Frequently asked questions on groundwater sampling

General questions

Q: When can I take a sample from a well ?

A: If you have fresh new (not stale) groundwater in your well. This is after having removed three to five wet well volumes of water. After this all parameters have shown to be stabilized. Not only the directly field measured pH and EC but also the volatiles, trace metals, polycyclic aromatic hydrocarbons, pesticides and so on. This purging is done directly prior to sampling. In wells that recover slowly (give little water) you may take a sample after 6 – 24 hours after the last purging. In this case make clear notes that you were not able to respect standard sampling procedures. Do not lower the water level in a well below the top level of the screened part of the well. Otherwise the sample will be severely aerated.

Q: I find it hard to make a good selection for sampling my wells. Can you help me ?

A: You may consult the document Sampling – purging pump selection table which you will be able to find in the Additional info section.

Q: Why is a cheap bilge pump not suitable for groundwater sampling ?

A: They are cheap because it is a mass product simply meant to remove bilge water out of a boat. No one (except you maybe after getting problems when using it for the wrong purpose) cares if the rubber used for valves, membrane, housing, tubing or fittings will contaminate your sample with a whole set of 'pollutants' would not have been found by a non-contaminating special sampling pump. The manufacturer of a bilge pump simply does not understand sampling language. Moreover these pumps cannot be decontaminated on volatiles. Plastics and rubbers sorb them and will desorb them later at your next sampling job. Maybe you can use such a pump to determine conductivity of water or macro-parameters as nitrate, iron or phosphates but for micro parameters … forget it. If your reaction is that you will use the pump as a pure vacuum pump to apply a vacuum in a so called wash bottle then we will have to disappoint you once more. The system you suggest there is a bottle (or more) fitted with a rubber stopper with two tubing connections. One tube goes to your vacuum pump, the other into your monitoring well or other water source. It will work up till 6 m depth. The thing is that vacuum is applied during minutes to fill the bottle. This will largely degas your volatiles from your 'sample' water. The air that is still in the vacuumed bottle is largely sufficient to (hydro)oxidize and precipitate (trace)metals. This is a mini-remediation project and not a sampling system. OK for non volatile macro parameters; a disaster for trace metals and volatiles.

Q: I am only sampling water, so why spend so much money on special equipment ?

A: We hope that the nurse giving you an injection in the hospital does not have the same curious mentality ! If she thinks: I am only injecting a liquid in some muscle then a lot of patients what be cross contaminated with hepatitis, aids and so on. We would have serious health problems throwing us back into medieval times. That is the risk of cross-contamination ! Measuring something that happened earlier on another spot ! Also we are analyzing water to extremely low pollution levels for mans safety and health. If your sampler by a wrong construction or wrong use contaminates your sample then the lab will analyze the sample procedure not the quality of the water itself. There are plenty examples of what can go wrong: zinc plating polluting a water sample, pollution seeping out or dripping from cords and cables, PVC tubing giving phthalates to the water, incorrectly stored plastic tubing (any quality) being polluted by nearby petrol containing jerry cans and engine tanks. Not to mention long lasting suction which will degas volatiles, oxygen precipitating metals, cavitation, turbulence and warmth caused by wrong or incorrectly applied pumps and so on. The pumps we

offer for samplings are universal purging and sampling pumps well known for their sampling qualities and avoidable cross-contamination risk.

Q: My well is too small for a MP-1 (12.27) or a combination of a Giant + Booster (12.12.06/08) pump. How can I sample this well ?

A: If the groundwater level is < 9 m (@ sea level) use the peristaltic pump. If the level is deeper use the foot valve pump (also called inertia pump) 12.13 (hand operation) or 12.15 (electrically powered).

Q: There is a lot of sediment in the well. Which pump is sensitive and which one isn't ?

A: If the sediment may contain coarse sand or stones forget any pump and bail it out with a special 40 mm steel bailer with extension rods or cable. The water bailer 12.04 will do this job as well. You may also use the larger sizes foot valve pump (18 or 22 mm) to bail out the sand. If you start pumping keep on going until the water gets clear; don't stop ! If the sediment is without coarse material we speak are speaking about silt-loaded water. Silt may severely reduce the lifetime of MP-1 (12.27) impellers. They turn at 22.000 rpm ! Aeolian deposits are less aggressive since the shape of the particles is rounded. Impellers may be replaced by yourselves. The Giant+ booster pumps turn much slower. Silt and sand may block the motors but won't reduce their lifetime. Foot valve pumps are insensitive. A peristaltic pump is not sensitive for any sand but may block when the rotor sucks a lot of sand at the same time. The electronic fuse will 'blow' but can be reset easily.

Q: How can I effectively decontaminate sampling equipment ?

Situation: Effective decontamination of a wide range of sampling equipment to be used for sampling in coal tar residues contaminated water/sediments - in a waste dam of several decades old at a large iron/steel works - the exact concentrations are unknown - that's why we are sampling.

The range of samplers to be used (for the variety of material conditions on site) are:

Hand augers
Bailer boring equipment & temporary casings & bailers
Stainless steel bailer for water sampling
Sample gutter for sample presentation
Multisampler
Dividable piston sampler
Bi partite gouge auger set
Peat sampler

THE ANSWER

Concerning the question on decontamination of equipment:

Tars are difficult matter for decontamination !
Hot diluted Deconex (20.05.29) is a very aggressive cleaner (zinc will go into solution !)
I will separate two groups of products:

A: The products used for soil or sediment sampling
A1: Stainless steel products
A2 Steel products
A3 Plastic products

B: The products for groundwater sampling
B1 Stainless steel or glass products
B2 Plastic products (non-disposable)

A1: Stainless steel products can be cleaned in a hot (60-95° C) concentrated Deconex solution (concentration indicated on the bottle). In case of very heavy contamination (greasy layer on the product) a cloth with pure acetone (alternative naphtha / paraffin where you wash clothes in) can be used in advance of the Deconex. Of course a steam cleaner is effective too. Rinse with clean water to finish with.
A2: Use the acetone option and after that baby shampoo + water rinse.
A3: Forget the acetone (except for Teflon where it can be used). Naphtha / paraffin can be used however. After that Deconex or (if less dirty) shampoo + rinse.

B: General: Use disposables when possible. Except when used in a layer with pure product the concentrations will be very low.
B1: Use the hot Deconex for an hour or so. Then rinse.
B2: The most delicate group: Through their micro-porosity you may clean the out + inside but not the interior (intra molecular space). Use the hot Deconex (attention not to deform the product by too high temperatures). Then rinse with ample water. Expose to warmth (sun, outside) for a few days to chase out the volatiles.

Please consult the decontamination documents in the additional info section (not in FAQ's) for decontamination procedures as recently described in a US magazine.

Peristaltic pumps Hand operated type (12.23) and electric (12.25)

Q: Is a peristaltic pump fit for use to sample volatiles.

A: An recent extensive research in the Netherlands, under the supervision of the Dutch Normalization Institute (www.nen.nl) has shown that no sampling device gives more consistent results for ALL environmental parameters as a peristaltic pump. Some loss of volatiles was reported due to the (short) period of applying suction to get the water above the ground but this was never > 20%. These losses were also reported by earlier investigators. However the peristaltic pump was judged the best sampling solution for all parameters since the dispersion of analysis results was considerably lower than with other sampling devices. This is due to the fact that sampling with a peristaltic pump is so simple that it is difficult to make errors. The Dutch Normalization Institute prescribed sampling with the PP as the best solution for all parameters in situations where the water table is < 8 m. below the pump level. Also see the question below Q: "Can I sample volatiles with a peristaltic pump ?" with a more extensive answer.

Q: Can I sample volatiles with a peristaltic pump ?

A: Diminishing the pressure on a liquid means advancing the evaporation. Applying suction to a groundwater sample consisting of water with volatiles means that a certain percentage of volatiles will degas. Volatiles in solution will start boiling and, if the low pressure persist, will leave the water. Losses by degassing of volatiles are reported up till around 20%. However, in the Netherlands a peristaltic pump is considered as the primary groundwater sampling tool for both non-volatile and volatile micro parameters up to a suction depth of 8 meters. Conditions are: Sampling speed 200 ml/min +/- 100 ml/min., renewal of pump tube prior to every sampling event (to prevent cross contamination), renewal of transport tube prior to every sampling event. Along with tests results reported in American Groundwater monitoring and remediation review through the years the Dutch Normalization Institute (NEN www.nen.nl) found it necessary to do a large scale field and laboratory test focused on the question which sampling pump would serve best the purposes of sampling groundwater on volatiles. The testing itself was done by a number of important Dutch engineering companies. Pumps included in the test where a bladder pump, a Grundfos MP-1 impeller pump, a foot valve (or inertia) pump, a peristaltic pump and a bailer. These tests have shown that the peristaltic pump showed highest accuracy in reproducibility of measuring results. Although losses up till 15% were reported, they were consistent and reproducible, whereas with the other systems the

variations were considerably larger. The high reproducibility and simple handling of the peristaltic pump has resulted in the general advice to use the peristaltic pump for all sampling jobs at suction depths <8 meters. Renewing the pumps tubing results in a 'new' pump which assures the highly consistent sampling results. Of course the suction depth of the peristaltic pump is limited to 9.5 m at sea level. So always be prepared to have another sampling system at hand for deeper samplings.

The NEN report referred to is: ANVM project 108/109 (1996) Sampling of groundwater for volatile components.
NEN standards referring to groundwater sampling are:
NPR 5741 (sampling equipment)
NEN 5744 (sampling of non-volatiles, including anoxic in-line field filtration on 0,45 micron)
NEN 5745 (sampling on volatiles)

Q: Can you supply me a statement which says that a peristaltic pump is a good pump to sample on environmental parameters ?

A: Statement

This paper is tot state that:

The subscriber ing. Gerard P. van Dyk, being an active member of the sub-committee for "Fieldwork environmental soil research techniques" at The Dutch Normalization Institute (NEN) in Delft states that:

1. A peristaltic pump is considered as the primary groundwater sampling tool for both non-volatile and volatile micro parameters up to a suction depth of 8 meters. Conditions are: Sampling speed 200 ml/min +/- 100 ml/min., renewal of pump tube prior to every sampling event (to prevent cross contamination), renewal of transport tube prior to every sampling event.
Extensive tests have shown the lowest variability in analysis results, the best analysis results on non-volatiles and limited losses on volatiles due to the applied suction (up to 15 %).
NEN standards referred to are:
NPR 5741 (sampling equipment)
NEN 5744 (sampling of non-volatiles, including anoxic in-line field filtration on 0,45 micron)
NEN 5745 (sampling on volatiles)

2. Eijkelkamp Agrisearch Equipment checks the leaching characteristics of products that come in contact with groundwater samples since about 8 years. Two Quality Control / Quality Assurance systems are applicable:
a) The ETU (Eijkelkamp Toxic Hallmark) system.
b) The KIWA* certification system.

Both systems check the leaching characteristics of the products involved:
ETU: Twice a year on LDPE tubing, Silicone tubing, Filter gauze, Filter sand
KIWA: Once a year on HDPE and PVC monitoring well material and bentonite.
Disposable 0,45 filters are factory tested by the supplier.

*KIWA = Official Dutch Institute for the Quality Control of water transport articles.
Eijkelkamp itself is ISO 9001 quality controlled by KIWA.

More information on the ETU Hallmark is attached. More information on the KIWA Hallmark at the KIWA Institute in Rijswijk. The KIWA Testing standards were written specially for the groundwater sampling market. Subscriber was member of the committee that wrote the testing standards.

ETU certificates are supplied with each shipment of the material in question. The certificates show all parameters that were found above the detection limit.

3. No contamination by phthalates can be expected from the use of a peristaltic pump in combination with silicone and PE tubing.

4. Leaching tests are extremely sensitive (and are getting more and more sensitive). So in normal cases some parameters (even sometimes phthalates) may be found during the tests. If, however concentrations are found that might in worst case situations contaminate a sample re-analyses are done and, if necessary users are alerted. Besides of three exceptions during the last eight years the re-analyses show that our products are also severely testing the laboratory !

5. If a phthalate contamination occurs (which is not site related) this will normally be caused by the use of:
I. Inadequate PVC for the monitoring well material (should be made of PVC for the drinking water transport market, although there contents of lead, zinc or tin are accepted. Eijkelkamp PVC pipes are stabilized with a metal free stabilizer)
II. PVC tubing (which may contain up to 40% of phthalates)
III. PVC caps on the sampling bottles
IV. Laboratory errors (which are very common even in certified labs)

Giesbeek 6 december 2002-12-06

Subscriber
ing. Gerard P. van Dyk
trainer / consultant of Eijkelkamp Training & Consultancy

Q: What are the clear advantages of the 12 Volt electronic peristaltic pump for sampling ?

A: There are several advantages:

- By changing the pump (silicone) and transport (PE) tubing prior to each sampling you posses a 'new' non-(cross)contaminating pump each time you take a sample.
- It not only gives perfect vacuum (7 meters water column @ sea level with the 6x10 mm silicone tubing and 9.5 mwc with the 4x8 mm silicone tubing) but also gives the perfect pressure for field filtration by means of 0.45 micron in line disposable or non-disposable filters.
- Battery incorporated with enough power for 4.5 hours of full speed pumping. Electronically protected against overcharging, protected against draining to low, against over current. Can be charged overnight. Battery can be changed easily and is not expensive. Connection for external (car) battery.
- CE approved device
- Smooth water and sand proof keypad; water tight case
- Reliable simple pump body allows quick changing of the silicone tubing
- By changing the speed (there are three speed memories of which two non-volatile) you may use the pump for purging as well as for sampling
- Fit for all samplings (according to Dutch sampling standards NEN 5744 (non volatiles) and 5745 (volatiles) up to groundwater levels of max -8 meters.
- Light in weight (8.5 kg) yet durable field proof construction
- All electronic fuses which can be user reset by operating off/on switch
- Can operate two external 12 Volt Giant and Booster pumps.
- The pump does not mind silt loaded water.
- Flow can be regulated fully from 50-2300 ml/minute so suitable for sampling as well as purging of typical monitoring wells
- Extremely durable engine and gear box.

Q: Can I use the electronic peristaltic pump to pump water from 25 m depth?

A: Depends on the groundwater level. You may use it to pump water from even 80 m depth on the condition that the water level is (and stays) < 9.5 meters. Be aware of the fact that a lot of pumping energy will be lost in small diameter long tubing so connect in stead of a 6 mm inside tubing an 10 or 12 mm inside diameters PE tubing !

Q: Is the electronic peristaltic pump officially spark proof ?

A: It was neither specially constructed nor tested for that so the answer is no. It has been used on petrol stations however for thousands of times. You may prepare the pump for sampling in (more) critical situations by drilling two holes face to face in the case. One hole is connected with a tube coming from a (very low pressure) nitrogen source. The other lets this nitrogen escape. This creates a slight overpressure so that no other gasses can enter and fills the case with an inert non-explosive gas.

Q: My pump does not give sufficient suction.

A: Normal suction should be 5-7 meters water column with 6 x 10 mm silicone tubing and 9,5 mwc with 4 x 8 (or 3 x 7 mm) silicone tubing. If suction is much lower check the following:

1. Was the outside of the silicone **tubing wet** by rain or wet fingers ? This will cause the tubing from slipping to one the side; away from the rollers and a complete release of (under)pressure will occur.
2. Is the pump house out of shape by falling (only a few tenths of a mm will the pump not to operate correctly. The plastic cover should fit without any problem. If not the **pump housing is out of shape** ! Have the pump housing renewed and prevent it for heavy blows.
3. Check, by releasing the tubing clamp a few times if the silicone tubing is not **twisted** in the pump housing. Also this will cause the tubing from slipping to one side.
4. Mount the plastic transparent cover at all times for safety and guidance of the tubing.
5. Water is oversaturated with a gas like methane or hydrogen sulfide or oxygen. "Air" bubbles will be visible at the suction side of the tubing.
6. The silicone tubing does not respond to the specification required. Only use silicone tubing with a wall thickness of is too thin. Check this with a sliding caliper. Thickness should be at least 1.95 mm

Q: What types of tubing can I use in the pump house ?

A: The rollers of the pump MUST close the tubing completely when they move clock or counterclockwise. All rubber tubing with a nominal wall thickness of 4.0 mm and sufficiently supple will do. Tolerance must be in between 3.8 mm until 4.2 mm with a hardness of roughly around 50° Shore. Sizes may vary between 2 x 4 mm (I.D. x O.D.) and 8 x 12 mm. Full vacuum (9.5 meters water column) is obtained with the 4 x 8 mm so it is not logical to use a size smaller than 4 x 8 mm. Maximum flow rate is then 1 liter per minute. A 6 x 10 mm tubing gives a good vacuum (5-7 mwc) and a good flow at the same time (2.3 lpm with the electric pump at max speed).
Basically you can use different types of rubber. The only disadvantage of silicone tubing is that it will (slowly) solve when using it with gasoline's also. Then Viton rubber can be used. Viton is to stiff to use with the electric pump. The hand pump will do then. Silicone rubber supplied by Eijkelkamp is tested for use as water sampling equipment.

Q: Can I operate the Eijkelkamp peristaltic pump at 220 (or 110) Volts ?

A: Yes. You must buy a stabilized power supply 12-14 Volt with a minimum power range of 8 Amps at an electronics hardware shop. Buy the special power cable for external batteries (12.25.25), connect the power supply with this cable to the pump and it works on the mains !
Do NOT use the plug that is connected with the battery CHARGER as this is fitted differently. Then only the battery will be charged.

Q: Can I use the pump without stopping for hours, days or even weeks.

A: If fitted with an adequate power supply YES.

Q: Can I use the electric peristaltic pump in a hazardous environment ?

A: The pump has "only" a CE marking which tells you nothing about application of the pump in hazardous environments ! So officially no. The electronics are incorporated in a completely airtight box (IP66) without vent. The battery is incorporated in a space with a separate vent. There are no switches there so no sparks. The pump is used at petrol stations everywhere. To make it safer you may over pressurize the box that holds all the electronics with Nitrogen gas. Simply drill two holes in the box and fit one with a connector to receive nitrogen gas from a separate bottle. Let flow this gas (with an extremely low flow) through the box. (This solution is applied with all equipment in hazardous environments that is not intrinsically safe).

Q: I am using the external power output of the peristaltic electric pump with Gigant and Booster pumps but the unit cuts off the power each time I power the pumps.

A: You have connected too many pumps or the pump(s) is blocked by e.g. sand or wear. Only two pumps may be connected maximum. Loss in the electronics circuit will even cause these two pumps to work in a limited way (see the manual of these pumps to learn more).

Q: My battery seems to give less energy then when the pump was new.

A: A new battery gives 4.5 hours of power with the peristaltic pump at full speed. This is sufficient for daily use and you will rarely need a supplementary external power source. This means however that the battery will be used almost at its maximum rating day after day. This simple fact means that it will not last for years and years. We could have mounted a more expensive "thicker" battery but you would insult the pump of being heavy everyday and never use its full capacity !! The disadvantage is that you will have to change it every few years. Recharge it at least every month.

Q: Must I use the pump until the battery is fully emptied ?

A: NO, you simply must not and cannot do that ! The battery included is a lead-gel battery. A kind of motorcycle battery but filled with acid as a gel instead of a liquid. Therefore it can be used in all positions and will never leak. Lead batteries may NEVER be drained at less than 9.4 Volts. Electronic circuitry in the pump protects the battery against draining below this tension. The LED starts blinking at 11 Volts and the pump will completely stop at 10.5 Volts. With a sound battery it will take hours to have the tension dropped from 12 to 11 volt but only 5-30 minutes (according to the load) to drain from 11 to 10.5 Volts. Only Nickel-Cadmium batteries will stay more powerful if drained regularly completely and that is why the Nickel-Manganese hydride battery was invented which does not have this disadvantage. The pump however holds a lead battery.

Q: Does the pump need any maintenance.

A: There are no greasing or oiling points inside or outside the pump. Keeping the rollers of the pump DRY and without DIRT will greatly increase its durability. Wipe the pump housing clean regularly and keep the front panel of the pump case clean (moist cloth). If you are in doubt send the pump to your dealer / Eijkelkamp for an extensive service check. Then you will limit operational disappointments for the near future. There are only electronic automatic fuses inside.

Q: Can you supply me a pump rate / depth chart for the peristaltic pump

A: You are in fact asking for a so called Q/H graph. Q/H graphs give important info on pumps used in industrial applications where you already know (or can calculate) the total H (pressure height). H then being the total of meters of suction, meters of needed pressure (e.g. to push water upward into a water tower) and friction in piping (but expressed in meters water column too). If you know all these you may easily find the Q(uantity) from such a graph.

For sampling situations traditional Q/H graphs have little value. It is fairly easy to determine the suction (is depth of water level in meters) and pressure (normally practically 0; except when using a 0.45 micron filter in the output tubing). But the big problem is that you do not know the friction (or loss in hydraulic head) due to length + diameter of tubing + the current velocity of the water in the tubing.

Q/H graphs therefore are only of importance if a short section of a very large diameter tubing is used. But for our peristaltic pump the most typical tubing is the 6 mm inside diameter PE tubing. This is a small diameter tubing but very cheap but it features in revenge, relatively high friction. This friction is difficult to calculate since it varies with suction height and pumping speed. For our peristaltic pump the 6 x 10 mm silicone tubing will give optimal performance under conditions with a water level < 6 m below pump level. When water table is deeper than 6m, use the 4 x 8 mm silicone tubing as this will give complete vacuum. Due to the fact that this is only a piece of 30 cm of tubing the friction is low in this section of tubing is low. This friction cannot be reduced either since this tubing is essential. For the much longer PE transport-tubing (up to 100 meters) the inner diameter is very important if sampling is done at large depths. We advice using 6 x 8 mm PE tubing for samplings up to 6-8 m depth. You change the tubing to to 8x10mm, 10x12 or even 12x16 mm for samplings at larger or much larger depths. At shallow depths (<2.5 m) flow is about 2.2 l/min for the 6x10 mm silicone tubing with 6 x 8 mm PE tubing. With the 6 x 10 mm silicone tubing with some 5 meters of PE tubing and a water table at -4m you may still count on some 1.5 l/min. With the 4x8 mm silicone tubing and 6x8 mm PE tubing, flow will be some 1 l/min up till 8.0 m of suction (and the same tubing length). At 9.5 m (max application depth) you still get 0.5 l/min (at sea level with an average atmospheric pressure). You may find the requested Q/H graph in the additional info section of this client information system.

Bailers

Q: Can a bailer like 12.04 (stainless steel) or 12.16 (Teflon) be used to sample open water ?

A: Yes, on the condition that there is no (12.16 too light in weight) or low (12.04= heavier) flow.

Q: Can a bailer be used to sample floating or heavy liquid layer (LNAPL or DNAPL) ?

A: The heavy ball of the bailer and the reduced entrance space at the bottom will prevent at least the first 5 cm of hydrocarbons to enter the bailer. Also the viscosity plays a roll in the fact that bailers should be avoided for DNAPL or LNAPL sampling. Better use the liquid layer sampler cable operated (12.41 equipment for wells > 40 mm) or electronic device 11.08.07 for all wells larger than 20 mm to do this.

Q: What bailer (stainless steel or Teflon) is better to sample water on hydrocarbons (fuels and such) ?

A: The stainless steel one (12.04) since it does not have a 'memory effect'. Metal and glass can be cleaned (with a detergent like diluted Deconex 20.05.29) entirely without remnants of the hydrocarbons staying behind in micro-pores in the plastic. In a Teflon or other plastic sampler micro porosity is so high that small molecules like those of toluene will penetrate into the plastic. Cleaning the surface only will not help. Heat and a well vented storage area will help them to emerge from their holes ! Teflon can be heated well over 200°Celsius so that is no problem. As said glass and metals have a closed surface which does not have this problem. Decontamination with a warm detergent will also remove the oils and volatiles.

Q: Can I use a plastic bailer (12.16) on a petrol station?

A: Theoretically no. Static electricity will build up on Teflon as on any other non conductive material. You may remove the static electricity with a damp cloth or by lowering the bailer in a metal bucket

with non-distilled water standing on the floor. We think in these cases you'd better use a stainless steel bailer. Hard metals can give sparks with other materials. The stainless steel we use for sampling material is considered non sparking because it is low in carbons.

Q: Can a stainless steel bailer be used to sample trace metals ?

A: Stainless steel samplers will do for **soil** sampling since the contamination level is too low to be found back in the soil to a degree that will bias the 'high' natural levels in soil. However for **water** sampling a sampler entirely made of iron and a lot of nickel and chrome together with a long contact time is not the good product of choice. For macro parameters as sulphates, nitrates, phosphates, potassium and so on there is no problem and even for Pb, Zn, Sn, Cu, Cd, Hg but specifically for the trace metals included in stainless steel no.

Q: Will a Teflon bailer sink in water ?

A: Teflon is a crazy plastic. Density is that of stone (2.2 gr/ml) so a Teflon bailer will even sink in concentrated sulphuric acid (1.6 gr/ml). What is also nice it will come out of it without minding being plunged in such a nasty liquid.

Q: Can I use a bailer to sample a monitoring well ?

A: Yes if you like spending much time in the field (nice climate ? cheap wages ? annoying office work ?) Prior to sampling (filling bottles) a well must be purged which means getting new fresh water into the well representative for the water surrounding the well. We think bailers work much too slow to purge the well directly prior to the sampling event itself ! Then a separate pump should be used to purge the well efficiently. Since most special pumps for purging are able to take samples as well (low flow speed (200 ml/min), no risk of contamination) samples can be taken more easily with these pumps too. In most comparative tests bailers show high variability in analysis results. Handling is very man/woman dependent. This is found back in the analysis results.

Q: Can I use a bailer to take a sample that has to be filtered on a 0.45 micron filter ?

A: The problem here is that a sample-to-be-filtered should not come into contact with oxygen. If the sample does come into contact with air insoluble metal hydroxides will form which are so large that they will not pass the filter. In other words oxygen will cause metals to transfer from ion-size to macromolecule size and be filtered out of the water. If you keep that in mind there are ways. Empty the bailer by the bottom emptying device in a small jar so that the jar is overfilled a few times. This will reduce the quantity of water that was in contact with air while filling the bottle. Now take a peristaltic pump (hand powered or electric) and put the suction tubing on the bottom of the bottle filled. Fit a 0.45 micron filter at the (pressure) outlet tubing of the peristaltic pump and filter the sample. Another way is to stick the suction tubing of the peristaltic pump directly in the bailer and filter the water straight from the bailer. Never transport an unfiltered sample (with or without having added an acid) for later filtration. If no acid was added the oxygen that was in the bottle when filling it will cause the (co)precipitation of metal hydroxides. If the sample is transported acidified, metals adhered to soil particles will go into solution and mislead your water analysis results. In fact you are then mixing the soil metals analysis with the water metals analysis. So you cannot filter a sample afterwards

Gigant and booster pumps 12.12.06/08

Q: I am using the external power output of the peristaltic electric pump with Gigant and Booster pumps but the unit cuts off the power each time I power the pumps.

A: You have connected too many pumps or the pump(s) is blocked by e.g. sand or wear. Only two pumps may be connected maximum. Loss in the electronics circuit will even cause these two pumps to work in a limited way (see the manual of these pumps to learn more).

Q: My Giant and booster pumps do not work according to your specifications !

A: Then you are surely not using them according to the manual supplied !
Common errors:

1. You did not mount the two (or more) pumps close enough together. Only fit some 20-50 cm of tubing in between the pumps. If mounted meters apart the water pumped by the bottom pump may not reach the first booster !
2. All pumps must be submerged when starting to pump. This are water pumps; not vacuum cleaners.
3. The pumps are not powered correctly. With every meter of extension cable voltage will drop. Low voltage means high current for the same quantity of transferred energy. For instance a 12 Volt battery powering two pumps operating with 25 m cable will loose some 3.5 Volts before reaching the pumps. Since 12 Volt DC motors do NOT support under tension well, their lifetime will be reduced or they will even burn (under tension will cause over current). They will not give more than 15 meters of water column instead of the expected 20 meters. Solution is in the manual: Start by connecting a 12 and a 6 V battery in series and power the pumps with this. Some over tension does not hurt (lower current) and you will get more than the specified flow rate ! If using the pumps at depths 40-50 meters (= maximum) do not hesitate to power them with 24 volts to start with.
4. Pump is plugged with sand: Pull them up and down a few times until they restart and then lower them more slowly into the sediment to be removed.
5. Water is gas loaded: The pumps are fitted with gas vents next to the tubing outlet. If the gas vent is blocked the gas cannot escape and will accumulate in the top section of the pump and block water flow.
6. These disposable pumps are powered with cheap, small yet very powerful "Formula 1" engines. This means that they will not last as long as you wish. That is why these pumps are so cheap. The warmer the water the shorter the expected lifetime. These pumps are meant to work up till 10 minutes in water >30°C At 10°C they will not show the overheating problem but they will wear out soon like a formula 1 car engine does. Average continuous lifetime of these pumps powered correctly (12 Volt nominal at the pump) and used in water @10°C is about seven days.

Q: Can I re-use / clean the plastic Giant / Booster pumps ?

A: The answer to this question is largely hidden in the answer on the question 'Why is a cheap bilge pump not suitable for groundwater sampling ?' Any plastic will sorb volatiles also the mechanically strong ABS plastic from the Giant + Booster pumps. The volatiles will come only out of it with time, heat and in a vented area. Re-using them for volatile sampling is a big risk. It is not permitted in our country but leaving them in the well (above the groundwater level) is a solution if you want to save some pumps. Re-using them when searching for volatiles is asking for trouble. Did you ever had lawyers of Shell or Exxon in front of you supported by Dutch or other sampling specialists ?
If you want to clean these pumps on other parameters than volatiles we suggest to immerse them in a diluted Deconex detergent (20.05.29)

Q: Until what depth can I use the Giant and Booster pumps ?

A: If you lower them far below the water table the water pressure on the pumps motor axle sealing will become too high and water will block the engine. We think that you should not submerge them more than 30 meters under water.

Q: Do Gigant and Booster pumps have Intrinsic safety certificates

A: No. The motor of these pumps is fitted in an absolutely closed motor housing (otherwise it would get wet and stop functioning). There is no way a gas would be able to enter this compartment. Additionally this housing is completely submerged so no gasses available either ! There is another reason why attention has to be paid to this product and that is while connecting the leads to a battery. This will cause sparks ! By putting a spark free switch in between the battery and the pumps

leads this can be avoided. If (max 2) pumps are connected to the external pump connectors of the 12.25 peristaltic pump when the power unit is in the OFF position sparks can be avoided. However you know that connecting the two pumps to the power supply 12.25 gives a lot less pressure head (11.5 m) as when connecting them directly to a 12 V battery (14.5 m) or even an 18 Volt set up (>22m).

MP-1 stainless steel impeller pump 12.27

Q: Can I clean an MP-1 impeller pump (12.27) ?

A: The pump itself is not the biggest problem. Lower it with or without tubing in a bucket with hot diluted detergent (20.05.29) and run it slowly for now and then. This will wash and leach out/off all dirt and even the volatiles. Since practically no plastics (being solely Teflon) are used in the construction of the pump cleaning is efficient and reliable. Renew the water in the pumps interior ! Power cable and Teflon tubing or more problematic. All contamination can be removed (hot detergent) but be aware of the memory effect for volatiles. Volatiles will only come out in time ! That is why it is advisable in these cases to work (if you sample on volatiles a lot on different projects) with disposable PE tubing (available tubing connectors for this pump are for 10x12 mm PE tubing, 12 x 16 mm PE tubing 13 x 18 mm Teflon tubing and 16 x 20 mm PE tubing.

Q: How can I make the use of an MP-1 pump and converter/generator combination safer?

A: We know legislation on safety in different countries varies. At least in the Netherlands we are obliged to use an isolation guard. This electronic device guards all circuitry of generator-pump converter-pump power cable-pump hundreds times per second on leaks. It will switch of the current to the converter-pump when the smallest leak is detected. We advise to use this in all cases.

Q: Can an MP-1 impeller pump 12.27 be used without converter?

A: The converter is needed to convert 50 Hz (or 60) into 400 Hz so that the pump can run at 22.000 rpm ! The converter also transforms the supplied one phase 230 Volts (or 110) coming from the generator (or mains) into three phase current as is used for heavy electric motors. So the answer is NO. The converter also guards electronically over current (friction in the pump or pump blocked), under current (pump used as vacuum cleaner in stead of water pump) and under or over tension coming from the generator.

Honda gasoline powered above ground centrifugal suction pump

Q: Can the small 4 stroke engine powered centrifugal pump (12.08) be used on a petrol station ?

A: In most countries most probably at your own risk. It is however not more dangerous than a car driving away after having taken petrol. As an extra measure you may consider mounting a spark arrester.

Q: Can I use the small 4 stroke engine powered centrifugal pump (12.08) to pump water from depths > 6 meters.

A: Depends on the groundwater level. You may use it to pump water from 80 m depth on the condition that the water level is < 6 meters.

Q: How can I avoid pollution by the gasoline of the pump during transport and use.

A: Use a gasoline type called Aspen. This gasoline is extremely low in aromatic hydrocarbons and powers these engine efficiently.
You may also try to avoid pollution by gasoline vapours generated from the tank (or jerry cans) by putting the pump in a metal case of which the lid is fitted with air tight gaskets. On one spot mount

a filter as you find on a gas mask. This will sorb the vapours. If you have a lot of gasoline powered equipment with you may also consider to divide your van in a dirty section and a clean section. The dividing wall should be diffusion proof (metal sheet). Normally the clean section is kept over pressurized compared to the dirty section by a small fan sucking in clean (or cleaned with a carbon filter) air from outside). Products to be protected (products that you use for water sampling are plastic well material and plastic sample products as tubing and disposable pumps.

Foot valve (inertia) pumps

Q: Can I take a sample from 100 m depth with a foot valve pump (12.13 or 12.15) ?

With the 12.15 no. We simply do not supply a 100 m long HDPE tubing which is needed to operate the foot valve correctly at that depth. It should exactly follow the movement of the electric actuator on the ground 100 meters higher ! With the 12.13 (or straight by hand) the up and down movements you make are slower so here (LD)PE tubing can be used which we supply in 100 m length for the larger valves. We suggest that at least the bottom 5 meters of the tubing should be submerged to give an efficient pumping action. You will also have to subtract a few above-ground meters of tubing. So 90 meters water level depth could be handled; not more. You will still get more than 2 l/min using the 18 mm foot valve.

Q: Why is the 12.15 set so expensive?

A: If you already have a generator > 1500 Watts you may subtract that from the price. The 'pump' itself (the electric actuator) is expensive because it is such a special product (as with many Eijkelkamp products). Most wells permit the use (because of their size) of an MP-1 pump which gives much higher purging flows. So we sell the 12.15 sets most of the time to people having installed small diameter wells with deep water levels which they afterwards want to sample ! Do not compare our equipment with electric garden or household tools. Those are sold millions and Research and Development costs are negligible. With Eijkelkamp equipment (or software !) this may be the mean cost factor. (That's why we do not like people copying our products).