EXHIBIT C:

Standard Operating Procedures for RO-TAP Material Processing

1. Scope

This SOP covers the sieve separation of both samples collected in dry form prior to material processing in the batch HPSA system as well as the samples collected from the sampler during system testing as described in Exhibit A: SOP for DISA Batch System Operation.

2. Terminology

System – Refers to the batch HPSA system as described in Exhibit A: SOP for DISA Batch System Operation.

Sieve – Description of screens for sample separation. Particle sizes of these sieves are detailed in this procedure by their mesh size or number of openings per inch with the corresponding particle micron size in parentheses throughout the procedure.

RO-TAP – Sieve shaking device described in the apparatus section consisting of a device to hold the WS Tyler sieves and a small motor to shake the apparatus.

RO-TAP Motor – Motor attached to the RO-TAP device for shaking sieves during the analysis described in the procedure.

Material – Refers to a subset of the sieved sample retained or passing each of the sieves during the procedure.

Pressure Filter – Bench top pressure filtering apparatus.

3. Summary of Test Method

This testing method is used for sieve separation into retained and passing material fractions from both dry soil samples and slurry samples retrieved from HPSA testing. Dry, moist, and slurry samples are both subject to the same wet RO-TAP procedure of separation to ensure consistency of data collected. Material collected in the sample cups and on the pressure filter paper will either be individually analyzed or combined for specific procedures as described in Exhibit D depending on the required analyses.

4. Apparatus

The general apparatus consists of the following equipment:

- RO-TAP machine consisting of a platform on which to place sieves, legs long enough to support the sieve holder above a 5-gallon bucket, and a RO-TAP motor that shakes the screens allowing material to pass through them.
- Two (2) clean 5-gallon buckets. These buckets will be place alternatingly under the RO-TAP machine throughout the course of the procedure as described below.
- 3-gallon pressure filter apparatus connected to an air compressor and regulator set to 60 pounds per square inch (psi).
- WS Tyler 8-inch sieves of varying mesh sizes (apertures per inch). Only two will reside on the sieve holder in the RO-TAP machine at a time.

5. Sampling

General sampling procedures should

6. Procedure

Procedure A: Wet sieve separation of collected dried samples prior to material processing in the HPSA system.

a. After collection of a dry or damp soil sample, place the soil sample into a sample cup. Identify the sample by writing in a clearly visible colored marker on the sample cup. Note the tare mass of the sample cup as well as the damp mass of the sample regardless of if the sample is expected to contain any moisture.
b. Place the sample cup containing the soil sample into a drying oven set for 24 hours at 120 °F. Once the 24-hour drying period has elapsed, remove the sample from the oven and record in an excel document for the pertinent test, the damp mass of the sample and the mass of the sample after its time in the drier. Be sure to include the tare mass of the sample cup in the calculation for the percent moisture of the soil sample. This dried sample mass will serve as a comparison against the summation of the mass retained on each sieve during the procedure for a percent difference/error between the original sample and after conduction of the RO-TAP on the material.
c. Collect the proper number of sample cups for the sieve procedure as dictated by the number of screens used. Label these cups using a visible permanent marker with:
    - Sample ID. This will indicate what test the sample was retrieved from and whether it is a feed material sample or a dried sample retrieved from a full system discharge.
    - Tare mass of the cup for reference in recording the mass after the material is dry.
    - A label for “Time Spent on Screen” or abbreviated “TOS.” This area will be filled out during the procedure.
d. If the dried soil mass of the grab sample is less than or equal to 500 grams, the sieve separation procedure can be completed in one set of sieve separation. If the dried soil mass of the grab sample is greater than 500 grams, the sample should be split into two samples of roughly equal mass. When performing two sieve separations for the same sample spit into equal proportions, additionally note which sample was performed first and which was performed second by writing in visible permanent marker on the sample cup “1 of 2” or “2 of 2.”
e. Dried samples greater than 1000 grams should be split into three equal size fractions prior to performance of the sieve procedure, >1500-gram samples should be split into four equal size fractions, and so on with the proper labeling as described by the point above.
f. Set up the apparatus as described in Section 4 of the SOP. Place the two coarsest screen sieves on the holder of the RO-TAP apparatus. These screens are typically the 10- and 25-mesh (2 mm and 707 micron).
g. Pour the sample over the top of the top-most screen until the entire sample resides on the coarsest screen.
h. Using a garden hose with the inlet connected to a garden hose and the outlet connected to a garden hose spray nozzle set to the “Center” selection, wet the material residing on the top of the coarsest screen deck until it is apparent, no dry material remains.
i. NOTE: Throughout the procedure, two 5-gallon water catch buckets will be alternatingly used to collect water passing the screens. Use water sparingly throughout the procedure, attempting to keep the total volume used throughout the full planned sieve deck under 5 gallons to ensure that no more than these two buckets are required.

j. Prepare a stopwatch, timer, or other appropriate timing device. Using the on/off toggle on the power cord to the RO-TAP motor, as best as possible, turn the timer on and the RO-TAP motor on at the same time.
k. Allow the sieve shaker to shake material through the sieves and into the water collection bucket, occasionally using water to rinse the material and rotate the screens to allow the material to travel across the mesh from side to side.
l. Visually assess while looking down on the sieve if material has stopped passing through the screen.
m. If material has finished passing through the sieve, carefully raise the sieve above the sieve below it and visually observe the water passing around the bottom rim of the screen. If the water is clear and no material can be seen dripping onto the sieve below for approximately ten seconds, the sieving for material retained on that sieve fraction can be transferred from the sieve to the sample cups. If material is still seen to be passing through the screen, perform another rinse of the sample on top of the sieve and repeat the process of assessing if the sieve separation for that size fraction is complete.
n. Upon determination that sieve separation has been completed for that size fraction, use a laboratory wash bottle to remove the sample from the sieve and into the correspondingly labeled sample cup.
o. NOTE: Take care to ensure that as much material as possible is transferred from the sieve on which it is retained to the sample cup. This will ensure that there are fewer errors associated with the sieving procedure for representative results as well as ensuring more ease of cleaning the screens.
p. Set the sieve with all material removed near the sink, indicating that it is ready for cleaning.
q. Proceed with performance of the same rinsing and rotation of the sieve for the lower sieve as described on the two-sieve deck earlier. Typically, this is the 25-mesh sieve (707 micron).
r. Once the sieving separation for this second sieve is complete and all material has been transferred to the sample cup, record the time on the cups as previously labeled for the time on the two-sieve group.
s. NOTE: Samples should not remain on a screen for greater than 20 minutes as recommended by ASTM D6913, regardless of if material is still seen passing through with water. Some materials are friable and will fracture into smaller particles if retained on a sieve shaker for an extended period of time, contributing to inaccurate results. If the total time for the two-sieve combination is exceeded when performing the sieve separation on the second sieve, transfer the material retained on the second sieve to its respective sample cup and note on both sample cups for the two-sieve set “Full 20” under the time spent on screen label. If the total time for the two-sieve combination is exceeded when performing the sieve separation on the first/top sieve of the two-sieve set, transfer the material from the top sieve to its respective sample cup and note “Full 20” on that specific sample cup. Reset the timing device and perform the sieve separation on the second/lower sieve for a maximum of 10 minutes. Record the time for this specific sieve on the respective sample cup once the sample has been transferred. If 10 minutes elapses on the second sieve, transfer the retained material to the sample cup and indicate its time spent on the sieve as “Full 10.”
t. Once samples have been transferred to their proper sample cups from the cleaned sieves, place the RO-TAP over the top of the second clean 5-gallon bucket. Set the next two sieves on top of the RO-TAP sieve shaker holder. For this example, the next two sieves would be 50-mesh and 100-mesh (297 micron and 149 micron) with the 50-mesh sieve residing on top of the 100-mesh sieve and the 100-mesh sieve residing in the sieve holder of the RO-TAP apparatus.
u. Pour the water passing the first two sieves over the top of the top sieve on the two-sieve deck, taking care to ensure that no water or material is lost, misses the sieve, or overflows between the small aperture where the lower sieve connects to the upper sieve. Once all slurry from the catch

bucket has been transferred to the top of the first sieve in the deck, repeat the procedure as outlined in steps j through t until all desired sieves for the analysis have been completed.

v. NOTE: The typical procedure calls for material mass to be collected from a sample on the sieve screens of 10-, 25-, 50, 100-, 140-, 200-, and 270-mesh (2 mm, 707-micron, 297-micron, 149-micron, 105-micron, 74-micron, and 53-micron). This may differ depending on the material tested. Refer to the specific Design of Experiments for further information on if the sieve sizes vary for that material application.

w. NOTE: The typical procedure calls for sieving times to not exceed 20 minutes for any one sieve and not exceed 30 minutes for any two-sieve set. Refer to the specific Design of Experiments for further information on if the time on the sieves should be decreased for a more friable material.

x. Once the material retained on each sieve has been transferred to the properly labeled sample cup. Place these sample cups in the drying oven for at least 24 hours at a temperature of 110 °F. Depending on how wet the samples are, the samples may need to be dried for a longer period of time. During the procedure described in Exhibit D: SOP for Sampling After RO-TAP Material Processing, check that the summation of the material masses retained on each sieve does not exceed the original dried mass. If it does, this indicates material in the sample cups may need to be dried for a longer period.

y. Upon conclusion of the RO-TAP procedure and placement of the sample cups on a drying pan into the drying oven as described above, pour the bucket of water passing the finest sieve used into the pressure filter tube with the correctly labeled 5-micron filter paper below the tube.

z. Once the top of the pressure filter apparatus is securely sealed, open the pressure line to the pressure filter, allowing 60 psi of pressure to build up and pressure the collected water through for collection of solids on the 5-micron filter paper.

aa. Collect the water exiting the pressure filter in a clean 5-gallon bucket.

bb. Visually inspect the water. If it is apparent that the pressure filtered water contains particulates, recirculate this water through the pressure filter until the effluent of the pressure filter is clear upon visual inspection.

cc. Once the pressure filter has removed all water from the finest fraction of solids, dispose of the collected effluent water properly.

dd. Release the pressure from the pressure filter tube and remove the pressure filter tube from the pressure filtering apparatus. Once this is removed, place the collected fine material fraction on a drying pan and place this drying pan into the oven.

ee. Let the material dry for 24 hours at 110 °F.

ff. Clean all equipment used for the procedure:
    - Thoroughly scrub the sieves used for the RO-TAP procedure using dish soap and water.
    - After scrubbing the sieves, allow the sieves to sit in the ultrasonic sieve cleaner for at least 5 minutes. Some screens may take longer to dislodge any contaminants stuck in the sieve.
    - After cleaning with the ultrasonic sieve cleaner, rinse the sieves using water only and allow them to dry prior to performance of another RO-TAP procedure.
    - Thoroughly clean with soap and water, the pressure filter tube, filter cloth, and base by removing the wire mesh and rubber gasket in the bottom of the pressure filter stand prior to running another sample through.

Procedure B: Wet sieve separation of collected slurry samples from the HPSA system operation during a test described in Exhibit A.

a. Prior to collection of a slurry sample from HPSA system operations as described in Exhibit A, record the tare mass of the slurry sample bucket to the nearest tenth of a pound.
b. After collection of the sample from the HPSA system in the slurry form, record the total slurry mass of the sample for use in determination of the percent solids by mass and volume of the sample.
c. Prepare sample cups in a similar manner as described in Procedure A for sieve separation of a dry sample in part c with the addition of the sample time that the sample was retrieved from the batch HPSA unit during material processing operations.
d. If it is expected that the collected solid mass of the slurry sample retrieved from HSPA batch unit operation will be greater than 500 grams, split the RO-TAP procedure into two separate parts. Further considerations that apply to part d and e of Procedure A apply to performance of multiple sieve separations for large samples.
e. Pour the liquid and solids from the sample bucket over the top of the first two screens and perform the RO-TAP procedure in the same manner as described in parts h through ff in Procedure A.