Common Misconceptions about Sample Analysis

1. Defensible laboratory analyses are always correct.
Many site investigators assume that sending samples to a laboratory and specifying the use of an "EPA-approved method" takes care of data quality. But good analytical techniques do not necessarily ensure good data. For example:

- Samples collected from a small number of locations may not be truly representative of site conditions.
- Soil conditions and contamination concentrations can vary tremendously over just a few feet.
- Improper handling of sample collection and transport can lead to incorrect analytical results.
- Chemicals can volatize into the air, or contamination from transportation can lead to incorrect analytical results.
- Improper handling of samples during collection and transport may not be truly representative of site conditions.
- Preservation of samples can also alter chemical characteristics.
- Consultants do not always fully understand the quality assurance/quality control (QA/ QC) data from the laboratory, which can significantly change the interpretation of results. For instance, the lowest concentration the laboratory can report is a particular analysis might be higher than the regulatory action level for the contaminant. As a result, concentrations reported as undetectable might still be of serious concern.
Large number of samples analyzed with real-time data generation in the field should be legally defensible as long as:

- The method used is the same as the one used to generate the reported data.
- The laboratory conducting the analysis is certified by the US EPA Technology Innovation Program, www.epa.gov/tio.

2. Sample data can be used to test the CSM predicted by the historical data—over time, contaminant concentrations can move or degrade in the environment.
- Contaminant concentrations predicted in the current data confirm these predictions, you can place more confidence in the older data.
- Look for historical trends in contamination concentrations, such as seasonal variations.

3. Clear Reporting

The environmental consultant must prepare a report summarizing the site investigation (SI) activities and their results. The report should address the following:

- The conceptual plan
- Site figure, drawn to scale and generally larger than 8 x 11, with:
  - north arrow
  - a clear and descriptive key
  - property lines and surrounding land maps
  - outline, underground storage tanks (USTs), underground injection controls (UICs), floor drains, etc.
  - areas of potential concern (such as chemical storage areas or open waste disposal areas)

- Groundwater and soil contamination contour maps for each site investigation (SI) activity performed, analytical results, applicable standards, etc.

- If using data collected more than a year before the decision was made. The report should contain text and graphics to compliment the text of the report—a picture is worth a thousand words.

- Clearly define the extent of contamination and potential risks, particularly to off-site areas.
- Discuss all data, including each outlier, and not oversimplify.
- Demonstrate that the data support the conclusions reached.
- Clearly present data
- Clearly define the data set used to support a conclusion and determine cause.
- Organize contaminant maps, including flow direction, classification, and depth to groundwater.
- Groundwater and contaminant contamination contour maps for each site investigation (SI) activity performed, analytical results, applicable standards, etc.
- Graphs depicting data trends if data over time are available.
- Copies of all analytical reports from laboratories, including QA/QC documents.
- Color digital photographs of primary areas of concern and other relevant information that could be photo-documented to compliment the text of the report—a picture is worth a thousand words.

Including the information can greatly improve the clarity, thereby decreasing the chance that state regulators will need to request additional information.

4. Compliance with State Requirements

Details on state-specific regulatory requirements and reporting requirements can be found at:

- Connecticut Department of Environmental Protection
  Building Safety Standards
  (860) 629-3022
  www.depp.state.ct.us/cpinfo/pubs/30series.htm

- Delaware Department of Natural Resources and Environmental Control
  Men's Health Unit
  (302) 739-4644
  www.dnREC.state.de.us/environmental/healthandwellness.htm

- Massachusetts Department of Environmental Protection
  Section on Site Characterization, Division of Responses and Remediation
  (617) 950-5000
  www.mass.gov/massdepadm/sectiononsitecharacterization.htm
  Men's Health Unit
  (617) 727-8452
  www.mass.gov/massdepadm/sections/healthandwellness.htm

- New Hampshire Department of Environmental Services
  Site Characterization Branch
  (603) 271-2050
  www.nh.state.nh.us/environmental/services/characterization.html

- New Jersey Department of Environmental Protection
  Office of Land Use and Waste Management
  (609) 292-1250
  www.depw.state.nj.us/landuse/wl註/assistance.html

- New York Department of Environmental Conservation
  Office of Environmental Remediation
  (518) 402-9706
  www.dec.state.ny.us/website/der
  www.dec.state.ny.us/website/der/guidance/860-3888

- Outdoor Structures Environmental Management
  (401) 222-2797
  www.dem.state.ri.us/website/property/渚/assistance__sites/property_management.htm

- Rhode Island Department of Environmental Management (RDEM)
  (401) 222-2797
  www.dem.state.ri.us/website/property/渚/assistance__sites/property_management.htm

- Vermont Department of Environmental Conservation
  Waste Management Branch
  (802) 241-3888
  www.anr.state.vt.us/dec/wastediv/sms/SI_Procedures.pdf

- Virginia Department of Environmental Quality
  Section on Site Characterization, Division of Responses and Remediation
  (804) 786-2700
  www.deq.state.va.us/website/property/渚/assistance/index.htm

A guide for property owners, buyers and sellers, attorneys, bankers, insurance representatives, and their environmental consultants.

A site investigation (SI) determines whether a property has been affected by chemical contamination and whether the contamination is at levels that require cleanup under state regulations. The concepts promoted in this brochure may or may not be required by state regulation. However, following the 4C's is more likely to result in a project that moves through the system faster and is more resource-efficient for all involved – responsible parties, consultants, and state regulators.
2. Collection of sufficient data

Collecting and analyzing sampling from locations that sufficiently reflect the nature and extent of contamination will lead to development of a rationale for further study, the development of a primary fact from inferences, and the decision criteria. The future sample, the greater the uncertainty about the conclusions drawn. Information from sampling is collected and analyzed—therefore the overall reliability of the data collection and analysis will affect the data on site investigation project and (usually taking time). With this end time, commands can form sample collection in perform areas, eliminate unnecessary sample, and better target the samples sent for laboratory analysis. Make sure that the site investigation methodology has been established and this is for the use as site.

Rapid sampling technologies

The development of most commonly used today include direct push technologies (for soil, groundwater, and gas sampling) and multiwell (for groundwater monitoring)

<table>
<thead>
<tr>
<th>Mechanisms</th>
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The rapid sampling techniques most commonly used today include direct push technologies (for soil, groundwater, and gas sampling) and multiwell (for groundwater monitoring).

- Define the nature and extent of contamination to determine appropriate risk options
- Determine: - 107 to 70°C sampling grid placed across the site - direct-push methods used to collect samples down to target depth - Based on the on-site analytical results, additional samples can be taken at an area - Develop sample analysis for TPH and PCB using ultraviolet fluorescence test sites (using micro extraction prior to analysis)

Project Goal:

- Characterization: - 103 samples analyzed for TPH using a gas chromatograph (GC) with electron capture detector (ECD). - based on the on-site analytical results, limited number of samples should be analyzed for TPH and PCB using ultraviolet fluorescence test sites (using micro extraction prior to analysis). - Develop sample analysis for TPH and PCB using ultraviolet fluorescence test sites (using micro extraction prior to analysis)

- Cost savings: Estimated at 35 percent compared to a "traditional" characterization effort - managing includes the cost increased upfront cost.


Direct-push units use the weight of a vehicle, in combination with a hydraulic or mechanical "shoe" directed on the soil. The result is a small borehole but no soil core, therefore eliminating the time and cost of soil sampling. For more information, see: - http://fate.clu-in.org/direct_push/dpgroundwater.asp - http://www.itrcweb.org/documents/scm-1.pdf

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Innovative on-site techniques can greatly increase the number of samples analyzed during fieldwork compared to traditional sampling strategies, increasing time savings (and usually saving time)!

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