



## EXHIBIT A:

# Standard Operating Procedures for Disa Batch System Operation

### 1. Scope

This SOP outlines the general procedures for operation of Disa's HPSA batch unit when processing solid material in slurry form. It does not cover sample preparation of the material to be processed in the batch system, analysis of post-system processed samples, or the system shakedown with only water present in the operating system. Further, this procedure does not cover the collection of feed material for comparison against the sample analyses on samples retrieved in sample buckets from the sampler during system operation.

### 2. Terminology

*System* – Batch HPSA operating unit.

*Catch Tank* – Conical and cylindrical tank below the collision chamber in the system.

*Material* – Crushed soil material prepared for processing in the system.

*Material Bucket* – Bucket, typically of 5-gallon volume used for collection of bulk samples to be processed in the system, not to be confused with sample buckets.

*VFD* – Variable Frequency Drive. Controls the rotation speed of the motors for the collision pumps in the system.

*Collision Pump* – High-pressure slurry pumps located at the bottom of the system catch tank. The outlet at the bottom of the catch tank is connected by 2-inch piping to the suction of the HPSA pump. For this system there are two collision pumps feeding the nozzles in the collision chamber through piping and hose connections.

*Collision Chamber* – Chamber containing impinging nozzles for the system, located above the catch tank.

*Sample Port* – 2-inch wye on the vertical discharge section of the system collision pumps. Sample ports are connected to the sampler with transparent tubing. For this apparatus there are two sample ports, one on each pump's vertical discharge piping. Flow from the sample ports to the sampler is controlled by a 2-inch ball valve on each of the sample ports.

*Sampler* – Connected by tubing to the sample ports on the system. Flow from the sampler to the sample buckets is controlled by a ball valve.

*Sample Bucket* – Bucket with tight sealing lid, typically of 2-gallon volume used for collection of slurry samples from the system retrieved from the sampler.

*Transfer Pump* – Gas-fired pump used to transfer slurry or rinse water from the system catch tank to the proper containment tote or trough as described in the procedure.

*Rinse/Process Water Tote* – 350-gallon tote for collection of the rinse water used to clean the system after conduction of a test as well as the water separated from the solids in the full discharge trough.



*Full Discharge Trough* – 200-gallon trough for discharge of all slurry upon conclusion of system operation during a test. This trough allows for settling to separate the solids from the dilution water used in testing and ease of removal of solids once the solids have settled.

### **3. Summary of Test Method**

The batch HPSA unit processes solid material in slurry form by first adding dilution water to the system, ramping the pumps for recirculation, then adding material to the unit during recirculation. Solid material is poured into the open top of the HPSA system catch tank during recirculation by the high-pressure pumps. Upon addition of all material desired to be processed during the test, a timer is started. Using this timer, samples are collected from the unit from the sample ports on the vertical discharge of the pumps at various times for further analysis. Upon conclusion of each test, the system is rinsed with clean water to prevent accumulation of any hazardous materials as removable contamination as well as to prevent any contamination of future system testing results.

### **4. Apparatus**

The HPSA batch system consists of a system catch tank which contains the slurry or water during operation, two collision pumps which individually pump slurry through a set nozzle contained in the collision chamber, associated piping and hoses connecting the suctions of the pump to the bottom of the system catch tank as well as the discharge of the pump to the inlet of the collision chamber nozzles, a VFD to control the operating speed of the two collision pumps, a collision chamber containing the two impinging nozzles, and associated process monitoring equipment such as the pressure sensors installed on the suction, discharge, and nozzle inlet on each of the system collision pumps and a portable Siemens Dopler flow meter. Water is added to the system using a shop garden hose with a known flowrate. Samples are retrieved from the unit using the sample discharge ports on the vertical discharge section of the pumps connected to the system sampler. A gas-fired transfer pump is connected to the tank outlet via hose and camlock connections for discharge of the system into the appropriate containment as described in the procedure.

### **5. Sampling**

The HPSA batch system unit has a top processing size of ¼-inch. Prior to performing the testing procedure, ensure by checking the labels on material to be processed and, if needed, pour the pre-processed material over a ¼-inch Tyler sieve to ensure that the material does not contain any particles larger than ¼-inch. Any particles remaining on the ¼-inch Tyler sieve may be discarded or carefully pressed through the screen with the appropriate tool so as not to damage the screen.

All material should be thoroughly mixed prior to addition to the system. Material can be mixed by pouring the bucket(s) of collected material into a wheelbarrow or other concave container capable of retaining the material volume without spilling over the edges then mixed with a shovel or other suitable instrument of similar length.

### **6. Procedure**

- a. Using a low flowrate hose in the range of 1-20 gallons per minute, fill the system catch tank with approximately 80 gallons of fresh dilution water. Record the time over the course of water addition and check it against the determined flowrate of the water addition system. This time will be used in post-process analysis for determination of the actual dilution water volume added.
- b. Inspect the system for any leaks of water. If there are any defects in the piping, hose connections, catch tank, or other component of the system, drain the system and fix the defect before attempting to complete a test.



- c. Attach the Siemens FUP 1010 doppler flow meter to the vertical section of one of the pump discharge pipes at least 10 pipe diameters downstream of any changes in the pipe and 5 pipe diameters upstream of any changes in the pipe. Ensure that all flow meter specifications are correct for the pipe. Set the application data to “liquid” with the approximate specific gravity for the liquid of 1.1. Begin logging data on the logger display for every 5 seconds. During operation make notes of the times displayed on the logger for time that the unit is started, when the unit is turned to the required VFD rotation frequency, when sample buckets start addition and end addition, when sample times are, and when the unit is powered down for discharge.
- d. Ensure that the valves are open to the suction of the pump as well as between the discharge of the pump to the collision nozzle.
- e. Turn on the power on the VFD.
- f. Connect either your phone or laptop to the wifi networks provided by the Sinamics smart access modules for each pump.
- g. Begin recirculation of the water only by ramping the pumps to a rotation frequency of 60 hz each. Ensure there are no defects in the system including leaks. If any leaks are present, power down the system and fix any issues prior to attempting to perform a batch unit test.
- h. If no issues in system operation are present, ramp the collision pumps to the desired frequency for test operation. Typically, this operating rotation frequency is 94.3 hz.
- i. If uneven distribution of flow between the nozzle outlets is observed in the collision chamber, adjust the frequencies of the pumps and allow the distribution of flow to match through each nozzle. Ensure that the minimum frequency between both pumps remains at 94.3 hz. Once flow has balance between the two pumps, material addition may begin.
- j. Introduce the material into the main process tank by pouring the material containing 5-gallon buckets into the open-top portion of the system catch tank. When the material is fully introduced, start the timer. Take care to introduce the material at a controlled rate so as not to slug the pump, but attempt as best as possible to limit the introduction of material into the catch tank to under one (1) minute, for collection of representative samples. Samples may be introduced in typical masses of 100 to 200 pounds. Only on rare occasions should this be exceeded.
- k. Allow the system to recirculate processed material for a predetermined length of time.
- l. At the determined sample times for the test:
  - o One operator will control both the ball valve on the sample port and the ball valve on the sampler while the other will be responsible only for opening and closing the ball valve on the opposite sample port.
  - o With the sampler open and positioned with its outlet inside of the tank, both operators will open their respective sample port ball valves.
  - o NOTE: Ensure that the sampler outlet tubing is sufficiently positioned directly downward in the system catch tank to prevent splashing of the purge slurry out of the open top of the system catch tank. Close the sampler ball valve and position the sampler in the properly labeled sample bucket, labeled for the proper time at which the sample was taken, which material was being processed in the system, and any specific variables that were used for the system testing procedure. Open the ball valve sufficiently to allow slurry to fill the bucket to approximately half the bucket’s volume. Purging the sampler should be done approximately 10 seconds before the
  - o Close the sample ball valve once approximately half of the bucket has been filled with slurry and allow the any remaining slurry sample to exit the tubing prior to hanging the sampler back on its place on the unit.
  - o At the same time, both operators will close the ball valves on the sample ports and allow the system to continue operation.
  - o Tightly cap the lid to the 2-gallon slurry sample bucket and set the bucket in a previously specified sample for further analysis.



- m. Repeat these steps for the desired number of samples at specified time intervals for the test. Once the final sample has been collected, slow the pumps from their set flowrate to 60 hz.
- n. With a hose securely connected by camlock fittings to the system tank outlet and the suction of the gas-fired transfer pump as well as the discharge of the gas-fired transfer pump securely with a hose and camlock fittings to the discharge tote, turn on the gas-fired pump to transfer the slurry to the containment tote.
- o. Visually observe the slurry exiting the system catch tank from above the open top on the system catch tank. Once the slurry reaches just below the weld separating the conical section of the system catch tank from the cylindrical section of the catch tank, stop operation of the collision pumps.
- p. NOTE: During discharge of the slurry, use a garden hose connected to a spray nozzle to spray the insides of the system catch tank, removing any contamination residue on that may remain on the insides of the system catch tank.
- q. Once all slurry has been pumped out of the system into the containment trough, turn off the gas-fired pump and close the tank outlet ball valve.
- r. Begin filling the tank with rinse water to approximately 45 gallons of volume.
- s. Transfer the discharge end of the hose on the gas-fired transfer pump to the rinse water containment tote.
- t. Once the system has been filled to 45 gallons of rinse water volume, begin recirculation of the pumps at 60 hz.
- u. As described in the first and second bullet points of part j in the procedure, purge clean water through the sampler.
- v. Turn on the gas-fired transfer pump and open the tank outlet ball valve to discharge rinse water into the rinse water containment tote.
- w. Turn off the collision pumps once the water is below the weld connecting the conical portion of the tank to the cylindrical portion of the tank.
- x. Once all rinse water has been discharged into the rinse water containment tote, turn off the transfer pump and close the ball valve for the system catch tank outlet.
- y. If necessary, with the discharge of the transfer pump still connected to the rinse water containment tote, repeat the rinsing procedure as described in steps r through x for another rinse of the system. After two rinses, the system should be clean and ready for another test.
- z. Allow the solids in the slurry discharged into the slurry containment tote to settle for 24 hours before separating the water from the solids using a small pump to pump the process water into the rinse/process water containment tote.