1. Purpose and Scope: Contamination of soil maybe associated with unintentional pesticide releases such as spills. Sampling of such sites is usually designed to (a) delineate a contamination plume and/or the intensity (i.e., the concentration) of the contaminant and (b) confirm and document satisfactory clean-up or decontamination of residue at a site where prior sampling indicated the presence of unacceptably high residue levels.

Pesticide residues in the soil also result from the intentional introduction of chemicals to control insects, weeds or other pests. Soil samples for residues originating in this manner are usually collected to: (a) confirm that an application was made correctly; (b) confirm that estimated residue levels for environmental fate models used to conduct risk assessments were correct; (c) complete one phase of an effort to track movement of residues in the environment (e.g., vegetation, soil, runoff); and (d) determine whether or not residues accumulate in soil.

Review the instructions contained in an applicable Environmental Monitoring Plan (EMP) before collecting soil samples. Program-specific sampling instructions in EMP will take precedence over those contained in this SOP.

2. Supplies Required: To request sampling supplies, contact the monitoring supplies coordinators, Lisa Mosser (305) 278 4902, or Richard King (305) 278 2905, Center for Plant Health Science and Technology, Miami, or email the Environmental Monitoring Supplies Checklist to lisa.k.mosser@usda.gov or richard.a.king@usda.gov.

2.1 hand garden trowel

2.2 aluminum foil

2.3 heavy-duty soil core sampler

2.4 3-gallon, galvanized pail

2.5 ¼ inch mesh screen

2.6 sample containers consisting of heavy aluminum foil lined envelopes

2.7 strapping tape

2.8 field log book

2.9 ice chest and either wet ice, dry ice or reusable ice packs (obtain locally)

2.10 APHIS Form 2060, Environmental Monitoring Forms

2.11 indelible marker

2.12 sanitary wipes.

3. Sampling Soil at Spill Sites.

3.1 When collecting samples from spill sites, wear appropriate personal protective equipment (PPE) as noted on the pesticide label or in the Material Safety Data Sheet (MSDS).

3.2 When collecting more that one sample at a site where highly contaminated soil may be present, select sites along a transect that is perpendicular to the suspected concentration gradient. Sample outside the contaminated area first, and continue to sample from locations least likely to be contaminated to those likely to contain the highest residues.

3.3 To prevent contamination, line a galvanized pail with aluminum foil.

3.4 One soil sample consists of a composite of five soil cores (see Figure 1 for suggested core sampling pattern). Each core should be collected at the surface to a depth of three inches (7.5 cm). No one core should be more than 10 feet from any of the other four cores.

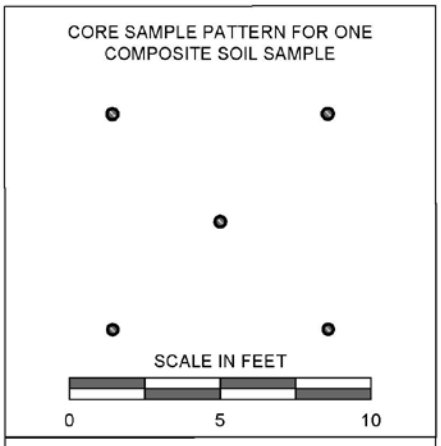

Figure 1 – Bird's eye view of core sample locations. Maximum distance of 10 feet shown, but smaller distances between cores are often appropriate.

3.5 Each core should be placed in the foil-lined pail. If necessary, collect additional cores to ensure that sufficient soil is collected to fill the foil envelope to within two inches of the top.

3.6 If muddy, place cores directly into a heavy foil envelope (do not attempt to sieve and mix samples, as described in 3.6 and 3.7, if a sample is too muddy to pass through the mesh of the sieve).

3.7 Using a clean garden trowel, thoroughly mix the sample (the soil cores should be reduced to fragments small enough to pass through a 1/4-inch sieve).

3.8 Sieve the sample (using the 1/4-inch wire mesh sieve) to remove twigs, leaves and other debris. If necessary, use a garden trowel to work the soil through the mesh. Use a doubled-over piece of aluminum foil approximately 18 x 18 inches or another galvanized pail lined with foil to catch the sieved soil.

3.9 Fill the foil envelope, leaving about 2 inches of space at the top. Using the strapping tape, securely seal the foil envelope and then label it using the indelible marker with a code that will allow the sample to be matched with its documentation.

3.10 Handle differently and separately from other samples because these samples have the potential to contaminate shipping containers, freezers and other samples. Place samples directly into a heavy cardboard box (not an ice chest) for shipping. Shipment in an ice chest could cause the Styrofoam to become contaminated. Unless directed to do so by the lab or the Environmental Compliance Team, it is not necessary to freeze samples from spill sites, so once samples are collected they should be shipped. Do not ship any other samples with these samples. Shipping with other samples could contaminate the other samples.

3.11 Decontaminate all of the sampling equipment. Rinse equipment with a jet of water so that any adhering soil is dislodged and removed. Wipe the equipment with sanitary wipes. Discard the wipes after cleaning a single set of sampling equipment.

4. Sampling Soil from Non-spill Sites.

4.1 Line a galvanized pail with aluminum foil.

4.2 Measure or pace off a one acre plot (a square 209 feet on a side encloses one acre) and divide the plot into four quadrants.

4.3 Using a core sampler, collect a composite sample consisting of at least four 3-inch deep soil cores, from four different randomly selected spots within each quadrant, for a total of 16 cores. Each core should be placed in the pail lined with aluminum foil.

4.4 Follow procedures for soil sampling already described for sampling at a spill site (section 3).

4.5 Store samples in an ice chest with ice, dry ice or frozen freezer packs until it can be transferred to a freezer for storage prior to shipping.

5. Documentation:

5.1 Record observations in the field log book (see SOP EM - 12, *Using a Field Log Book*). Draw a site map, including an approximate scale and North arrow, showing the location of the sample collection site and its relation to the treatment site and any sensitive area that might be near by. A topographical map or aerial photograph annotated with the required information should be provided if possible as well as photographs and a video of the sample collection site. Be sure to record the type of and density of ground cover and any canopy over the site where the sample was collected. Determine the soil characteristics (e.g., clay, silt, sand), land slope and if apparent, the direction of surface run-off (see SOP EM - 13, *Taking Measurements for the APHIS 2060 Form*)

5.2 Complete an APHIS Form 2060 for each soil sample.

5.3 Retain the pink copy for your records and distribute the remaining copies as noted on the bottom right hand corner of each copy of the APHIS Form.

6. Packaging and Shipping:

6.1 Package and ship the soil samples as described in SOP EM - 17, *Packaging and Shipping of Samples*, except highly contaminated soil samples from spill sites which are packaged as described in section 3.10 above. Call Richard King or Lisa Mosser, above, before shipping highly contaminated samples so that they can prepare to receive them.