General Field Sampling Guidelines
ERT SOP # 2001

Sampling is the selection of a representative portion of a larger population or body (i.e. target population). The primary objective of all sampling activities is to characterize a site accurately in a way that the impact on human health and the environment can be evaluated appropriately.

Sampling Designs

- Judgmental Sampling
- Probability-based Sampling
  - Simple Random Sampling
  - Systematic Sampling
  - Stratified Sampling

Judgmental Sampling

- Based on professional judgement and technical knowledge of site (biased sampling)
- Specific samples based on background information
- Often used to target areas of known chemical spills or visible staining
- May not be representative of the full site

Examples:

- Enforcement sampling
- Sampling of off-site migration pathways
- Sampling of illegal dumping sites
- Sampling of all containers at a meth lab

Probability-Based Sampling
Simple Random

Simple Random Sampling

- Sample locations are randomly determined statistically.
- Suitable for sites where concentrations of contaminants of concern are assumed homogenous throughout the site

Probability-Based Sampling
Systematic Sampling

Systematic Grid Sampling

- Samples are collected at each node (where lines intersect) of a grid; origin point of grid is selected at random.
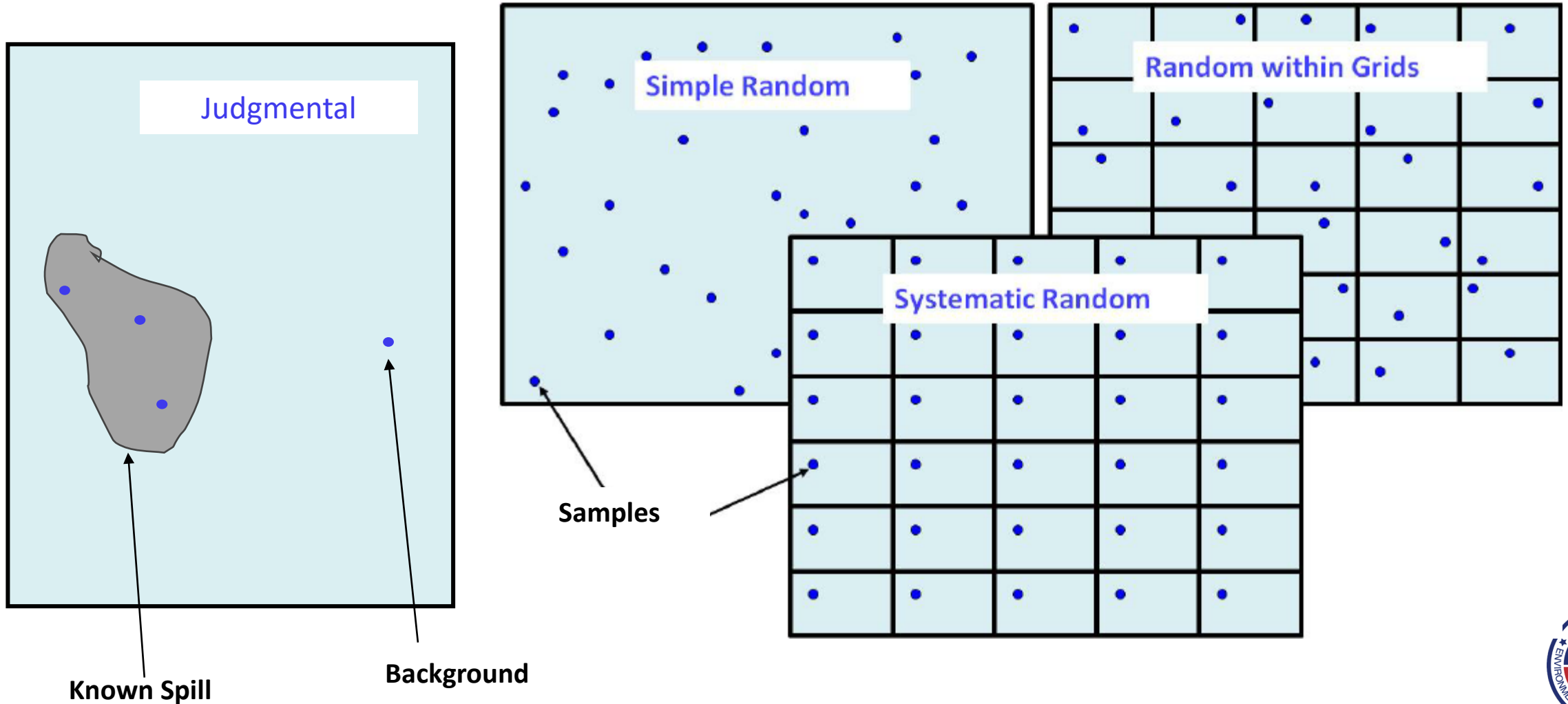
Systematic Random Sampling

- A random sample location is selected within each grid cell or decision unit

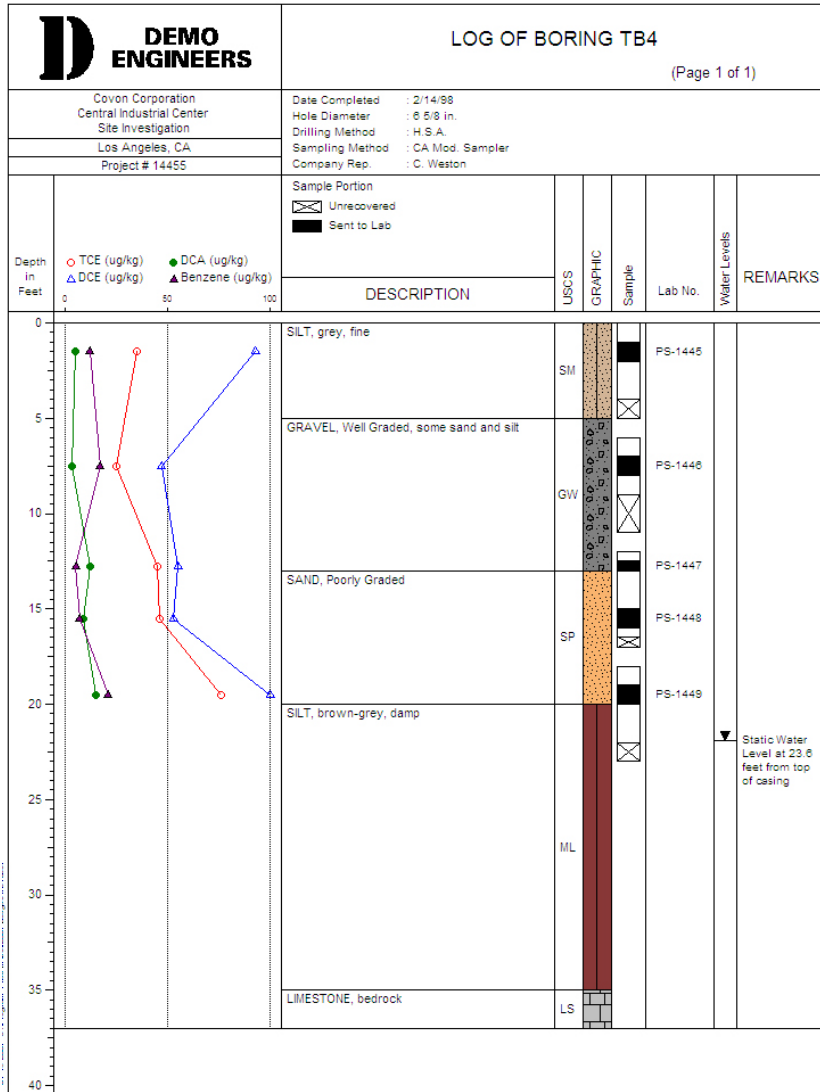# Probability-Based Sampling
Systematic Sampling

Judgmental

Known Spill

Background

Simple Random

Samples

Systematic Random

Random within Grids

Stratified Sampling

- A site with heterogenous conditions is separated into multiple homogenous layers.
- Each layer may be sampled using judgmental sampling, random sampling, or systematic sampling.

Sampling Techniques

Grab Sample

- Discrete sample collected at a specific location and/or time
- Investigate area(s) for the presence or absence of contamination

Composite Sample

- Non-discrete sample composed of two or more equal aliquots collected at various locations.
- Represent an average concentration within the composite area

Sampling Techniques

Soil homogenization (mixing)

In-line filter setup

- **Homogenization:** Mixing of a soil and sediment sample to obtain a representative sample

- **Filtration:** In-line filters are used when collecting water samples for dissolved metals analysis.

QA/QC Samples

Identify, measure, and control the sources of error that may be introduced throughout the sampling process.

- Quality Assurance Samples:
  - Used to determine if environmental data meet established quality criteria.

- Quality Control Samples:
  - Used to establish laboratory or analyst specific precision and bias, or to assess the performance of the measurement system.
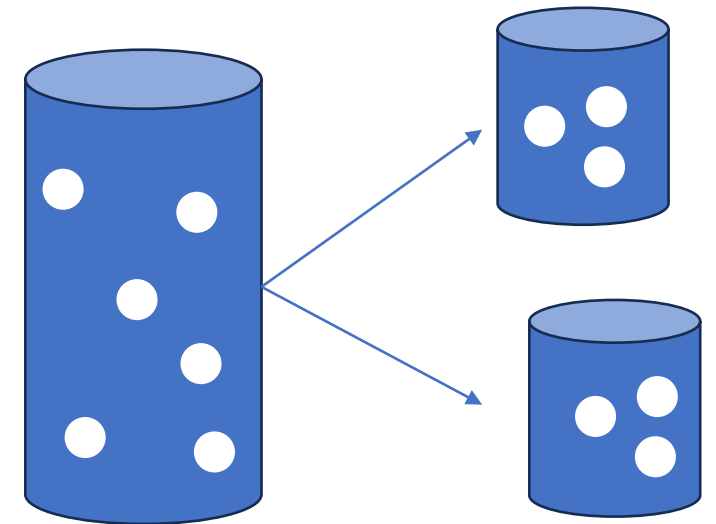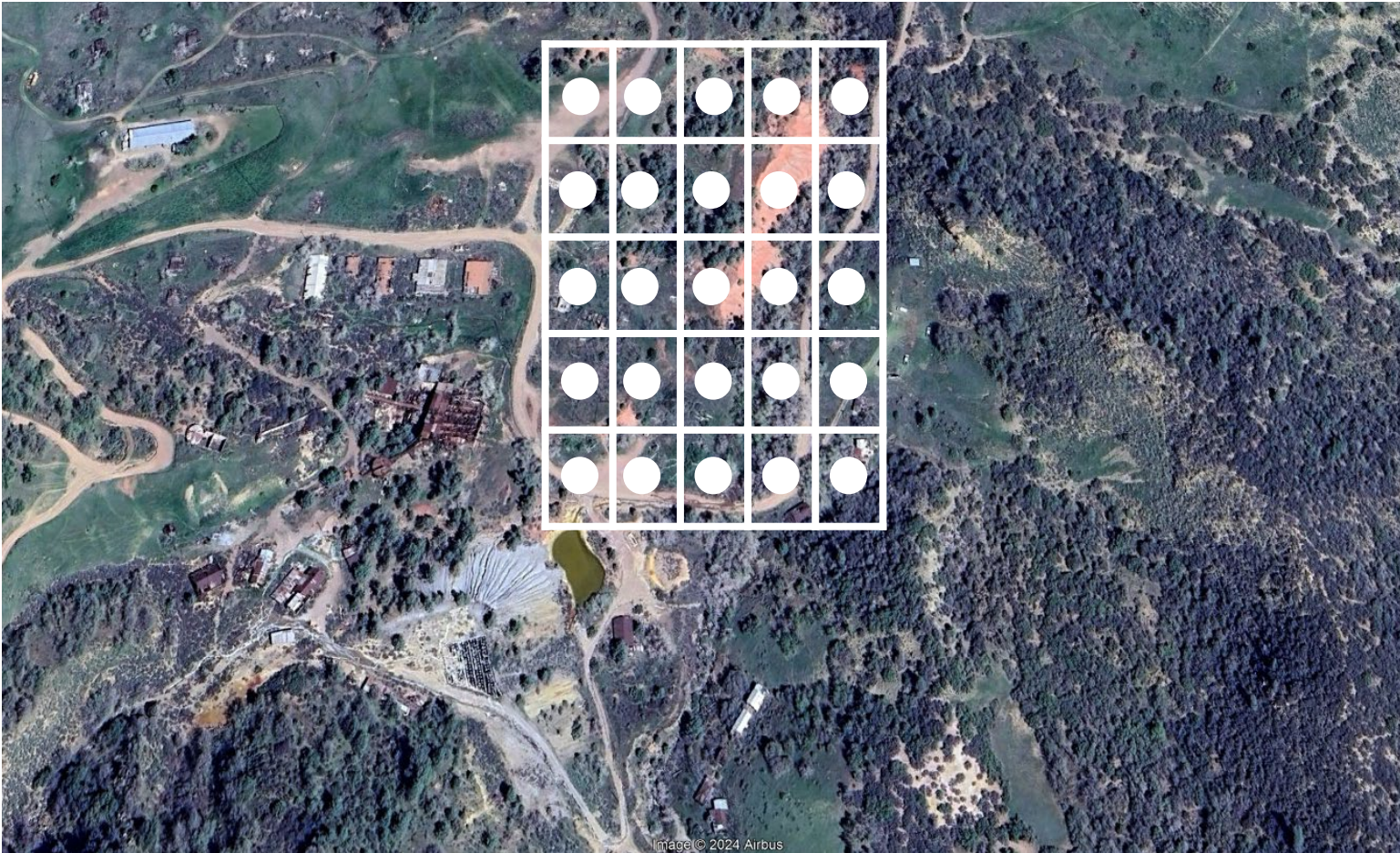
QA/QC Sample Types

- **Field Duplicates**
  - Two samples collected concurrently (in the same sampling event, under the same conditions) from a single location. Used to measure variability and precision associated with the sampling process including sample heterogeneity, sampling methodology, and analytical procedures.
- **Field Replicates**
  - Field samples obtained from one location, divided into separate containers and treated as separate samples. Assess error associated with sample heterogeneity, sampling methodology, and analytical procedures.
- **Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples**
  - Extra volume/mass is collected for MS/MSD samples. Environmental samples are spiked in the laboratory with a known concentration of target analytes to verify percent recoveries. Used to check sample matrix interferences and to monitor laboratory performance.

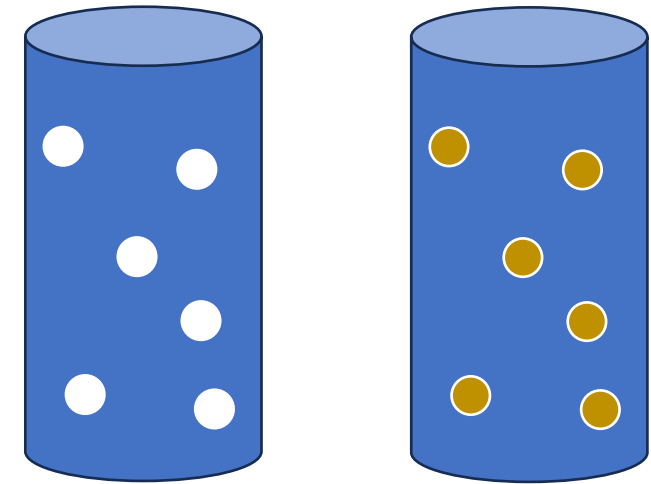# QA/QC Sample Types
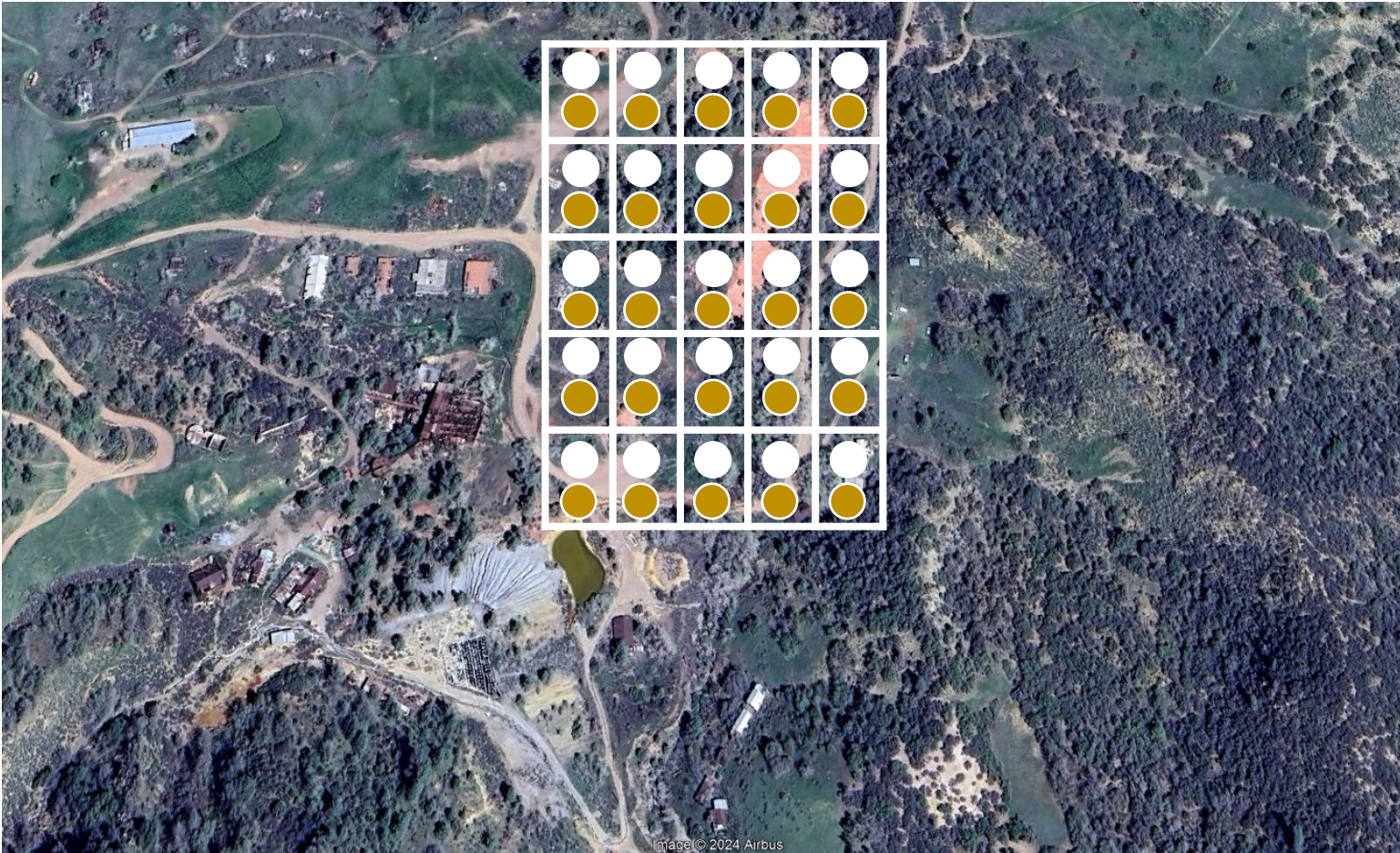

Field Duplicate vs Field Replicate example:

Field Replicate

QA/QC Sample Types

Field Duplicate vs Field Replicate example:

Field Duplicate

- **Equipment Blanks (Rinseate Blanks)**
  - Samples obtained by running distilled/deionized water over the decontaminated sampling equipment to test for residual contamination.
- **Field Blanks**
  - Prepared in the field by filling the sample container with clean matrix. Evaluates contamination error associated with field operations or with shipping. May also be used to evaluated contamination error from laboratory procedures.
- **Trip Blanks**
  - Only required for volatile organics analysis. Consists of clean matrix, prepared prior to going into the field which is then handled, transported, and analyzed in the same manner as the other samples. Used to evaluate contamination error from sample handling, shipment, laboratory handling, and analysis.