

Proper Soil Sampling Techniques

How to be Smarter than the
Dirt



Today's Speaker

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What Are the Problems?

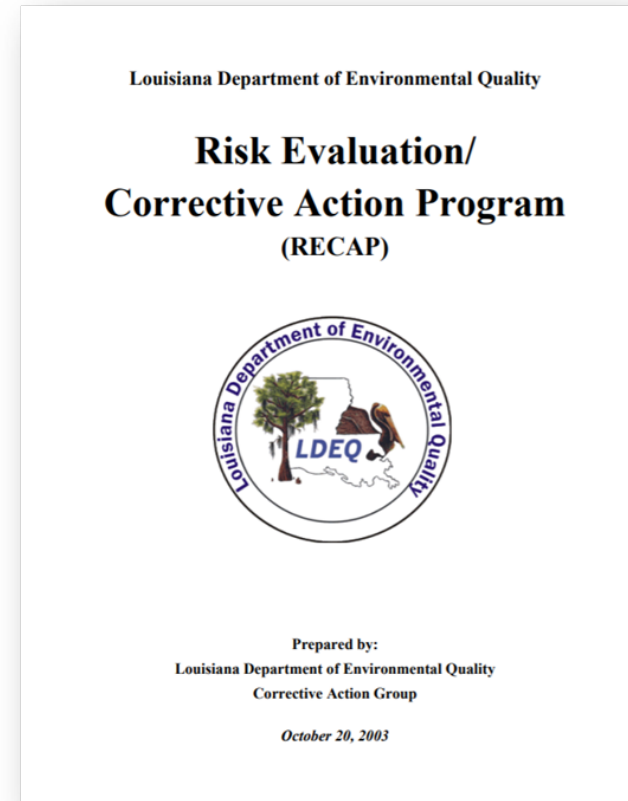
- **LDEQ personnel are reporting problems with field soil sampling techniques conducted by the regulated community.**
- **Almost all of these problems are due to failure to follow the requirements of RECAP Appendix B Section B2.5.2.**
- **RECAP is not guidance, it is a regulation, it is mandated by LAC 33:I Chapter 13 Section 2.3.**



What is this RECAP Regulation?

LDEQ's Risk Evaluation / Corrective Action Program

www.deq.louisiana.gov/page/recap



What does RECAP Require?

- **Let us review RECAP Appendix B Section B2.5.2, *Soil Investigations*:**
- *“Soil samples are to be collected using a thin-walled sampler (e.g., Shelby tubes), split-spoon samplers, direct push samplers or other sampling tools approved by LDEQ. **Soil samples shall be extruded in the field immediately following retrieval of each sampler.** A representative portion of each soil sample shall be carefully trimmed to remove the smear zone formed during sample acquisition and split into two portions.”*



RECAP Appendix B Section B2.5.2

- “One portion **shall immediately be placed in a clean sample container appropriate for the method**, labeled, and cooled to 4 degrees Centigrade while the other portion **shall be placed in a clean 16-ounce glass container**, covered with clean aluminum foil, and sealed. The soil in the 16-ounce glass container shall be allowed to volatilize for approximately 15 minutes prior to conducting a headspace screening analysis by penetrating the foil with the probe from a flame ionization detector, a photoionization detector, or other instrument approved by LDEQ.”



RECAP Appendix B Section B2.5.2

- **“If the organic vapor analyzer is incapable of detecting the COC due to constituent characteristics (e.g. non-volatiles, metals), alternative field screening tests or other rationale for selection of samples previously approved by LDEQ shall be employed. All samples shall be submitted with completed chain-of-custody forms to an accredited laboratory in accordance with LAC 33:1, Subpart 3.”**
- **Alternative field screening or rational could include: X-Ray Florescence (XRF), field test kits (such as immunoassay kits), staining, sheen, odor (be safe!), fate & transport knowledge, etc.**



Alternative Field Screening for Metals with XRF



Specific Problems (1 of 8)

- **Soil cores are to be processed “...*immediately following retrieval of each sampler.*”**
- **Drillers should wait till geologists and/or sampling personnel have processed the previous soil core before acquiring the next core.**
- **Samplers should not have multiple cores staged to be processed.**



Specific Problems (2 of 8)

- **Continuous sampling is not always being conducted as required. Sample containers “*appropriate for the method*” are to be filled first from each and every interval, labeled, and chilled, then field screening aliquots are collected.**
- **Storing soil cores and collecting analytical samples after field screening has been conducted has never been allowed under RECAP.**



Specific Problems (3 of 8)

- **An alternative to continuous sampling is co-located borings.**
- **Co-located boring is where a initial boring is made, mandatory sample intervals are collected, then the rest of the boring is screened.**
- **Based on the field screening results from the first boring, a second co-located boring may be made to collect additional samples indicated by field screening results.**



Specific Problems (4 of 8)

- **Co-located borings should only be considered when contaminant concentrations should be at equilibrium between immediately adjacent boring locations.**
- **Co-located borings must be proposed and approved by LDEQ as they are not currently covered in RECAP Appendix B Section B2.5.2.**



Specific Problems (5 of 8)

- **Co-located borings are not allowed for reimbursement under the Motor Fuels Underground Storage Tank Trust Fund (MFUSTTF – or UST Trust Fund).**
- **On UST Trust Fund sites, continuous sampling is required and reimbursable (if all other requirements are met).**



Specific Problems (6 of 8)

- **Per the RECAP Regulation, 16oz glass jars are required for field screening of soil aliquots. 16oz glass jars have consistent headspace.**
- **The use of glass jars is based on research conducted for EPA, which was incorporated into the former UST Site Investigation Guidance, and later into RECAP Appendix B.**
- **Field screening using plastic bags (“Zip-Locks”) has never been allowed by RECAP.**



Plastic Bags are Inconsistent



Specific Problems (7 of 8)

- **When using the various field-filled vial methods for volatile soil sampling under EPA Method 5035, EPA Method 5035A, MDEP Volatile Petroleum Hydrocarbons (VPH), or Texas Method 1005 and 1006, the use of a field balance to check vial weights, and the weight of soil aliquots, is strongly recommended by LDEQ.**
- **EPAs 1997 Clarification of Method 5035 states, “Sample vials are weighed in the field before use” (available on EPA CLU-IN website).**



Specific Problems (8 of 8)

- **LDEQ's experience is that the methanol evaporates, even from vials that appear to be properly sealed.**
- **LDEQ's experience with Louisiana soils is that samplers used to fill preserved vials, like the TerraCore or ESS Lock N' Load, almost always collect larger (heavier) aliquots than the 4.5-5.5g typically allowed by the cited methods.**
- **Methanol vials should not be left open for extended periods while sampling, evaporation of methanol and/or absorption of humidity from the air may result.**



5035 Sampling With Preserved Vials



Other Issues – Quality Assurance/Quality Control

- **RECAP Section 2.4 requires field Quality Assurance/Quality Control (QA/QC) samples be “*collected and analyzed*” for “*routine sampling events*.”**
- **Matrix Spike/Matrix Spike Duplicates (MS/MSD) samples are to be “*from the site*.” Laboratory-selected MS/MSDs that are not from the site are not an acceptable substitute.**



What's New? – Core N' One Sampler for Volatiles

- **There is an equivalent to the EnCore Sampler; the Environmental Sampling and Supply (ESS), Core N' One sampler system.**
- **The Core N' One is currently accepted by EPA Region 6 as an EnCore equivalent sampler, it is in use by EPA contractors.**
- **The LDEQ currently accepts the Core N' One as an EnCore equivalent.**
- **LDEQ SOPs have been updated to list Core N' One as an EnCore equivalent sampler.**



ESS Core N' One Soil Sampler



What's New? – EPA Method 5035A now a Validated Method (1 of 3)

- **EPA Method 5035A has become a “Validated” Method, it had previously been in “Draft” since 2002.**
- **It allows a third 5035A-only option of “dry vial” collections, with 48-hour hold times. Preservatives are injected through the septum of the vial using a micro-syringe by the laboratory within 48-hours.**
- **Labs utilized for analysis must be LELAP accredited in Method 5035A in Louisiana.**



What's New? – EPA Method 5035A now a Validated Method (2 of 3)

- **Field weight checks of the soil placed into in the dry vials are strongly recommended by LDEQ, 4.5-5.5g is still the target range.**
- **Method 5035A is Validated by EPA but is NOT a SW-846 Method, so if your regulation, permit, contract, Quality Assurance Project Plan (QAPP), etc., requires SW-846 Methods, you may not use Method 5035A.**
- **Method 5035A is approved under the EPA Contract Laboratory Program (CLP). So if you can use CLP Methods...**



What's New? – EPA Method 5035A now a Validated Method (3 of 3)

- **Certain labs have been unable to achieve the same low detection limits using Method 5035A that they could using Method 5035. Make sure your lab can achieve the detection limits you require before using Method 5035A. If they cannot, you can still use Method 5035 (just no dry vial collections – that's a 5035A exclusive).**
- **Method 5035A advantages include low-cost sampling supplies, specifically, dry tare-weighted vials that should not have a limited shelf life. There is also no need to dispose of excess preserved vials as hazardous waste.**



What's New? - Sonic Drilling (1 of 3)

- **Sonic Drilling is a newer method of drilling which is popular for installing Monitoring Wells.**
- **It has significant issues though with regard to soil sampling – it can both heat and sonically disrupt soil – this destroys volatiles and light-end semi-volatiles.**
- **EPA Region 6 and LDEQ initially advised that volatile soil samples should not be obtained from sonic borings.**



What's New? - Sonic Drilling (2 of 3)

- **The current version of the LDNR/LDEQ *Guidance Manual for Environmental Boreholes and Monitoring Systems (November 2021)* addresses the sonic drilling & volatile issue as follows:**
- ***“Depending on the soil type, the typical sonic core may retain a nearly complete soil column that is representative of the soil stratigraphy, but does not typically result in an undisturbed soil sample, due to both the method for core advancement and extrusion. Soil samplers and techniques that recover **undisturbed** soil samples may be used with sonic equipment.”***



What's New? - Sonic Drilling (3 of 3)

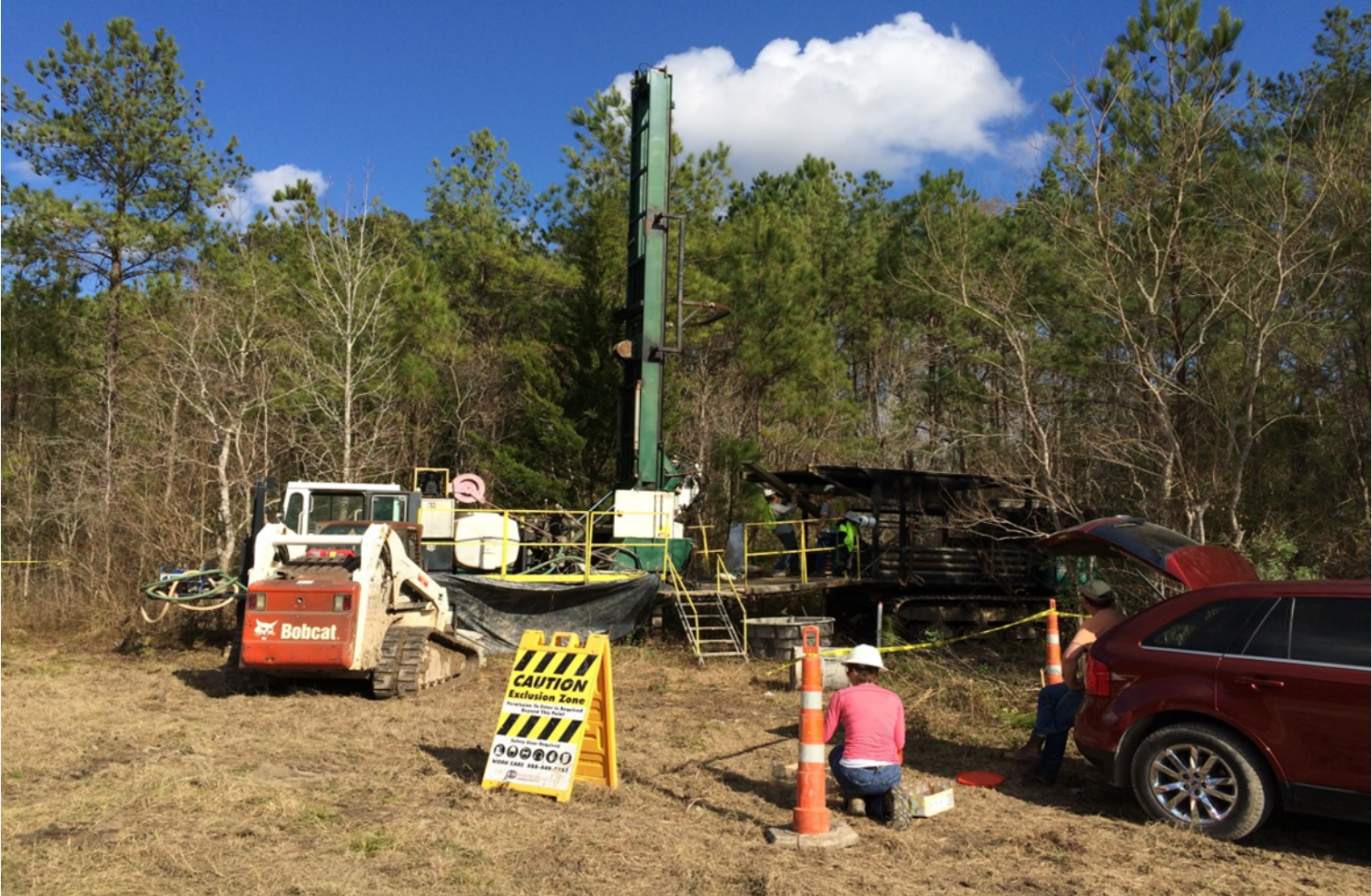
- ***“However, unless specific tools or techniques are used, sonic drilling can result in soil cores that are heated and reduced to a slurry, resulting in the destruction or loss of volatile organic compounds (VOC) or semi-VOC. Consequently, in sampling for VOC or semi-VOC, drillers must seek approval from the ARA on a case-by-case basis and/or consider guidance on using rotary sonic techniques found in the EPA’s “Design and Installation of Monitoring Wells” (Jan. 29, 2013) to insure that soil cores are not heated or disturbed.”***



Sonic Drilling in Action!



More Sonic Drilling in Action!



Questions?

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