DEPARTMENT OF NATURAL RESOURCES & ENVIRONMENTAL CONTROL
DIVISION OF AIR & WASTE MANAGEMENT
SITE INVESTIGATION & RESTORATION BRANCH

STANDARD OPERATING PROCEDURE
SOIL SAMPLING – DEEP (from a depth of 2 foot to the top of water table)

Soil Sampling Procedure – Deep

Deep soil samples are generally collected from the same location as the shallow soil sample but one or more deeper intervals up to the top of the water table. Usually deep soil samples are collected over the entire site to characterize the subsurface contaminant distribution above the groundwater table. Collection of soil samples at different depths may be required in order to satisfy the current or future risk scenarios. Please confirm the correct sampling depth with the DNREC-approved Sampling and Analysis Plan.

Recommended Equipment:
- *Certified pre-cleaned 8 oz wide mouth sample containers with labels
- *Plastic scoops
- *Food grade disposable aluminum warming pans (12 x 9.5 x 2.5)
- *40ml VOA vile with 25ml of methanol
- 10ml plastic syringe (with tip clipped off)
- Wax paper
- Fat and thin tipped waterproof markers such as the Sharpie fine point, the Sharpie extra fine point and/or the Sharpie ultra fine point
- PID
- Coolers with temperature blanks
- Ice
- Plastic zip bags
- Chain of custody forms for Screening lab and analytical lab
- Plastic garbage bag (for trash)
- Decontamination equipment (such as deionized or bottled water and alconox soap)

***Alternately Accepted Sampling Equipment:**
- Any size jar that is certified pre-cleaned
- 40ml VOA vile with 10ml of methanol
- Stainless steel scoops
- Stainless steel pans

Procedure:

1. Before visiting the field, pre-cut plastic syringes so that they hold approximately 10 mg (miligrams) of soil.
2. Calibrate PID prior to field work.
3. Don appropriate protective equipment (minimum disposable gloves) as specified in the Site Health and Safety Plan.
4. Proceed to selected sample point as indicated by site's Sample and Analysis Plan.
   Note: Once the shallow sample has been collected proceed to describe the lithology in the subsequently deeper cores to determine where the true groundwater is encountered. If

unusual/unexpected material is encountered such as soils with odors, staining, sheens, hair/bone, etc samples should also be collected.

5. Once the true groundwater interface has been determined by the hydrologist on-site, collect the volatile sample at or near the interface. Shake for several moments to break up the soil in the vial.

Note: Collect a proportionate volume from each of the visually identifiable soil types to fill the 10mg syringe once.

Caution: Do not overfill or spill the methanol, as this will yield inaccurate analytical results. If methanol is spilled, start over with a new vial.

6. With a fine tipped indelible marker record the same sample name, time and date of sample collection on the VOA vile and 8oz jars for the sample interval.

Note: All VOA vials can go into one Ziploc bag for storage in coolers.

7. Scan soil with a PID by cutting into each soil horizon, carefully insert PID/FID tip into cut space for several seconds. Record reading for that interval.
8. Record in the log book the total inches of soil recovered from the flight/acetate sleeve.
9. Describe and record the soil lithology using EQuIS approved terminology for grain size, color (Munsell Soil color charts can be used), consistency, relative moisture content, odors. Describe any other indicators such as staining, organic matter, foreign materials (glass, brick, slag, processed wood, etc).

Note: If analytical analysis is split between two labs then two jars of soil will need to be collected. Confirm with DNREC-SIRB chemists for the amount of bottleware needed.

10. Once the soil has been described then the sampler can remove the remaining 0-24" interval of soil and place into an aluminum or stainless steel pan with a clean scoop.
11. Homogenize all the soil; thoroughly breaking up any soil clumps. Clayey soil types are very difficult to homogenize. Do the best you can.
12. Scoop the homogenized soil into the 8oz wide mouth jar(s). The jar should be filled at least half way with soil.
13. Label with a thick tipped indelible marker the top of each bottle with the sample name, date and time (this is a precaution in case the bottle labels fall off).
14. Collect screening sample. Scoop approximately one teaspoon of the homogenized soil and place on the wax paper. Fold the wax paper, 3 times in one direction, turn it 90 degrees and fold 3 times. Do not tape the wax paper.
15. Label the folded wax paper with the sample location ID with a thick tipped indelible marker and place in a Ziploc bag.

Note: All wax paper samples can go into a single Ziploc bag.

16. Place all samples in cooler.

Note: If ice in coolers is loose then place jars in individual Ziploc bag per sample. If ice is contained in bags and not likely to leak then sample jars need not be placed in Ziploc bags. Secure the lid tightly. The chemical preservation of solids is not generally recommended. Cooling to 4 degrees centigrade is usually the best approach supplemented by a manual holding time.

17. Record sample information on the chains of custody.

Note: Recycle used aluminum pans whenever possible.

Note: If using stainless steel pans and scoops, they must be decontaminated with alconox soap and deionized water before using them at another sample location.

Repeat same sampling procedures for all deep soil samples unless otherwise dictated by DNREC-SIRB.