Snap Sampler

How exactly does the Snap Sampler work?

In the simplest explanation, the user places Snap Sampler bottles into the Snap Samplers, "cocks" the bottles open, deploys the samplers downhole using the trigger cable, and when ready to sample, activates the trigger to seal the water sample in-situ.

The Snap Sampler employs specialty double-opening bottles that collect water in-situ within the well. The Snap Sampler itself provides a mechanical means of holding the Snap bottles open during deployment and a mechanism for triggering the bottles to close only when the user wants to collect the sample.

Snap Sampler bottles have special end caps made of PFA Teflon. The end caps are constructed to attach to a Teflon-coated internal closure spring and to an outer release mechanism. The trigger retracts the release pins, allowing the internal bottle spring to close the end caps. The sampler is retrieved ready for minor preparation and submittal to the lab.

How does the Snap Sampler compare to other sampling methods?

Field testing shows that groundwater sampling with the Snap Sampler is faster and less complicated than pump sampling. No power is needed and no separate devices are needed to determine purge stability, turbidity, or water level fluctuations. Laboratory and field testing of the Snap Sampler show consistent positive results. Blank Snap Sampler bottles are clean and sealed in the same container as an Encoretm soil sampler. Extensive analyte testing by the Army Corps of Engineers and others show the Snap Sampler "passes with flying colors"--with no statistical differences from the control.

The McClellan report by Parsons is one of the more extensive comparisons of passive sampling. While there are some problems with the analysis and broad-brush interpretations, the data sets generated for the Snap Sampler and other methods illustrate graphically how well the Snap Sampler method performed.

Visually it is clear which sampling methods compared best. The Snap Sampler and Low Flow performed very well in the McClellan study. The Hydrasleeve and several others did not perform as well in the McClellan study. Correlation coefficients below 0.50 are generally poor, and several comparisons with the Hydrasleeve (VOC, hexavalent chromium) had low correlation coeffients compared to purge sampling and other passive methods.

The Snap Sampler improves sample collection through simplicity and consistency. Purge methods incorporate several variables the Snap Sampler method does not. These include: exposure to surface air during pouring to sample bottles, pouring technique, rate of bottle filling, weather, potentially different pump depth settings, duration of pumping, purge

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volume, changes in stability parameter criteria, equipment used, and other site-specific and event-specific variables. These factors combined are illustrated by increased variation of the "traditional purge" results when compared to the Snap Sampler. Concentration trends are discernable much sooner with less variability or "noise" in the sampling data. With data trends discernable sooner, demonstration of remedial effectiveness or monitored natural attenuation (MNA) can be achieved sooner.

I've heard passive sampling is a big money saver, how much could I expect to save?

Cost savings using the Snap Sampler is commonly 50%. Some sites even exceed that amount. With no waste to dispose (not even extra sample waste), very little preparatory logistics, and simple operation, sampling 20 wells per day should be expected. Improving productivity by 100% or more is the primary driver for cost savings, along with avoidance of waste handling and disposal.

Another driver for cost-savings is reduction in field sampling variability. Reduction of sampling random error from 30% to 10% can make the difference between seeing a trend and not. Demonstrating remedial effectiveness or natural attenuation in many cases is more important from a cost perspective than the sampling itself. All sources of savings sould be considered when evaluating overall cost of a groundwater sampling program.

What about sample volumes?

The sample volume of the Snap Sampler VOA vial is slightly less than 40ml. This is not an issue for EPA method 8260 or other standard lab methods for volatiles. For non-volatile analytes that benefit from larger volumes, such as SVOCs, 1,4-Dioxane, explosives, etc., 125ml and 350ml bottles and samplers are available that can increase sample volume for analytes that require more water.

Snap Samplers can be stacked in any combination up to 6, allowing a maximum water volume of 2.1 Liters in 4-inch/100mm and larger wells, and 750ml in 2-inch/50mm wells. Sample volume is a technical limitation, but it is always worthwhile to have a conversation with your laboratory to find out how much water is really required. Advances in technology continually improve analytical performance and often reduce require sample sizes.

Are there limitations of what analytes can be tested with Snap samples?

No. Snap samples are not restricted to certain analytes. The bottles are open to the well environment during deployment, so no special equilibration is needed beyond restabilization of flow in the aquifer/well. All chemicals/parameters in the water column can be sampled with the Snap Sampler. While no chemical or parameter is excluded from the

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sample bottles, some analytes require large sample volumes to achieve appropriate detection limits. Sample volume can be a constraint on these analytes or on an extensive analyte list.

How many Snap Samplers do I need to collect a sample?

In the recommended usage, Snap Samples are collected by deploying the samplers and bottles in advance of sampling. The well re-equilibrates, then you trigger the sampler. Using this method, you need one Snap Sampler for each bottle you plan to collect. The number of samplers you need per sample depends on how much sample volume your laboratory needs. For some analyses such as SVOCs, you may have to combine several bottles to get one analysis.

For simple analysis needs, you may be able to deploy just one Snap Sampler. For longer analyte lists you may have to deploy four or more samplers (and bottles) on one trigger line. There are 40ml glass VOA vials, 125ml and 350 ml plastic bottles available, so combinations of sample bottle sizes usually can accommodate most analyte lists. In 2" wells the maximum sample volume is 750 ml with 6 bottles set in series. In 4" wells, the maximum sample volume is 2L with 6 bottles set in series. Our best advice is to consult your lab on their requirements.

What's the advantage of no-pour groundwater sampling?

Consistency is vital to assure comparability of data from different sampling events. Variability of sampling conditions from event to event can be significant. Wind, temperature, and sampling personnel can each have an effect on sampling consistency, and are not always controllable. The Snap Sampler VOA vial seals under the groundwater surface right in the monitoring well. When retrieved, the sample is already sealed in the bottle that you ship to the laboratory. Since you never transfer sample from a pump discharge line or a bailer into the sample bottle, there is no exposure of the sample to the ambient conditions at the time of sampling. Differences in pouring technique by different field personnel are not a factor. As a result, consistency of sampling method is considerably improved when samples don't have to be poured.

How hard is it to assemble the Snap Sampler?

It's really not hard at all. Snap Sampler assembly takes just a few seconds. There are four main parts to the sampler, plus screws and the attachment mechanism. The release mechanism (3 of the four parts to the sampler) is held in place with only one screw. Users can become proficient in Snap Sampler assembly with only a few repetitions. Recent improvements include "push-in" trigger cable and single screw connections.

What about decontamination?

In most applications, the Snap Sampler is dedicated equipment so there is no need for

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decontamination. The Samplers go right back into th well that they are removed from, limiting the need for cleaning.

If a Snap Sampler needs cleaning, there are just 4 parts to the sampler, plus screws and connectors. Disassembly is relatively easy with very few moving parts. Cleaning can be accomplished by disassembling, rinsing, and brushing with a bottle brush. No special tools are needed beyond those provided with the sampler and normally used for equipment decontamination.

How does the trigger line work? How does it attach at the well head?

The manual Snap Sampler trigger line is comprised of HDPE tubing with an FEP-coated stainless steel cable. Fluorocarbon (PVDF or PFA Teflon) is also available as tubing material. The tubing attaches to the sampler to the Well Dock. Up to 4 trigger lines can be attached at a 4-inch well head. Up to 2 lines can be attached at a 2-inch well head. The sampler end of the trigger attaches to the release pin mechanism with a press-in ball fitting, similar to a bicycle brake cable. To trigger the sampler, just pull firmly on the trigger cable at the well head. The tubing and sampler stay in place, the cable moves the release pins, the bottles close.

The pneumatic trigger system utilizes a downhole pneumatic actuator that does the trigger pulling for you. You provide bicycle pump air pressure at the surface, which trips the sample bottles to close. Low air pressure is required to activate closure--unlike bladder pumps, there is no need to overcome hydrostatic pressure of submergence to complete sampling. Pressures as low as 15 PSI (1Bar) and normally below 60 PSI (4 Bar) can activate the pneumatic system. A pressure gauge provided in the Pneumatic Tool Kit indicates when the Snap Samplers have tripped.

What about deep sampling?

The Snap Sampler trigger is now available with a downhole pneumatic trigger. With the pneumatic trigger, you can sample from virtually any depth. With a check valve system, the downhole air line fills with water up to the water surface, so you don't have to overcome submergence pressure to activate the Snap Samplers to close. This makes sampling at depth very easy and reliable. Technically, the activation downhole is hydraulic, but air pressure at surface provides the power to the actuator motion, so we call it a pneumatic system.

In shallow or deep applications, samples are never exposed to air with the pneumatic system. At shallow submergence depths (less than 30ft/10m), air is not released until after the Snap Sampler bottles are closes, and at depth, air is never released downhole. The system has been used to depths greater than 2000 feet /600 meters and there is no theoretical depth limit for the system.

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For wells that are difficult to pump because of lift or other limitations, the Snap Sampler is a great way to make sampling deep much easier than the alternatives.

Once you retrieve the bottles, how do you prepare them for the lab?

When Snap Sampler bottles are retrieved, the end caps still have the retainer pin tab. This portion of the cap must be clipped off to allow placement of the septa cap. With the clipper tool provided with Snap Sampler, both caps are easily clipped flush with the top of the cap.

How do you preserve the samples?

To preserve the sample, acid can be added to vial through one of the end caps. Each vial cap has a conical-shaped cavity and a thin membrane for introduction of preservative to the vial. The cavity is sized to accept the proper amount of 1:1 HCl solution to lower the vial pH to <2. To add preservative, one end of the vial should be sealed with a screw septa cap. To the second end, the field or lab technician adds HCl. HCl preservative can be obtained in 1ml ampules or poly dropper bottles from your lab or through a laboratory supply vendor.

Using the back end of the screwdriver tool provided with the samplers, the membrane of the vial cap should be pierced. This allows the HCl preservative to mix with the sample without introducing air to the vial. The cavity should then be topped off with preservative to create a meniscus over the cap cavity. Screw the septa cap onto the vial as usual.

Do the laboratories need to do anything they're not used to?

No. For samples that require no dilutions, or where labs have autodilution devices, the Snap Sampler VOA is placed directly in the autosampler just like a normal vial. It doesn't matter which way is up, either end works just as well. For manual dilutions, the analyst can sample with a syringe directly through the septa and cap membrane; or remove the screw the cap and sample through the cap membrane only; or pull the cap off, hook the end of the spring over the lip of the bottle, and sample from the open container.

What is the green spring inside the bottle?

The spring inside the Snap Sampler bottles are made of stainless steel with a PFA Teflon-coating. The spring pulls the end caps onto the vial when the Snap Sampler is triggered, and holds the caps in place when the bottle is closed. The green coloring is a primer that allows the PFA to stick to the stainless steel. The PFA itself is clear. The PFA coating is cured at 700 degrees F, so no volatile chemicals remain, and the coating provides an inert barrier between the sample and the stainless steel spring. The spring remains in the sample bottle when submitted to the analytical laboratory. The low-friction PFA Teflon coating on the spring allows autosampler extraction probe to be inserted in the Snap Sampler vials without binding.