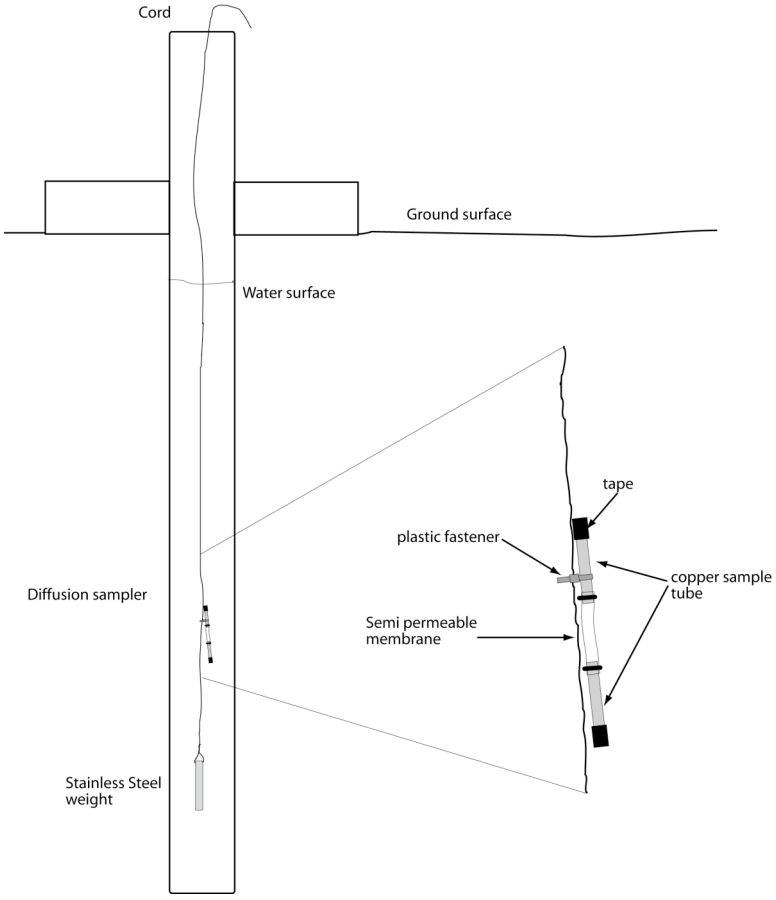
Deployment of Standard Diffusion Samplers

Gas samples for isotope analysis can be collected from water in several ways. Two of the best are very briefly described. The most common technique uses standard 3/8" refrigeration grade copper tubes. Water is pumped, pushed, or pulled through the sample tubes. When the user is convinced there are no air bubbles present within the sample volume, the sample tube is sealed at both ends. This technique traps water, which then must be stripped of all gases for analyzes in the lab. The second technique uses an in situ passive diffusion sampler. Small copper tubes, 3/16" diameter and 2" in length are attached to a semi-permeable membrane. This watertight sampler is lowered to the desired depth within a well on a length of cord. The samplers are left in the well for several days. During this time, gasses within the sampler equilibrate with gasses dissolved in the well water. The samplers are brought to the surface and immediately cold-welded **(See Using the Pinch-off Tool Instruction Sheet)** to permanently seal the sample tubes for future analyses. The immediate sealing of the samplers prevents atmospheric contamination. The seal is obtained using a cold-weld tool, which is similar in appearance to specialized cutting pliers. This technique has the advantage of collecting only gases, allowing for less prep time in the lab. The instructions below describe its application.



Check list for use of diffusion samplers:

1) Diffusion samplers, generally (2) samplers are used per application. The diffusion samplers each contain (2) sample ends. Each copper tube attached to the tubing is a sample.

2) Weight, generally stainless steel or brass is used. NOTE: it is very difficult to deploy samplers to depths greater then ten feet without addition weight.

3) Sampling cord or string. Fishing line will not work; it will stick to the wet sides of the well. Generally, "mason's line" or similar thick braided material works best.

4) Copper rings or similar object to prevent samplers from falling down the well. This is attached to the opposite end of the cord from the weight and samplers.

5) Tape measure, at least 50' length is needed for accurate sampler placement.

Standard application:

1) Be sure the diffusion sampler remains clean and free of holes or abrasions. Unwrap the samples only when you are ready to use them.

2) Attach diffusion samplers to cord. They should be placed at the desired depth using "zip ties" to secure as shown. Using (1) plastic fastener or "zip tie" per diffusion sampler set works best. If (2) plastic fasteners are used, care most be given to allow for cord stretch. The sampler can be pulled apart if the plastic fasteners are secured to tightly.

3) Attach weight to cord end closest to samplers as shown. Care must be taken to avoid damaging the samplers during deployment preparation. NOTE: Weight must be used if samples are to be taken at depths greater then 10 feet.

4) Lower diffusion sampler a few feet below water surface. With the diffusion sampler under water, gently shake or jiggle to remove air bubbles from the surface of the sampler.

5) Using tape measure, lower to the desired depth. Generally, close to the screen is preferred. Secure end of sample string to something larger then well diameter.

6) Allow sampler to equilibrate for several days (2 days to 1 week is satisfactory).

7) Samples should be brought to the surface and sealed as quickly as possible, less than 1 to 2 minutes is acceptable. The sampler will re-equilibrate with the atmosphere over time, the quicker the samplers are sealed the better. (SEE USING PINCH-OFF TOOL instructions)

8) The sample is now sealed; to protect the delicate ends, carefully wrap them with black plastic tape. Be sure to label all samples clearly. Using label stickers as a flag works best.