Surface Soil Sampling

Katherine Kruse
Tribal Lands Forum 2012
Overview

- Trainings
- Quality Assurance Project Plans
- Standard Operating Procedure
- Equipment & Supplies
- Procedure
- Data & Records
- Sampling and Analysis Plan
- Quality Assurance/Quality Control
- Health and Safety Plan
- Hands on activities
Trainings

- HAZWOPER 40 hour
- Sampling for Hazardous Materials
  - www.trainex.org
  - 2.5 day course
  - Covers soil, groundwater, surface water, and waste
- The Nielsen Environmental Field School
  - http://www.envirofieldschool.com/
  - Field courses covering groundwater monitoring, groundwater sampling, surface water & sediment, soil, and groundwater monitoring well design
  - Certification program
  - Environmental Field Conference
QAPPs

- Quality Assurance Project Plan
  - EPA funded environmental programs required to establish and implement a quality system
  - EPA also requires that all environmental data used in decision making be supported by an approved QAPP

- Purpose
  - Integrates all technical and quality aspects of a project
  - To provide a project-specific “blueprint” for obtaining the type & quality of environmental data needed for a specific use
QAPPs continued

- **Outline**
  - Project Management
  - Data Generation and Acquisition
  - Assessment and Oversight
  - Data Validation and Usability

- **Resources**
  - http://www.epa.gov/quality/qapps.html
Soil Sampling SOP

- Purpose and Applicability
- Summary of Method
- Definitions
- Health and Safety Warnings
- Cautions
- Interferences
- Personnel Qualifications
- Equipment and Supplies
- Procedure
- Data and Records Management
Equipment & Supplies

- SAP, HASP, maps, etc.
- Clipboard - pens, pencils, marker
- Field notebook
- Camera - GPS camera
- GPS unit/Trimble W/ ArcPad
- Extra batteries
- Field scale - sensitive to 0.1 gram
- Calibration weight
- PID
- Appropriate sample containers and labels
- Stainless steel scoops, bowl
- Flags
Equipment & Supplies

- Shovel/rake
- Baggies- quart & gallon
- Packaging tape
- Scissors
- Gloves- nitrile & work
- First aid kit
- Liqui-Nox detergent
- Scrub brush
- 2-5 gallon buckets
- Garbage bags
- Distilled water
- Plastic sheeting
Procedure

- Soil sampling locations
  - Biased sampling approach
  - Identified RECs
  - Visually impacted soil
  - Obvious points of discharge
  - Locations of USTs or associated piping
  - Preferential pathways for contaminant migration

- Soil sampling methods
  - Remove leaves, grass and surface debris
  - Use clean stainless steel spoon/scoop
  - Grab vs. Composite
Procedure

- VOC analysis
  - Taken prior to disturbing soil
  - EPA Method 5035
  - Includes pre-weighed 40 ml vial, 10 ml ampule of methanol, sampling syringe
  - Weight sample syringe to nearest 0.1 gram
  - Obtain a 10 gram sample
Procedure

- Screening of Organic Vapors in Soil
  - Half fill Ziploc® bag
  - Vigorously shake for at least 30 seconds
  - Temps below 32° F
  - Unzip corner of bag insert probe
  - Record response
Data and Records

- Field notebook
  - Sample locations
  - Sampling times
  - Type of sample
  - Who
  - Soil type, color, moisture

```
take gps points of sample loc. + sample loc. photos
left site @ 3:15p
field notes taken by Jennifer Merke 8/17/11

8-2-12 Ben Rd. Property Soil Sampling
Katie Kruse, Jen Merke, Chris Chosa/THRO
arrive @ 9:50a

BR-SS-1 WP# 549 SVOC/metals
soil type = clay loam sheen = no
color = dark brown  HS = 0.1 ppm
odor = no  time taken = 10:15a
moisture = moist
* sample collected next to junk vehicle on northern portion of property.

BR-SS-2 WP# 550 SVOC/metals
soil type = silty clay odor = no
color = brown sheen = yes
moisture = moist  HS = 0.1 ppm
* sample collected S. of junk vehicle
underneath vehicle motor? which looks corroded maybe acid
time taken = 10:15a
```
# Data and Records

## KBIC Natural Resources Department
### Surface Soil Sampling Log

<table>
<thead>
<tr>
<th>Project Name:</th>
<th>Location:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date:</td>
<td>Location:</td>
</tr>
<tr>
<td>Field Team:</td>
<td>Location:</td>
</tr>
<tr>
<td>Sample #:</td>
<td>Interval: -</td>
</tr>
<tr>
<td>Tag:</td>
<td>Bottle:</td>
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<tr>
<td># Collected:</td>
<td>Bottle:</td>
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<tr>
<td>Lab Sample Type:</td>
<td>VOA</td>
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<tr>
<td>Soil Type:</td>
<td>Color:</td>
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<tr>
<td></td>
<td>Odor:</td>
</tr>
<tr>
<td></td>
<td>Moisture:</td>
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<tr>
<td>Headspace Vapor:</td>
<td>Sheen</td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
</tr>
</tbody>
</table>

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**USDA Soil Texturing Field Flow Chart**

- Remove any material larger than 2 mm in size and start with approximately 25g of sediment in pain. Add water dropwise and knead the soil to break down all aggregates. Stop adding water when soil is plastic and moldable.
- Place tail of soil between thumb and forefinger gently pushing the soil with the thumb, squeezing it upward into a ribbon. Form the ribbon with uniform thickness and width. Allow the ribbon to extend over the forefinger, breaking from its own weight.

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**Texture Class & Quantity**

- Sandy Loam
- Clay Loam
- Sandy Clay
- Clay

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**Compositional Texture Modifiers**

- Organic Class
- Silt Clay
- Clayey Silt
- Silt Loam
- Loam
- Loamy Sand
- Sandy Loam
- sandy loam
- sandy clay
- sandy clay-loam
- clayey loam
- clay

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**Texture Class & Quantity**

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- Clay Loam
- Sandy Clay
- Clay
## Data and Records

![Image of a Chain of Custody Record form](image)

### Chain of Custody Record

<table>
<thead>
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<th>Analyses Requested</th>
<th>Page of</th>
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<tbody>
<tr>
<td>A</td>
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<td>B</td>
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<tr>
<td>G</td>
<td></td>
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<td>H</td>
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### Test Details

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Sample ID</th>
<th>Containter Code</th>
<th>Sample Date</th>
<th>Sample Type</th>
<th>Notes</th>
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### Sample Details

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</table>

### Laboratory Details

<table>
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<th>Comments</th>
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Sampling and Analysis Plan

- **Introduction**
  - Project objective
  - Site background information
  - Property reuse
  - Identified site issues
  - Site figures/maps

- **Site investigation**
  - Type of sampling
  - Collection and handling
  - Handling waste
  - Decontamination procedures
## Sampling and Analysis Plan

- **QA/QC**
- **Reporting**

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>No. of Samples</th>
<th>Duplicate</th>
<th>Total Samples</th>
<th>MS/ MSD</th>
<th>Analysis- TriMatrix</th>
<th>Containers</th>
<th>Preservation</th>
<th>Turnaround Time (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Soil</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>-</td>
<td>VOC</td>
<td>1-40 ml VOA vial, 1-10 ml ampoule of MeOH, 1-sampling syringe</td>
<td>4°C, MeOH in field</td>
<td>14</td>
</tr>
<tr>
<td>Surface Soil</td>
<td>12</td>
<td>1</td>
<td>13</td>
<td>-</td>
<td>SVOC, Metals</td>
<td>250 ml wide mouth glass</td>
<td>4°C</td>
<td>14 180 - Metals</td>
</tr>
<tr>
<td>Methanol Blank</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>VOC</td>
<td>1-40 ml VOA vial</td>
<td>MeOH in field</td>
<td>14</td>
</tr>
<tr>
<td>Field Blank</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>VOC, SVOC, Metals</td>
<td>Lab supplied</td>
<td>HCl, Cool to 4°C</td>
<td>14 180 - Metals</td>
</tr>
<tr>
<td>Trip Blank</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>VOC</td>
<td>Lab supplied</td>
<td>HCL, Cool to 4°C</td>
<td>14</td>
</tr>
<tr>
<td>Equipment Blank</td>
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<td>-</td>
<td>1</td>
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<td>VOC, SVOC, Metals</td>
<td>Lab supplied</td>
<td>HCL, Cool to 4°C</td>
<td>14 180 - Metals</td>
</tr>
</tbody>
</table>
QA/QC

- Methanol blank
- Equipment blank
- Field blank
- Trip blank
- Temperature blank
- Duplicate sample
Health and Safety Plan

- General Information
- Possible Site/Waste Characteristics
- Hazardous Evaluations
- On-Site Control
- Emergency Information
- Emergency Routes
- Standard Safe Work Practices on Contaminated Sites
Hands on Activities

- Station 1: Screening for organic vapors in soil
- Station 2: Soil sample for VOC analysis
- Station 3: Grab soil sample
- Station 4: Determining soil type
- Station 5: Collecting an equipment blank