

# **BESST, INC.**

*Best Environmental Subsurface Sampling Technologies*  
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## **MiniSimulProbe™**



Soil and Groundwater Mode Written SOPs

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# STANDARD OPERATING PROCEDURES FOR THE MINI SimulProbe®

(Collecting Soil and Ground Water Simultaneously)

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# **STANDARD OPERATING PROCEDURES FOR THE MINI SimulProbe®**

**(Collecting Soil and Ground Water Simultaneously)**

## **1.0 ASSEMBLY FOR SOIL/GROUNDWATER MODE: USING NITROGEN GAS BACK-PRESSURIZATION AND THE SimulProbe® WATER CANISTER**

- 1.1 The Mini SimulProbe® should be assembled as described in the Soil/Soil Gas SOP as per section 4.0 – except do not use the Valve Head Insert. This part is used only for soil gas sampling. Assembly instructions for the SPLAT systems can also be found in Section 4.0 of the Soil/Soil Gas SOP.
- 1.2 Place a 1-inch o-ring from the Mini SimulProbe® O-Ring Kit around the groove located at the bottom of the Water Canister Base's male AW threads.
- 1.3 Place a 2-inch o-ring from the Mini SimulProbe® O-Ring Kit around the groove located at the top edge of the Water Canister Base. Place a fat 1.25inch o-ring around the threads just to the inside of the top edge of the Water Canister Base and the 2-inch o-ring.
- 1.4 Place a Reed Valve firmly onto the single hose barb at the up hole end of the Water Canister Base.
- 1.5 Screw the Water Canister Base onto either end of the Water Canister – making sure that the Reed Valve is inserted up into the Water Canister.
- 1.6 Place a 2-inch o-ring in the groove on the bottom edge of the Water Canister Sampler Head. Place a fat 1.25" diameter o-ring around the threads just to the inside of the bottom edge of the Water Canister Sampler Head and the 2-inch o-ring.
- 1.7 Screw the Water Canister Sampler Head into the freely open end of the Water Canister.
- 1.8 Screw the assembled Mini SimulProbe's® Valve Head onto the bottom of the Water Canister Base. (Make sure the 1-inch o-ring is on the down hole end of the Water Canister Base – at the base of the AW threads)

- 1.9 Screw a 3/8" NPT x 1/4" brass Swage-lok connector to the top of the Water Canister Sampler Head. Before screwing the brass Swage-lok connector to the top of the Water Canister Sampler Head, wrap Teflon tape around the 3/8" NPT threads – and then screw the Swage connector until well snug.
- 1.10 Unscrew the 1/4" Swage Cap from the connector and make sure that there is a brass ferrule base and top on the inside of the Swage Cap. Next, set the cap and Swage set off to the side, but within arms reach.
- 1.11 Take the 1-foot long AW female rod with the large perforation on the side, and insert the back pressurization line (typically 1/4" OD x 3/16" ID line) through this hole. This is the line leading up hole to the ground surface.
- 1.12 Take the 1/4" brass Swage cap that you set over to the side, and slide it over the back pressurization line (small diameter first).
- 1.13 Then slide on the ferrule set. First the ferrule base which appears circular with a slightly smaller diameter ledge. Then slide on the conical part of the ferrule – the larger base of the cone first.
- 1.14 Screw the Swage cap onto the male counter part pointing upward from the top of the Water Canister Head. When you can't turn the cap any more by hand, tighten the cap with a 9/16" wrench (in the SimulProbe® tool box) 1.25 turns. That means 360 degrees and then another 90 degrees. This will slightly crush the ferrule set around the pressurization line and allow an air tight seal.
- 1.15 Slide the AW female rod to the top of the Water Canister Head and screw onto the Canister Head.
- 1.16 If the water sample is to be collected from a cased hole with standing bore hole water or a mud boring, the outside of the Mini SimulProbe® should be covered by a Mini SimulProbe® Condom. This prevents cross-contamination of the water or soil sample with bore hole fluids. Then, a Gooch Tube should be placed around the Condom and just above the circumferential seam – where the Drive Shoe assembly and the Core Barrel meet. The Gooch tube serves as a bumper for the Condom as the probe is lowered into the casing.

- 1.17 If the Mini SimulProbe® is to be used at depths greater than 30 feet below the ground water table, then a Ceramic Diaphragm should first be placed over the drive shoe opening, and then the Condom rolled over it. The condom will hold the Ceramic Diaphragm in place. The Ceramic Diaphragm will prevent water pressure from the bore hole fluids from pressing into the Condom before the Mini SimulProbe® reaches the bottom of the bore hole. Once on bottom, the driving force on the tool will tear and roll away the Condom along the outside wall of the tool, and the Ceramic Diaphragm will shatter into small fragments. The shattered fragments will rise to the top of the Core Barrel as the core enters the tool.
- 1.18 If the SPLAT is to be used with the Mini SimulProbe®, then the use of this device excludes the use of the Ceramic Diaphragm. The SPLAT is installed as per Section 4.0 of the Soil/Soil Gas SOP. The Condom is then rolled over the SPLAT and the outside of the tool.

## **2.0 OPERATION: SOIL/GROUNDWATER SAMPLING MODE – USING NITROGEN GAS BACK PRESSURIZATION AND THE SimulProbe® WATER CANISTER WITH CASED HOLE DRILLING METHODS**

- 2.1 Assemble the Mini SimulProbe® as per section 1.0 of this SOP.
- 2.2 Attach the Mini SimulProbe® to a wire line (down hole) hammer and secure the Teflon or polyethylene Nitrogen Gas Line (back pressurization line) to the side of the hammer's anvil using two or three plastic tie wraps (or duct tape, if permitted on the site). Hammer weights up to 300 lbs. may be used to drive the Mini SimulProbe®.
- 2.3 Attach the up-hole end of the SimulProbe® water-sampling spool to the Nitrogen Gas Regulator. The three-way valve handle should be pointed towards the regulator line.
- 2.4 With the probe suspended a few feet down inside the casing, pressurize the water canister. A good rule of thumb for pressurizing is to assume 60 PSI/100 feet of hydrostatic head in the bore hole (pure water is approximately 43 PSI/100 feet; the additional pressure assumes suspended and dissolved solids and thus increased specific gravity). See attached tables from Groundwater and Wells, Driscoll, 1987, pages 938 and 939. **Note: for safety, the SimulProbe® should always be pressurized and de-pressurized inside the casing/drill string.**

- 2.5 Observe the line pressure gauge on the regulator. When line pressure is equal to about 60 PSI/100 feet of hydrostatic head (0.60 PSI/ft), close 3-way valve on hose spool to trap pressure. The closed position is when the valve handle is at 90 degrees to 3-way valve body.
- 2.6 Disconnect the Teflon line from the regulator and hook it on to the side of the spool.
- 2.7 Lower the Mini SimulProbe® slowly down the inside of the casing while maintaining a small amount of tension on the Teflon line as it is reeled out. It is important that slack Teflon line not be allowed to enter the bore-hole. (Extra Teflon line can become tangled on the hammer.) If you think that extra tubing has entered the bore-hole, do not be afraid to pull up on the line. The Swage-lok fitting connection will withstand significant amounts of tugging.
- 2.8 When you reach the bottom of the bore-hole, carefully mark the hammer cable (or drive rod) to measure the drive distance.
- 2.9 Begin driving the Mini SimulProbe®. When using the SPLAT, it is very important that the operator does not back-hammer (lifting the hammer so far that it pulls the tool back at the top of the hammer stroke) while driving the Mini SimulProbe®. Back hammering may cause the SPLAT to release prematurely.
- 2.10 Stop when you have driven the Mini SimulProbe® either the full distance of the Mini Core Barrel if driving the tool without the SPLAT, or if possible at least 2-feet ahead of the bore hole bottom when using the SPLAT 1 or 2. The maximum drive distances achievable with the Mini when collecting a core sample without the SPLAT are the following:
  - 18-inches with the Short Mini Drive Shoe
  - 20-inches with the Extended Mini Drive Shoe

The maximum core lengths achievable with the Mini when using the SPLAT 1 and 2 are the following:

- 15-inches with the Short Mini Drive Shoe and the SPLAT 1
- 17-inches with the Extended Mini Drive Shoe and the SPLAT 1
- 14-inches with the Short Mini Drive Shoe and the SPLAT 2
- 16-inches with the Extended Mini Drive Shoe and the SPLAT 2

2.11 At this point the operator has one of three options.

**Option 1 (Non SPLAT Option).** Drive the SimulProbe® the full distance of the Mini Core Barrel section. Jerk the Mini tool back 2-inches when using the Short Mini Drive Shoe and 5-inches when using the Mini Extended Drive Shoe. Release the nitrogen gas back-pressure by opening the 3-Way Valve on the side of the Hose Spool and wait for the Water Canister to fill.

**Option 2 (With SPLAT)** is that after the SPLAT has been released, drive forward and collect the core sample. The core will push the SPLAT to the top of the Core Barrel section. After the core sample is collected, then pull back one more time to expose the screen, release the nitrogen back pressure, and then wait for the Water Canister to fill. Option 2 directly correlates the ground water sample to the bottom of the core sample.

**Option 3 (With SPLAT)** is that after the SPLAT has been released, pull back a little further to make sure the Mini Screen is fully exposed to the formation. At this point, release the nitrogen pressure, and then wait for the Water Canister to fill. After the ground water sample phase is completed, now drive forward to collect the core sample. Option 3 approximately correlates the ground water sample to the top of the core sample.

2.12 The maximum screen pull back for the Mini SimulProbe® is the following:

- 2-inch pull back with the Short Mini Drive Shoe and for the 1-inch long screen.
- 5-inch pull back with the Extended Mini Drive Shoe for the 4-inch long screen.
- **15-inch pull back when using the Mini SimulProbe® High Flow Extender for the 14.5” screen (see SOP for Mini SimulProbe® High Flow Extender).**

2.13 After the pull back, open the three-way valve on the side of the hose spool to allow pressure bleed off.

2.14 Allow water to enter tool under ambient hydrostatic pressure. After the initial pressure bleed off, the fill rate can be observed by placing the up-hole end of the Teflon line into a bucket of water. For fast to moderate fill rates, the end of the Teflon line can be placed inside an inverted water filled bottle inside the bucket (i.e. one liter plastic soda bottle). When the bottle is full of air displaced from the Water Canister, it can be reused for additional volume.

- 2.15 After sufficient water sample has been collected, re-pressurize the SimulProbe®.
- 2.16 Pull the SimulProbe® back to a few feet below the top of the drill casing and stop. Open the valve and bleed off the system pressure. **Note: For safety, the SimulProbe® should always be pressurized and de-pressurized inside the casing/drill string.**
- 2.17 To decant the water sample into a sample vial or bottle, follow the disassembly instructions in Section 7.0.
- 2.18 After collecting the water sample, disassemble the core barrel and collect the soil sample as described in the soil gas SOP for the Mini SimulProbe®.
- 2.19 Disassemble the Mini SimulProbe® and follow your site specific decontamination procedures.

### **3.0 OPERATION: SOIL/GROUNDWATER SAMPLING MODE – USING NITROGEN BACK PRESSURIZATION AND THE WATER CANISTER WITH MUD ROTARY**

#### **INTRODUCTION:**

Water sampling with mud rotary drilling poses numerous problems to obtaining high quality environmental samples. The first problem is to lower a sampling device through a mud column without cross contaminating the inside and out side surfaces of the tool with potentially contaminated mud. The second problem is driving the tool beyond the mud infiltrate. The third problem is obtaining a proper soil seal around the tool as it is driven into undisturbed materials. Finally, the fourth problem is retrieving the tool to the surface without cross contaminating the samples.

The use of SPLAT, the SimulProbe® Condom, and the encapsulated core sleeves with the Mini SimulProbe® solves these problems. The SPLAT, Condom, and the Encapsulated Sleeves keep the drilling mud out of the inside of the Mini SimulProbe® as it is being lowered through the drill string. As the tool is driven into the formation, the Condom is torn away. The SPLAT permits soil core collection to begin below the infiltration zone. The encapsulated core sleeves prevent mud from leaking into the core sleeves as the tool is driven into the soil and as the tool is retrieved from the bore hole. The water sample is collected from sediments below the infiltrated zone and is then sealed inside the Water Canister by the SimulProbe® Nitrogen back pressuring system as the Mini SimulProbe® is hoisted to the surface.

- 3.1 Assemble the Mini SimulProbe® as per Section 1.0 of this SOP.

- 3.2 Attach the Mini SimulProbe® to a wire-line (down-hole) hammer or drive rod and secure the Teflon Nitrogen Gas Line to the side of the hammer's anvil or rod using plastic tie wraps (or duct tape, if permitted on the site). If using a down-hole hammer, the hammer must be slim enough to fit inside the mud rotary drill pipe and allow enough annular space between the maximum OD of the hammer and the inside of the drill pipe so that Teflon or poly line is not severed at any point in the sample collection process. Additionally, the down-hole hammer, should be a 300-lb sealed water tight hammer (manufactured by Foremost Drill) to overcome the viscosity and buoyancy effects of the drilling mud on the hammer's movement and the higher formation densities commonly encountered on mud rotary jobs. The Hammer should have at least 0.5 inches of clearance inside of the drill rod to allow space for the Teflon or poly line.
- 3.3 Attach the up-hole end of the SimulProbe® water-sampling spool to the inert gas tank regulator. The three-way valve handle should be pointed towards the line leading to the regulator.
- 3.4 With the probe suspended a few feet down inside the casing, pressurize the Water Canister. The rule of thumb for pressurizing when using drilling mud is to assume 75 PSI/100 feet of hydrostatic head (pure water is approximately 43 PSI/100 feet. See attached tables from Groundwater and Wells, Driscoll, 1987. **Note: for safety, the SimulProbe® should always be pressurized and de-pressurized inside the casing/drill string.**
- 3.5 Observe the line pressure gauge on the regulator. When line pressure is equal to about 75 PSI/100 feet of hydrostatic head (0.75 PSI/ft), close the 3-way valve on the hose spool to trap the pressure. The closed position is when the valve handle is at 90 degrees to 3-way valve body. Note: The **exact** pressure will depend on the specific gravity (mud weight) of the drilling mud being used on the project. Use the attached chart from Driscoll to calculate the correct pressure for the mud used in the boring during the sampling event. Mud weights should be checked before each sampling event as they may change.
- 3.6 Disconnect the Teflon line from the regulator and hook it on to the side of the spool.

- 3.7 Lower the Mini SimulProbe® slowly down the inside of the drill string while maintaining a small amount of tension on the Teflon line as it is reeled out. It is important that slack Teflon line not be allowed to enter the bore-hole. (Extra Teflon line can become tangled on the hammer.) If you think that extra tubing has entered the bore-hole, do not be afraid to pull up on the line. The Swage-lok fitting connection will withstand significant amounts of tugging.
- 3.8 When you reach the bottom of the bore-hole, carefully mark the hammer cable or drive rod to measure the drive distance.
- 3.9 Begin driving the Mini SimulProbe®. When using the SPLAT it is very important that the operator does not back-hammer while driving the Mini SimulProbe®. Back hammering may cause the SPLAT to release prematurely.
- 3.10 Stop when you have driven the Mini SimulProbe® either the full distance of the Mini Core Barrel if driving the tool without the SPLAT, or if possible at least 2-feet ahead of the bore hole bottom when using the SPLAT 1 or 2. The maximum drive distances achievable with the Mini when collecting a core sample without the SPLAT are the following:
  - 18-inches with the Short Mini Drive Shoe
  - 20-inches with the Extended Mini Drive Shoe

The maximum core lengths achievable with the Mini when using the SPLAT 1 and 2 are the following:

- 15-inches with the Short Mini Drive Shoe and the SPLAT 1
- 17-inches with the Extended Mini Drive Shoe and the SPLAT 1
- 14-inches with the Short Mini Drive Shoe and the SPLAT 2
- 16-inches with the Extended Mini Drive Shoe and the SPLAT 2

- 3.11 At this point the operator has one of three options.

**Option 1 (Non SPLAT Option).** Drive the SimulProbe® the full distance of the Mini Core Barrel section. Jerk the Mini tool back 2-inches when using the Short Mini Drive Shoe and 5-inches when using the Mini Extended Drive Shoe. Release the nitrogen gas back-pressure and wait for the ground water sample to fill the Water Canister. Repressurize the Water Canister and retrieve the ground water and soil sample to the ground surface.

**Option 2 (With SPLAT)** is that after the SPLAT has been released, drive forward and collect the core sample. The core will push the SPLAT to the top of the Core Barrel section. After the core sample is collected, then pull back one more time to expose the screen, release the nitrogen back pressure, and then wait for the Water Canister to fill. Option 2 directly correlates the ground water sample to the bottom of the core sample.

**Option 3 (With SPLAT)** is that after the SPLAT has been released, pull back a little further to make sure the Mini Screen is fully exposed to the formation. At this point, release the nitrogen pressure, and then wait for the Water Canister to fill. Now drive forward and collect the soil sample. Option 3 approximately correlates the ground water sample to the top of the core sample.

3.12 The maximum screen pull back for the Mini SimulProbe® is the following:

- 2-inch pull back with the Short Mini Drive Shoe and for the 1-inch long screen.
- 5-inch pull back with the Extended Mini Drive Shoe for the 4-inch long screen.
- **15-inch pull back when using the Mini SimulProbe® High Flow Extender for the 14.5” screen (see SOP for Mini SimulProbe® High Flow Extender).**

3.13 Open valve to allow pressure bleed off.

3.14 Allow water to enter tool under ambient hydrostatic pressure. After the initial pressure bleed off, the fill rate can be observed by placing the up-hole end of the Teflon line into a bucket of water. For fast to moderate fill rates, the end of the Teflon line can be placed inside an inverted water filled bottle inside the bucket (i.e. one liter plastic soda bottle). When the bottle is full of displaced air from the Water Canister it can be emptied and reused for additional volume.

3.15 After sufficient water sample has been collected, re-pressurize the SimulProbe®.

3.16 Pull the SimulProbe® back to a few feet below the top of the drill string and stop. Open the valve and bleed off the system pressure. **Note: for safety, the SimulProbe® should always be pressurized and de-pressurized inside the casing/drill string.**

3.17 Lift the hammer and Mini-SimulProbe® out of the drill string and unscrew the Mini-SimulProbe® from the hammer anvil, leaving the AW pin on the Water Canister Sampler Head.

- 3.18 To collect the water sample, follow the Disassembly & Sample Retrieval SOP for the Groundwater Mode.
- 3.19 After collecting the water sample, disassemble the core barrel and collect the soil sample.
- 3.20 Disassemble the Mini SimulProbe® and decontaminate it according to site specific procedures.

**4.0 OPERATION: SOIL/GROUNDWATER SAMPLING MODE – USING NITROGEN BACK-PRESSURIZATION AND THE WATER CANISTER WITH DIRECT PUSH**

- 4.1 Assemble the Mini SimulProbe® in the Soil/Groundwater Mode with the SPLAT, as per Assembly sop's.
- 4.2 Thread a 1/4" OD, 3/16" ID Teflon or poly back pressurization line through enough drive rods to reach the maximum anticipated depth for this particular sampling event. (Note: Pure Teflon tubing is preferable to Teflon lined tubing because of the lined tubing's tendency to kink when bent.)
- 4.3 Thread the back pressurization line through the AW adapter pin which is applicable to your particular direct push apparatus and screw the pin into the end of the first drilling rod.
- 4.4 Attach the end of the back pressurization line to the Swage-lok Fitting and attach the Mini SimulProbe® as described in the Mini SimulProbe® Assembly SOP for Groundwater sampling.
- 4.5 Screw a slotted drive head on top of the first drive rod. The back pressurization line will extend out through the slot while you are screwing in the drive head.
- 4.6 Attach the drive head, drive rod and Mini SimulProbe® to the direct push drilling rig.
- 4.7 Check the SPLAT to be certain that it cannot be pushed up inside of the shoe, and lower the Mini SimulProbe® into position with the Drive Tip resting on the soil surface.
- 4.8 Attach the up-hole end of the back pressurization line to a three way valve and attach one branch of the valve to a Nitrogen Gas Tank Regulator

- 4.9 Begin driving the Mini SimulProbe® into the soil.
- 4.10 Once the Mini SimulProbe® has been pushed below the soil surface, but before first water is encountered, pressurize the water canister. A good rule of thumb for pressurizing is to assume 0.6 PSI/foot of anticipated hydrostatic head at your intended sampling depth. (pure water is approximately 43 PSI/100 feet; the additional pressure assumes suspended and dissolved solids and thus increased specific gravity) See attached tables from Groundwater and Wells, Driscoll, 1987. **Note: for safety, the SimulProbe® should always be pressurized and de-pressurized below ground surface.**
- 4.11 Resume driving the Mini SimulProbe®. After each drive rod has been pushed into the ground, unscrew the slotted drive head from the rod, and screw on the next segment of drive rod. Be careful to prevent the back pressurization line from twisting relative to the Mini SimulProbe® during this process.
- 4.12 Attach the slotted drive head to the top of the new section of drive rod and continue to advance the Mini SimulProbe®.
- 4.13 When you have reached an interval where you wish to collect a groundwater sample, stop and remove the slotted drive head and attach a slotted pull bail.
- 4.14 Pull the drive rod and attached Mini SimulProbe® back about 2-inches to release the SPLAT.

The maximum core lengths achievable with the Mini when using the SPLAT 1 and 2 are the following:

- 15-inches with the Short Mini Drive Shoe and the SPLAT 1
- 17-inches with the Extended Mini Drive Shoe and the SPLAT 1
- 14-inches with the Short Mini Drive Shoe and the SPLAT 2
- 16-inches with the Extended Mini Drive Shoe and the SPLAT 2

4.15 At this point the operator has one of two options.

**Option 1 (With SPLAT)** is that after the SPLAT has been released, drive forward and collect the core sample. The core will push the SPLAT to the top of the Core Barrel section. After the core sample is collected, then pull back one more time to expose the screen, release the nitrogen back pressure, and then wait for the Water Canister to fill. Option 1 directly correlates the ground water sample to the bottom of the core sample.

**Option 2 (With SPLAT)** is that after the SPLAT has been released, pull back a little further to make sure the Mini Screen is fully exposed to the formation. At this point, release the nitrogen pressure, and then wait for the Water Canister to fill. Now drive forward to collect the soil sample. Option 2 approximately correlates the ground water sample to the top of the core sample.

4.16 The maximum screen pull back for the Mini SimulProbe® is the following:

- 2-inch pull back with the Short Mini Drive Shoe and for the 1-inch long screen.
- 5-inch pull back with the Extended Mini Drive Shoe for the 4-inch long screen.
- **15-inch pull back when using the Mini SimulProbe® High Flow Extender for the 14.5” screen (see SOP for Mini SimulProbe® High Flow Extender).**

4.17 Allow water to enter tool under ambient hydrostatic pressure. After the initial pressure bleed of, the fill rate can be observed by placing the up-hole end of the back pressurization line into a bucket of water. For fast to moderate fill rates, the end of the Teflon line can be placed inside an inverted water filled bottle inside the bucket (i.e. one liter plastic soda bottle). When the bottle is full of displaced air from the Water Canister it can be emptied and reused for additional volume.

4.18 After sufficient water sample has been collected, re-pressurize the SimulProbe® by following step 4.10.

4.19 Pull the SimulProbe® back to a few feet below the ground surface and stop. Open the valve and bleed off the system pressure. **Note: for safety, the SimulProbe® should always be pressurized and de-pressurized below ground surface.**

4.20 To collect the water sample, follow the Disassembly & Sample Retrieval SOP for the Groundwater Mode in Section 7.0.

- 4.21 After collecting the water sample, disassemble the core barrel and collect the soil sample.
- 4.22 Disassemble the Mini SimulProbe® as per the disassembly instructions in Section 7.0.

**5.0 ASSEMBLY AND OPERATION FOR SOIL/GROUNDWATER SAMPLING MODE – USING THE HOLLOW ROD AND BAILER METHOD**

- 5.1 Assemble the Mini SimulProbe® as per the soil and soil gas assembly SOP, omitting the Valve Head Insert, Swage-lok Fitting and Soil Gas Line.
- 5.2 Attach the Mini-SimulProbe® to a hollow AW pin (not slotted) and seal the junctions between the AW pin and Mini-SimulProbe® and between the AW pin and AW rods with O-rings. (Additional O-rings available on request.)
- 5.3 Attach the Mini-SimulProbe® to hollow AW rods and use an up-hole hammer to drive the tool.
- 5.4 If the water sample is to be collected from a cased hole with standing bore-hole water or a mud boring, the outside of the Mini SimulProbe® should be covered by a Mini SimulProbe® Condom. This prevents cross-contamination of the water or soil sample from bore hole fluids as the tool is being lowered to the bottom of the boring.
- 5.5 Expose the Mini SimulProbe® screen and wait for the ground water to enter the hollow drive rod. Periodically check for water in the rod with a water level indicator.
- 5.6 When sufficient ground water is present, bail the ground water to the ground surface.

## **6.0 ASSEMBLY AND OPERATION FOR SOIL/GROUNDWATER SAMPLING MODE – USING PERISTALTIC PUMP METHOD**

- 6.1 The Mini SimulProbe® should be assembled as described in the Soil/Soil Gas assembly directions. The soil gas sample line is used to draw the water sample to the surface. This method can be used with either direct push or cased hole drilling methods. Note: This method will only work when the peiziometric surface of the water in the formation to be sampled is less than 25 feet below ground surface. If the water is highly turbid, the suspended solids will increase the specific gravity of the water and can reduce the effective depth to as little as 10 feet below ground surface.
- 6.2 This method may not be appropriate if the analytes of interest are volatile substances. The vacuum created by the Peristaltic Pump may pull such analytes out of solution.

## **7.0 DISASSEMBLY & SAMPLE RETRIEVAL: GROUNDWATER MODE:**

- 7.1 If the Nitrogen Gas pressure system has been used, bleed off the residual pressure before removing the Mini SimulProbe® from the borehole. **Note: For safety, the SimulProbe® should always be pressurized and depressurized inside the casing/drill string or soil boring.**
- 7.2 Unscrew the Mini SimulProbe® from the rod, leaving the AW pin on the Water Canister Sampler Head. Carry the probe UPRIGHT to the sample collection area. Disconnect the Water Canister Base from the Valve Head. This portion should be disassembled as per the Soil Gas Mode instructions above.
- 7.3 To Collect a water sample, insert a short length of Teflon Tube into the bottom of the Water Canister Base and up through the Reed Valve. The sample will flow out of the tube. Flow rate can be controlled simply by crimping the tube. If the sample flows too slowly, loosen or remove the Water Canister Sampler Head from the top of the Water Canister. A water sample may also be collected with a water sampling syringe by inserting the needle through the bottom of the Reed Valve and withdrawing the sample.
- 7.4 After the water sample has been collected, remove the Water Canister Base from the Water Canister. Remove and discard the reed valve and o-rings.
- 7.5 Remove the AW pin from the Water Canister Sampler Head. Disconnect the Nitrogen Gas line and discard the O-rings.

7.6 Remove the soil sample from the Core Barrel section and disassemble the rest of the Mini SimulProbe®.

## **8.0 DECONTAMINATION:**

Follow procedures specified in site specific work plan and/or quality assurance project plan for standard operating procedures for sampling device decontamination. A new consumable kit should be used for each sample unless otherwise specified in the work plan. Reuse of consumables may result in cross contamination of samples through incomplete decontamination or from leakage through damaged O-Rings or Reed Valves.

