



CH2MHILL

Applied Sciences Laboratory

Multi-Incremental Sample Preparation for Use in Site Characterization and Remedial Investigation/Action Sampling Programs

CH2M HILL Applied Sciences Laboratory

Multi-incremental Sub-sampling & Analysis Test List

- Sample Particle Size, Classification, and Screening
- Sample Air Drying and Moisture Determination
- Visual Characteristics
- Sample Milling and Particle Size Reduction
- Multi-incremental Sub-sampling
- Large Aliquot Sample Generation
- Large Aliquot Metals Analysis
- Large Aliquot Total Petroleum Hydrocarbon Analysis
- Large Aliquot Pesticide/Herbicide Analysis
- Large Aliquot Semi-Volatile Organics Analysis

Overview

Uncertainty in physical, chemical, and toxicological characterization of soil (and other heterogeneous solid materials) can be driven to unacceptable levels in the absence of proper sampling, sample handling, and preparation. Use of conventional analytical procedures designed for homogeneous materials is inadequate for materials that are non-homogeneous. In the absence of proper sampling techniques and sample handling procedures, fundamental error and data uncertainty is driven to levels that are many times the level of uncertainty associated with the subsequent analytical method(s) performed.

Since the mid-1950s the significance of sampling error and data uncertainty has been taught to mining engineers throughout Europe and the U.S. (Pierre Gy, Francis Pitard, et al).

The U.S. Environmental Protection Agency (EPA) now provides guidelines (EPA/600/R-03/027) on particulate (soil) sampling and analysis techniques based on Pierre Gy's sampling theory. Following these guidelines, which include the principals of multi-incremental sampling and multi-incremental sub-sampling, it has been shown (F. Pitard, C. Rames, et al) that uncertainty and fundamental error can be reduced to acceptable levels.

Prior to EPA's published guidelines, in general it could be said that in the investigation of soil contamination (and other non-homogenous materials), sampling and handling practices have not always received the attention necessary to obtain data with acceptably low uncertainty. To remedy this situation, CH2M HILL's Applied Sciences Laboratory (ASL) offers customers multi-incremental sub-sampling, sample preparation, and large aliquot analysis methodologies that are consistent with EPA's recently published guidelines.

ASL was a participant in one of the first pilot studies using the multi-increment sample collection design

Hanford Nuclear Reservation

ASL's Qualifications

CH2M HILL's ASL offers customers laboratory sample preparation procedures that are complementary to EPA's guidelines for multi-incremental sampling programs. ASL was a



Sub-sampling Prep Area



Air Drying Room

participant in one of the first pilot studies using the multi-increment sample collection design. This pilot study was commissioned by the Washington-Hanford Closure Group and performed on large, open burn pits at the Hanford Nuclear Reservation. The study clearly demonstrated the benefits of multi-incremental sample collection, multi-incremental sub-sampling, sample preparation (conditioning and aliquot creation), and large aliquot sample analysis.

Multi-incremental sample collection and sample preparation are uniquely different than conventional sample handling and preparation. The benefits and value of this approach are realized when the probabilistic (statistical) aspects of the multi-incremental approach are maintained. To do so requires special procedures for sample handling, sample conditioning, sub-sampling (analytical aliquot

generation), grinding, and robust analytical procedures for large aliquot analysis. ASL brings all the necessary laboratory standard operating procedures (SOPs) to your project. We have successfully shown that use of these SOPs will reduce data quality uncertainty and the fundamental error associated with soil analysis down to levels that are equal to the uncertainty found in standard EPA analytical methods.

Multi-incremental sampling methodology and the appropriate downstream laboratory processing procedures have been shown to greatly reduce the cost of remedial investigations. This same approach can be applied to any heterogeneous material. It is particularly appropriate in instances where only wide spatial characteristics are needed or where the average characteristic of large volumes of material is desired.

Contacts

For more information on this and other services CH2M HILL's ASL can provide, please contact:

Kathy McKinley

(kathy.mckinley@ch2m.com)
CH2M HILL Laboratory Client Services Manager
541-768-3144

Mark Boedigheimer

(mark.boedigheimer@ch2m.com)
CH2M HILL Applied Sciences Laboratory
Director
541-768-3125

General Customer Service Questions

(asl@ch2m.com)
541-768-3120



CH2MHILL
Applied Sciences Laboratory