

[INSTRUMENTATION]

PLACEMENT

POWER

Determining the best location for automatic sampling

By Bob Beyer & Johnny Barron

As storm water management programs take hold across the nation, the need for quality data increases. While computer models can estimate pollutant loads, the best data on pollutants is collected by sampling runoff. In order to increase productivity and decrease risk to workers, an increasing number of these samples are collected with automatic samplers.

Getting Situated

The first step in deciding when and where to sample is to review your purpose for sampling. For instance, if you were trying to measure impacts from nonpoint source pollution from an urbanized area, you would select a location downstream enough to capture all runoff from the area and sample during and after storms. If you

are sampling to determine impacts from a construction site, either sample individual discharges or sample upstream and downstream in the receiving water bodies.

When selecting the location for installation of an automatic sampler, visit each location and verify that the site is physically and legally accessible. Obtain written permission from any property owners whose land you must cross to access the sampling station. Make notes of potential hazards such as steep banks, loose rocks and barbed-wire fences.

Next, make sure the location will yield representative samples. If testing for turbidity in runoff from a construction site, be aware of other pollutant sources nearby that could skew test results. Adjust your sampling location and method as needed.

Overhead cover must also be considered. An automatic sampler should be triggered by an automatic rain gauge. The rain gauge usually signals the sampler via a cable. The sampler may be installed on the streambank under dense tree cover, but the rain gauge must be installed out in the open. Add cable extensions as needed to position the rain gauge so that it is in the open. Ideally, the nearest obstruction to the rain gauge should be twice as far away as it is tall.

Stream Characteristics

Segments. The next step is examining the stream, in which you will likely see different types of sections. Riffles are shallow, swiftly moving water with high dissolved oxygen and sediment loads. Pools are deep, slow-moving water with lower dissolved

oxygen and more sediment deposition. Runs are sections of moderate depth and velocity. The sections most representative of overall stream quality will be the runs.

Flowing streams are dynamic in nature. If a worker was to take continual measurements of any parameter (i.e., turbidity), he or she would notice concentrations fluctuating over time.

Category. Perennial streams flow freely year-round and support a wide variety of aquatic life. Intermittent streams are seasonal and support more aquatic life. Ephemeral streams flow only after storms and generally do not support aquatic life. Perennial and intermittent streams have a dry-weather base flow that is charged by groundwater. Ephemeral streams are charged only by storm water.

Pathway. Natural streams do not travel straight paths. The frequency of stream bends is referred to as the stream's "sinuosity." Different factors such as soil type, substrate and slope will affect the sinuosity.

In a stream bend, the outside edge of the bend has the longest water path and, consequently, the most quickly moving water; this is the cutting side where one would expect to find steep cut banks and deep water. The inside edge has the shortest path and, therefore, the most slowly moving water; this is the deposition side where one would expect to find a sandbar.

Install automatic samplers on the cutting side of streams so that sand does not bury the sample collection tubes. Where practical, collect samples at the horizontal and vertical center of a stream or run. Sampling at mid-stream and mid-depth is standard practice



Proper sampler location is key to measurement accuracy and worker safety.

because water quality at this point is more representative.

While standard practice, it is not always practical to sample at mid-depth and mid-stream. Automatic sampler pumps typically can pull a sample 20 to 25 vertical ft. To protect equipment and sampling technicians, it is advisable to locate the sampler outside the main channel if possible—even if it means the other end of the sample collection tube is not mid-stream.

Hazards. Remember that streambanks can be risky. Undercut banks may shear off and fall into the channel, and floodwater can rise above them. One must exercise caution when retrieving samples after a storm.

Sampling, in concept, is a simple matter. But in practice, it can be rather complicated. Taking the time to select suitable sampling locations—and properly installing sampling equipment—can make headaches from bad data water under the bridge. [SWS]

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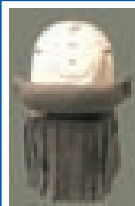
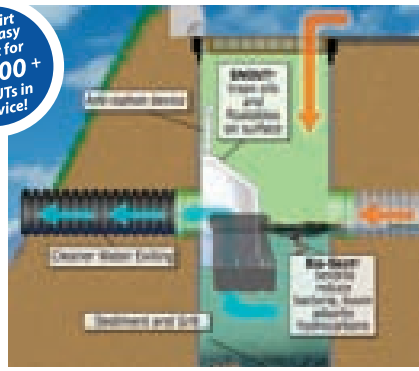
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