal guidelines.

Several questions arise when sampling heterogeneous waste. Is it possible to obtain a sample of sufficient representativeness that the resultant data will truly reflect the type and level of contamination at the site? Is it correct to physically separate samples before analysis? Should this separation be based on

physical characteristics or on contamination type? How can health risks be fairly evaluated when the contamination varies in level from trace to high percentages? Can homogenization steps be taken without compromising the quality of the data? These questions are addressed and guidance is given in technologies ranging from soil-gas measurement and open-path FTIR to geophysical methods and

Sample Acquisition*Continued*

aerial photography. Particular emphasis is placed on sample collection procedures and on handling steps. Field screening

methods are discussed: x-ray fluorescence, vapor analyzers, and various spectroscopic techniques. Additional discussion

focuses on radiography, gamma ray assay, and neutron assay methods.

Analytical Laboratory Requirements

This chapter deals with the analysis of the samples as they are received by the analytical laboratory. If the sample arrives as a multiphase liquid or as a collection of various solids, decisions must be made about the analysis. It is crucial that any segregation or homogenization of samples be discussed with the decision makers. The DQOs should be consulted again and, as always, QA/QC plays a vital role in the generation of useable data.

knowledge is important in the laboratory, too.

Fusion methods are discussed for use in the analysis of inorganic contaminants. Neutron activation analysis is suggested for some analyses of radioactive samples. Guidance is provided on the choice of sample size and the consideration of particle size. A table compares various radiation screening devices.

safety precautions. Waste disposal at the analytical laboratory is discussed and the reader is reminded that help exists in this area from the American Chemical Society's Task Force on RCRA.

The importance of proper reporting is stressed because the need for understanding reporting requirements in advance is often critical in the success of a study.

A flow chart is provided to lead the reader through several phases of the laboratory procedure. The consideration of a *priori*

A section on the special requirements of mixed waste samples documents the need for further refinement of analytical methods and the need for proper

For Further Information

For further information about the document, Characterizing Heterogeneous Hazardous Waste: Methods and Recommendations (EPA/600/R-92/003) or to obtain a copy, contact:

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