Instruction Manual for MHE Products DeepWater2 PushPoint Sampler
Ver. 2.0
November 21, 2016

The DeepWater2 is heavier-duty a version of the PushPoint Sampler made of stainless steel pipe instead of SS tubing. It is constructed of a base sampling unit that closely resembles a very heavy-duty PushPoint Sampler. This base unit can be used exactly like a standard PushPoint Extreme Sampler, but can additionally be used in deeper water applications by adding extension pieces. In many environments, sediment pore water sampling can be conducted under 20+ feet of water. Sediment pore water can be drawn up, filling the leak-tight 17/64" bore of the tool, or ¼" polyethylene, Teflon, stainless, etc. tubing can be inserted down the bore of the tool, directly into the screened-zone for sample collection. We also offer a slide-hammer for gently driving this tool deeper into sediments than it can be easily pushed by hand.

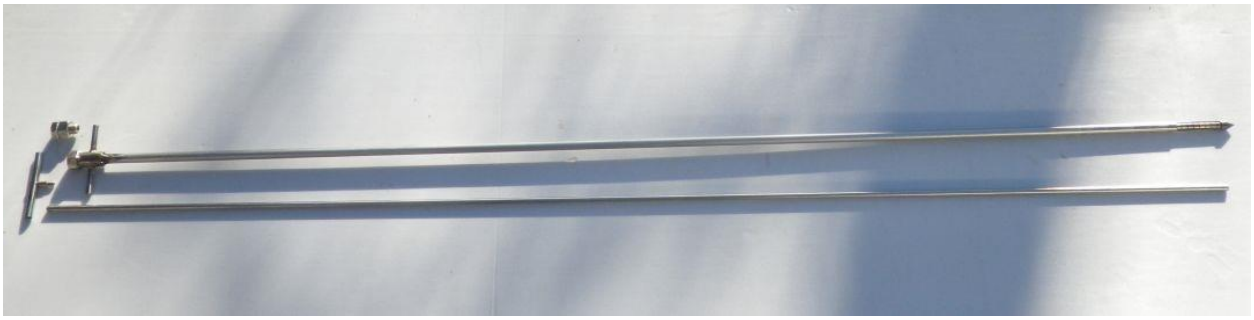

Figure 1: DeepWater 2 PushPoint Sampler including (clockwise): the body of the DeepWater Sampler, guard-rod, guard-rod handle, anvil-plug.

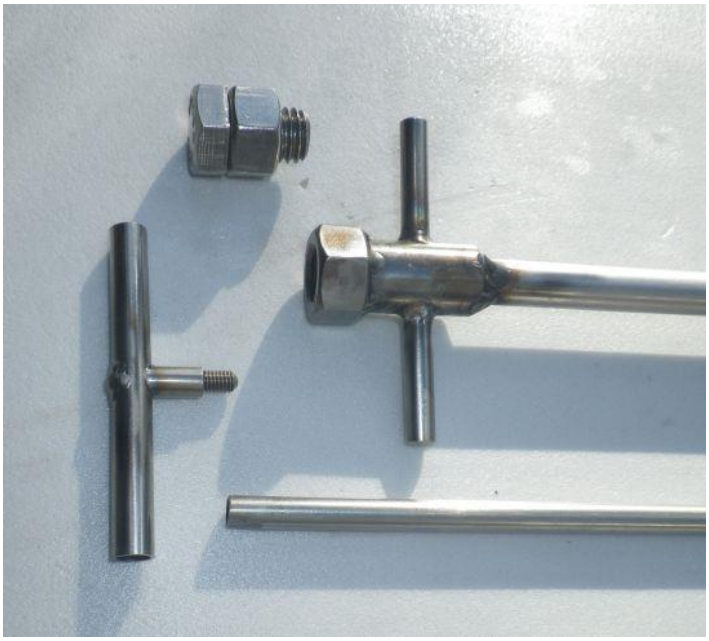

Figure 2: Close-up of Figure 1.

The guard-rod fits fully into the body of the sampler with its threaded top extending ~5/16” above the sampler body as shown in Figure 3. The guard-rod occludes the screen of the tool to prevent sediment fines from entering the screen during its insertion into the sediments, and provides significant structural strength to the tool. Once the screened zone of the tool is at the desired depth the guard-rod is removed for sampling.

Figure 3: Guard-rod inserted into the sampler body.

Attach the handle to the guard-rod if you are using it as a conventional PushPoint Sampler as shown in Figure 4.

Figure 4: Attach guard-rod handle if DeepWater2 is to be used as a conventional PushPoint Sampler.

The anvil/plug consists of a SS bolt securely tightened to a SS nut and is meant to be used as a single unit. The center of the anvil/plug has been bored out to fit over the guard-rod. When tightened to the sampler body over the guard-rod, it keeps the guard-rod in place when a mallet is used to drive the base unit of the sampler into the sediments. It is also handy to retain the guard-rod inside the sampler during storage. See Figure 5.

Figure 5: Anvil/plug attached to the base unit of the DeepWater2 sampler.

The bottom of the guard-rod has a saw cut in it to assist in the maintenance of the tool. This slice in the guard-rod provides a groove to scour the bottom of the tool bore when the guard rod is inserted fully into the Deepwater2 body. If the handle is attached to the guard-rod in the tool bore and spun in a clockwise direction the groove should loosen any accumulated grit and silt that may form in the well that exists between the last screen slit and the bore terminus. See Figure 6.

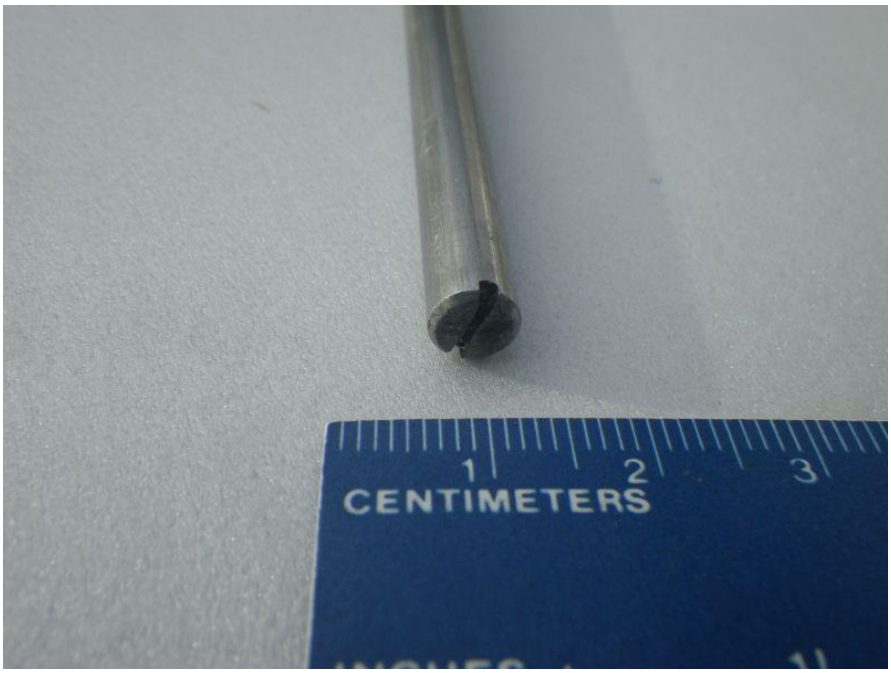

Figure 6: Slit in guard-rod bottom.


Figure 7: The top of the guard-rod has opposing flat spots ground on it to provide a grip for pliers.

In a nutshell, the operation of the DeepWater Sampler is straight forward. For example, if you wanted to sample pore water 3' into the sediments in a 12' deep lake, you would:

1) Take the base unit of the sampler and insert the ¼" guard-rod fully into the bore of the tool.
2) Connect a 6' extension piece to the base unit of the sampler.
3) Insert the extension guard-rod into the bore of the attached extension and tighten together with the primary guard-rod.
4) Hang this 12' long assembly vertically in the water column.
5) Attach a second extension to the assembly.
6) Insert the second extension guard-rod and thread it together with the other two guard-rods.
7) Attach either the slide-hammer attachment, anvil-plug, or a guard-rod handle to the top of the sampler assembly.
8) Push or pound the assembly vertically 3' into the sediments.
9) Remove the slide-hammer or anvil-plug if used, and attach a guard-rod T-handle to the guard-rod.
10) Maintaining the sampler assembly at the same elevation, vertically pull all the linked guard-rods from the assembly, unscrewing and removing each piece as it comes out of the sampler assembly.
11) Attach a Teflon taped 1/8"NPT->1/4" SS sampling tube adapter to the top of the assembly.
12) Attach a peristaltic pump or syringe assembly to the tube adapter and pull pore water from the sediments.
13) The first 200-500ml of pore water will contain the development fine material directly surrounding the screened zone, and should be discarded.
14) Collect pore water for sampling and/or physical parameter measurements.

There are three types of machine and pipe threads used in the DeepWater Sampler. Threads are subject to damage if mistreated or mishandled. Damaged threads will likely lead to inadequate sealing of the pipe joints (allowing surface water intrusion) or damage to the tool. This can be avoided if threads are kept clean and are not over tightened. Use Teflon tape on all the pipe threads, every time! The guard-rods are threaded together using a #10-32 thread, the sampler body and the extensions use 1/8"NPT, and there are ½"-13tpi nuts at the top of the sampler and the top and bottom of all extensions. It is very important to protect the 1/8"NPT male fitting (at the bottom of all the extensions) when not in use. The extension(s) were shipped with a (expensive) 1/8"NPT stainless cap that should be on these threads when they are not in use. The sampling accessories were shipped with vinyl caps that should be used to protect their 1/8"NPT threads when not in use. The photo below shows a suggested tool kit to help maintain and clean the various threads.

Figure 8: Tools for long-term maintenance of the DeepWater2 PushPoint Sampler. (L->R: 1/8”NPT->SS 1/4” tube for sampling, 1/8”NPT->¼” SS compression fitting for sampling, 1/8”NPT tap and die, Teflon tape, extra guard-rod T-handle, #10-32 die and tap, two ¾” wrenches).

The DeepWater2 is carefully constructed entirely of 316 Stainless Steel and consists of a base sampling unit that has a machined SS screened zone (¼” bore welded to 1/8”NPT SS pipe. The screened zone has 14 slots that are 0.025” (25-slot) wide and the entire discrete slotted portion of the screen is ~ 5cm long. See Figure 9.

Figure 9: Screened zone of original DeepWater sampler (left), and the DeepWater2 sampler (right)

The top of the sampler consists of a 1/8”NPT SS coupler welded to a ½”-13tpi SS machine nut. This top nut is used for easy coupling/uncoupling of extension lengths or sampling connectors using standard ¾” wrenches. The two handles welded to the top fittings of the primary sampler and all extensions can be used for hand tightening the connection prior to final tightening with wrenches. These handles can also be used to pull the sampler from the sediments or as places to tie tethers, buoys, etc.

Figure 10: Fitting at the top of the DeepWater sampler.

Note: Teflon tape has been used to seal the threads between the 1/8”NPT and the coupler assembly. The assembly has been securely tightened or welded to the 1/8”NPT and it should never be necessary to remove it from the pipe.

A similar ½”-13tpi has been welded on corresponding extensions and fittings. When two 1/8”NPT pieces are threaded together their ½”-13tpi nuts are ~ 1/4” apart, allowing tightening with wrenches placed close together.

Figure 11: Connection between the DeepWater base unit and an extension piece.

Always use Teflon tape on **ALL** 1/8”NPT male threads used to make a leak-proof connection. These fine 1/8”NPT threads can easily be tightened to become leak-tight connections, but once the joint has been tightened and loosened again, Teflon tape should be reapplied before another connection is made. Use

Teflon Tape **every time**. Note: wrap the Teflon Tape on the threads the same direction as the threads are cut….use 2-4 wraps.

Figure 12: Teflon tape all 1/8”NPT pipe threads every use.

Two ¾” wrenches should be used to tighten/loosen all 1/8”NPT connections. Open-end wrenches (shown) work well, but flair-nut wrenches work best. To tighten 1/8”NPT connections, place the wrenches on the ½”-13tpi nuts on either side of the connection such that they are separated by about 45 degrees. Squeeze the wrenches together to tighten, repeat as necessary. Frequently with the final tightening action, the wrenches set about 15 degrees apart can be squeezed together using one one hand. Tighten to snugness (~20 ft-lb). There is no need to over-tighten.

Figure 13: Wrench position for final tightening of pipe connections. The joint can be tightened by squeezing the wrenches together with one hand.

To loosen 1/8”NPT connections, position the ¾” wrenches exactly the opposite of how they were for tightening, keeping them at about 45 degrees of separation. Squeezing them together loosens the joint. Repeat as necessary.

Figure 14: Wrench position for loosening pipe connections. The joint can be loosened by squeezing wrenches together with one hand.

A slide-hammer attachment is available to assist getting the sampler to deeper depths in the sediments.

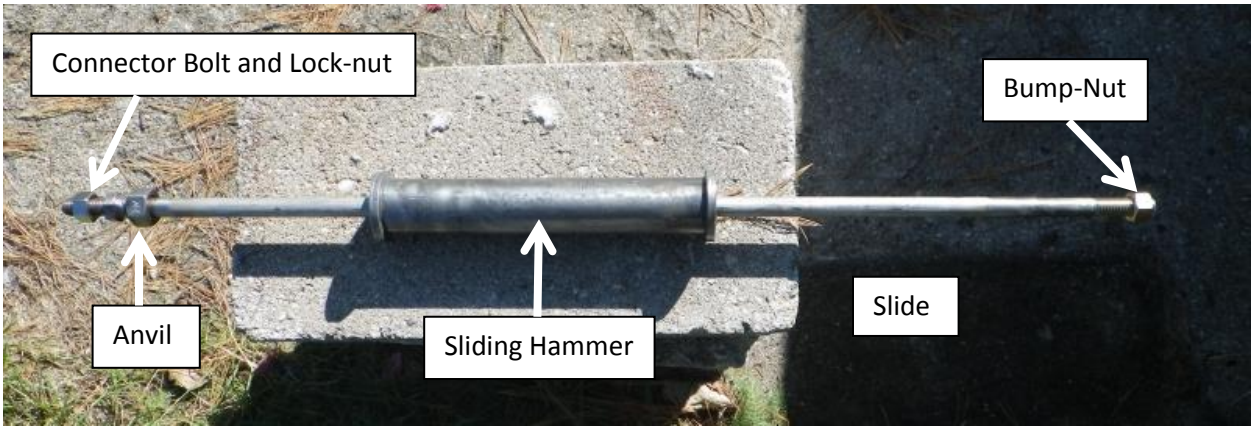

Figure 15: Slide hammer attachment for DeepWater PushPoint Sampler.

The slide-hammer connector bolt attaches the slide-hammer to the top of the DeepWater sampler or the top of the extensions. The guard-rod should be fully inserted into the sampler and extensions. It’s T-handle should be removed. The fully inserted and screwed together guard-rod(s) will stick up above the ½”-13tpi nut at the top of the sampler/extension approximately ½”. The guard-rod should fit inside the hole drilled into the bottom of the Connector Bolt as the bolt is fully threaded into the ½”-13tpi nut at the top of the sampler/extension(s). Once the Connector Bolt is secure, the Lock-Nut should be tightened against the ½”-13tpi nut at the top of the sampler/extension. Two ¾” wrenches should be used to tighten the Lock-Nut using the same technique used to tighten Extensions together.

The ½" Lock-Nut is stainless steel while the ½" Bump-Nut is hardened steel – they are not interchangeable. It is sometimes best to remove the Bump-Nut and Sliding Hammer while connecting the slide and Connector Bolt to the sampler/extension(s) (a lot less weight to maneuver around). After the slide-hammer assembly has been securely attached to the sampler, install the hammer on the slide and maybe the Bump-Nut. The Sliding Hammer should move smoothly and strike the Anvil uniformly. It is sometimes helpful to remove the Bump-Nut during hammering to achieve a longer hammering stroke. To assist removing the sampler from the sediments there is a Bump-Nut at the top of the slide. Striking this nut with the hammer repeatedly should easily bump the sampler from the sediments. Wear hearing protection and eye protection! Be wary of the very serious potential pinching hazard that exists with this tool. Keep all fingers, toes, hair, shirts, etc. from between the hammer and the Bump-Nut and the Anvil. A tremendous amount of force can be generated by the hammer.

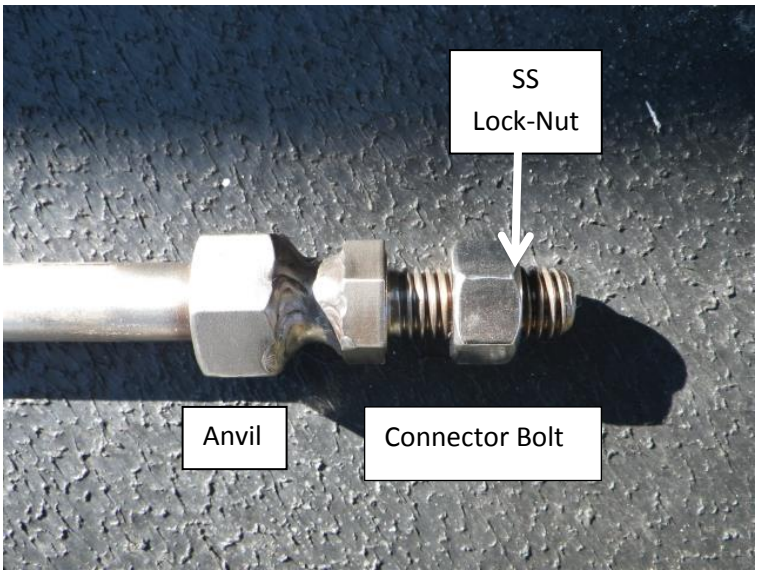

Figure 16: Enlargement of connection at bottom of slide hammer

Figure 17: Slide hammer driving DeepWater sampler into sediments.

A simple tubing connector accessory is available as an adapter between a piece of ¼" SS tubing and the bore of the DeepWater/Extension(s). This adapter allows suction devices such as syringe or peristaltic pump to draw pore water up the bore of the tool and make a connection to standard ¼" OD tubing.

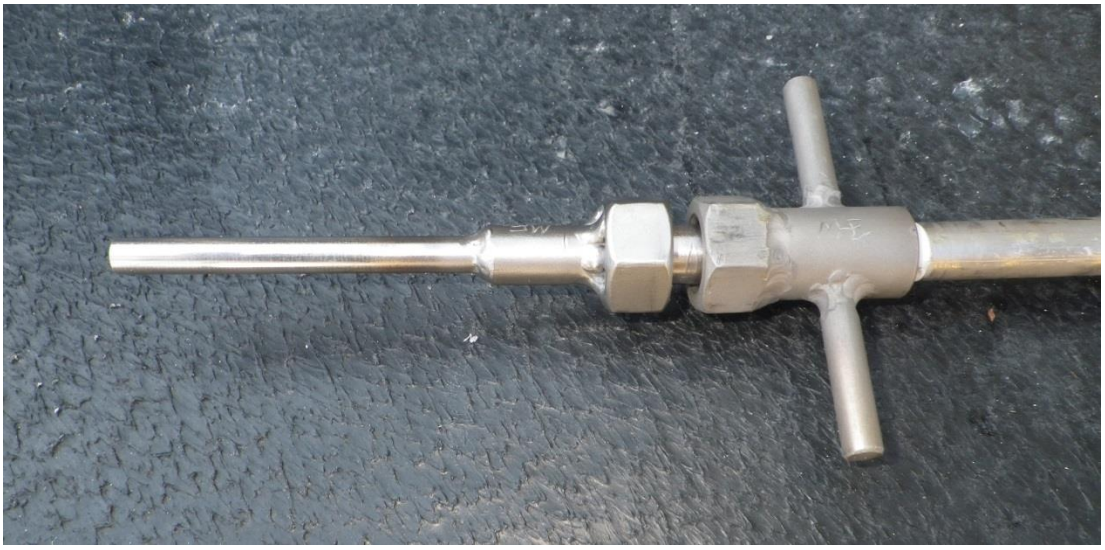

Figure 18: 1/8"NPT->1/4" tube adapter connected to DeepWater sampler.

Figure 19: DrillPump connected to 1/8”NPT->1/4” tubing adapter for pumping porewater out of sediments.

A compression adapter is available that will allow ¼”OD tubing to be lowered down the bore of the tool once it has been installed in the sediments. The tubing can be inserted to fill the entire bore of the sampler/extensions and then pulled up 2” to just above the screen slots. At the top, the ¼” tubing is threaded through the compression adapter, and the adapter is secured to the top of the sampler/extensions. Then the compression nut is tightened snuggly to the adapter, compressing the ferrule within to make a leak-free connection. This adapter allows one to reliably isolate the bore of the sampler from the sampling stream. In essence the pore water is brought into the screen and immediately is brought into the ¼” tubing without ever coming in contact with the bore of the sampler. If you are using polyethylene, Teflon, or other plastic tubing that came on a spool, the tubing seems to retain some “curl memory”. This propensity to bend back into a loop causes difficulty when advancing the tubing down the bore of the tool and into the screened portion of the sampler. To reduce these problems, take the time to “uncurl” the first 2-3 feet of tubing by bending in a curl opposite to the natural curvature. In the end, you should have tubing that maintains its straight configuration for several minutes. It is sometimes helpful to cut the end of the tubing with a slight bevel so that the tubing encounters obstacles at an angle, rather than with the blund end of the tubing.

Note: the 2-piece ferrule that was originally used in the manufactured compression fitting is provided. Once this 2-piece ferrule is compressed it cannot be reused. We highly recommend that you go to a local hardware store and purchase a package of inexpensive reusable ¼" nylon ferrules for use with this adapter, and use them instead of the 2-piece ferrules.

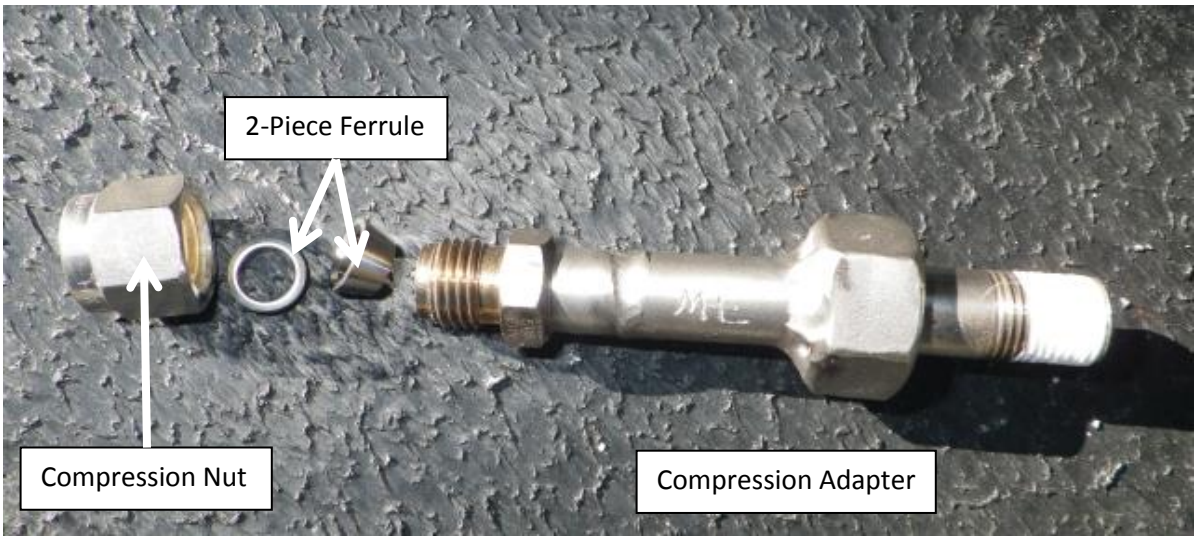

Figure 20: Exploded view of 1/8"NPT->1/4" compression adapter.

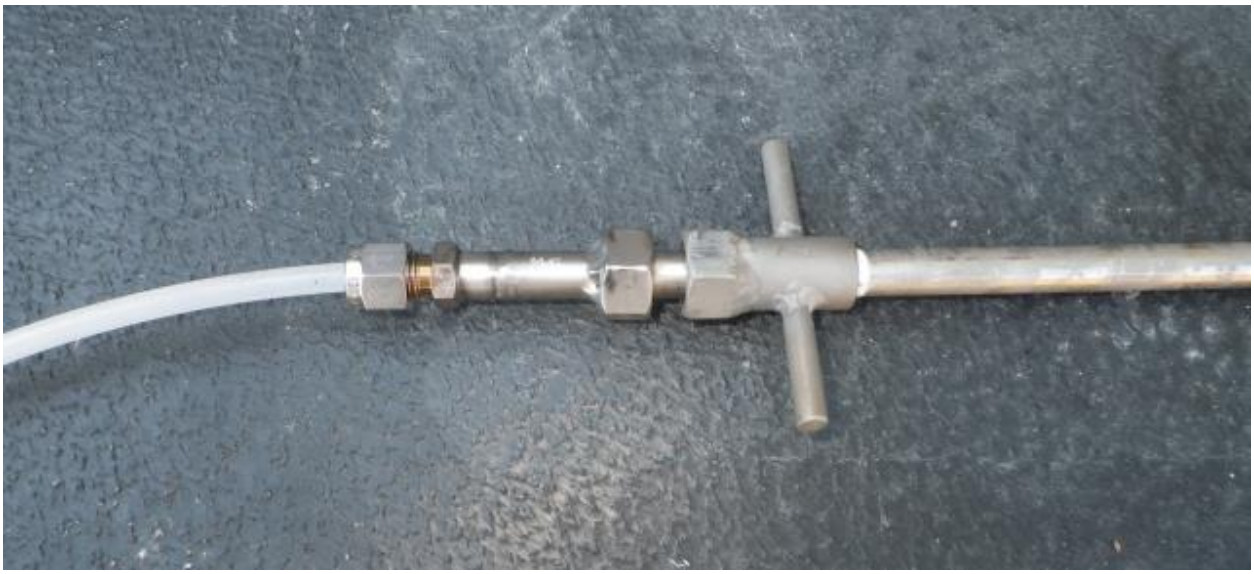

Figure 21: ¼" polyethylene tubing passed through the 1/8"NPT->1/4" tubing compression, down the bore and into the screen of the DeepWater sampler.

Figure 22: ¼” polyethylene tubing passing down the DeepWater bore into the screened zone.

Some Suggestions:

- Look down the sampling string on land…it should be straight when threaded together
- 1/8”NPT pipe will bend, be careful. Make sure that all pieces are straight before use
- Make sure that all threads are clean and clear of any grit…keep covered when storing or transporting
- Primary guard-rod should fit perfectly in sampler and should clink with the end when inserted
- If guard-rods are all fully threaded together, they should stick out of the sampler 5/16”-3/8”” above ½”-13 nut
- If sampling from a boat, make sure that it does not move laterally much – use 3 anchors @ 120 deg. if possible
- Sampling tubing from pump to sampler should have enough slack as to never become taut during sampling. Do not pull sampler sideways as it may bend the screen or the sampler, or the entire sampling string may become top-heavy and bend over.
- Consider having a safety float on surface tethered to the sampler
- Consider having a safety buoy or safety line on ¾” wrenches
- MHEproducts.com offers a 6’ long adapter that allows the utilization of DeepWater extension barrels to install our ¼” diameter SedPoint2 polyethylene/polypropylene sampling or monitoring points. Information on SedPoints can be found at: www.MHEproducts.com/SedPoints.pdf