Agenda:
Planning and Quality Methods for Pile Sampling Training
for the
Idaho Department of Environmental Quality

April 13 - 14, 2016
Boise, Idaho

Pile Sampling represents a unique environmental sampling and characterization challenge. Although piles are often smaller and more well-defined spatially than other environmental site situations, access issues complicate the sampling process efforts to obtain representative samples. Furthermore, piles characterization goes beyond chemical and radiological analysis, introducing the need for characterizing biological pathogens, which introduces temporal elements.

Systematic planning, Geostatistical Error Management (GEM), Data Quality Objectives (DQOs), and Sampling Theory & Practice (STP) contribute proven structures and technology towards accurate assessment and disposition of waste piles. This training class emphasizes the importance of using tested project execution approaches and state-of-the-art environmental characterization techniques to manage uncertainties and errors, which allows decision-making with maximum confidence.

This class focuses on the design of sampling and characterization programs that minimize sample and decision errors, with special emphasis on sampling errors, which EPA recognizes as the largest source of error in characterization. Using "experiential" (hands-on) sampling using proprietary physical models, attendees will experience the life-cycle of a site characterization process along with the associated data quality and statistical issues to be managed during a project. Specialized public domain software programs Visual Sample Plan and ProUCL will also be demonstrated.

Day 1

8:30 – 8:45 am	Welcome and Course Overview
8:45 – 9:30 am	Introduction to Data Quality Objectives
9:30 – 9:45 am	Break
9:45 – 10:45 am	Sampling Theory & Practice: Impacts of Heterogeneity
10:45 – 11:00 am	Break
11:00 – 12:00pm	Sampling Theory & Practice: Correct Sampling Equipment
12:00 – 1:00 pm	Lunch on your own
1:00 – 1:45 pm	Experiential Sampling: I'm Peppy© Pasta Models
1:45 – 2:45 pm	Environmental Statistics
2:45 – 3:00 pm	Break
3:00 – 4:15 pm	Statistical Problems and Issues
4:15 – 4:30 pm	Questions & Answers

Day 2

8:30 – 9:45 am	Once a Molecule – A Foundation for Incremental Sampling Methodologies
9:45 – 10:00 am	Break
10:00 – 11:30 am	Incremental Sampling
11:30 – 12:00 pm	Questions & Discussion
12:00 – 1:00pm	Lunch on your own
1:00 – 1:45 pm	Sampling and Statistical Software: Visual Sample Plan and ProUCL
1:45 – 2:30 pm	DQO Case Study 1: Biosolids Composting
2:30 – 2:45 pm	Break
2:45 – 3:30 pm	DQO Case Study 2: Petroleum Contaminated Soils
3:30 – 4:15 pm	DQO Case Study 3: Pesticides in Soils
4:15 - 4:30 pm	Questions & Answers

Day 1

8:30 – 8:45 am Welcome and Course Overview

8:45 – 9:30 am Introduction to Data Quality Objectives

The DQO process addresses two major sources of uncertainty and error: (1) Sampling Error; and, (2) Laboratory Error. Whereas many DQO efforts focus on laboratory error, proper characterization focuses on the minimization of sampling errors, which are known to be the largest source of error. This module will present the relationship between GEM, DQOs, and STP.

9:30 – 9:45 am Break

9:45 – 10:45 am Sampling Theory & Practice: Impacts of Heterogeneity

Sampling of particulate materials such as soils is fraught with errors due to heterogeneous materials. Pierre Gy has identified the seven errors associated with sampling soils and other particulate materials. This module presents the sampling errors of STP along with quantification and mitigation strategies. These techniques are crucial components of Incremental Sampling Methodologies (ISM).

10:45 – 11:00 am Break

11:00 am – 12:00 pm Sampling Theory & Practice: Correct Sampling Equipment

Heterogeneities complicate the sampling process and introduce the need for "correct" sampling devices to extract appropriate sample increments. This module will discuss correct and incorrect sampling devices for field sampling and laboratory subsampling.

12:00 – 1:00 pm Lunch on your own

1:00 – 1:45 pm Experiential Sampling: I'm Peppy© Pasta Models

STP and ISM are based on theoretical constructs that have been field-tested on environmental projects. In order to gain a practical and "experiential" knowledge of these techniques, attendees will use "I'm

Peppy©"physical models to field test the theory. The relationship of sample support (physical volume/mass) and statistical distributions will be demonstrated.

1:45 – 2:45 pm Environmental Statistics

Even with the best quality data, statistical analyses are required to design defensible sampling programs to minimize decision errors. Myriad potential reasons for sampling; consequently, many possible approaches may be applied to sampling. This module will discuss how to match sampling objectives with field sampling design and implementation so decision errors can be minimized and the DQO error constraints met.

2:45 – 3:00 pm Break

3:00 – 4:15 pm Statistical Problems and Issues

The power of statistical sampling and Data Quality Assessment (DQA) is recognized by EPA and other regulatory agencies. However, each statistical technique is subject to its own strengths and weaknesses. This GEM module discusses the potential pitfalls of various methods and provides guidance on how to detect potentially inappropriate statistical applications

4:15 – 4:30 pm Questions & Answers

Day 2

8:30 – 9:45 am Once a Molecule – A Foundation for Incremental Sampling Methodologies

The relationship between a *sample* and a *composite* or *incremental sample* is the source of frequent debate. GEM techniques have demonstrated that the physical size of a sample, whether a single molecule or mass of several tons, is the critical component in producing quality field samples. This module explores the relationship between sample volume (*support*) and statistical distributions.

9:45 – 10:00 am Break

10:00 – 11:30 am Incremental Sampling

Incremental Sampling Methodologies minimize sampling errors through application of STP. This process includes the implementation of a coordinated field and laboratory effort that is typically more rigorous than traditional compositing approaches. This module will introduce the implementation of ISM, including situations where it is applicable.

11:30 – 12:00 pm Questions & Discussion

12:00 – 1:00 pm Lunch on your own

1:00 – 1:45 pm Sampling and Statistical Software: Visual Sample Plan and ProUCL

Public domain computer software is available to assist in designing, implementing, and assessing the quality of a sampling program. Visual Sample Plan (VSP), developed by the U.S. Department of Energy,

focuses on the design of sampling field programs. ProUCL, developed by U.S. EPA, analyzes statistically the sample results from field investigations. These programs will be demonstrated and discussed.

1:45 – 2:30 pm **DQO Case Study 1: Biosolids Composting**

Elimination of biologic pathogens from biosolids materials is accomplished through composting procedures. Temperatures in the pile must be sustained for a period of time before the material can be released for public use. This module discusses the DQO process related to determining if free release of composted material will be protective of public health.

2:30 – 2:45 pm **Break**

2:45 - 3:30 pm **DQO Case Study 2: Petroleum Contaminated Soils**

Petroleum contaminated soils are commonly treated through land farm techniques. This is a time-consuming process and soils must be sampled periodically to determine whether the process is complete. This module will explore applicable sampling techniques and decision approaches, including a composite sampling methodology.

3:30 – 4:15 pm **DQO Case Study 3: Pesticides in Soils**

Property redevelopment often encounters soils that may contain contaminants of concern based on site history, material evidence (drums, etc.), or previous sampling. This DQO case study applies a presence or absence decision approach to determine an appropriate disposition of soil materials.

4:15 – 4:30 pm **Questions & Answers**

4:30 pm **Adjourn**