

Equipment Notes from the Field

ISCO Pumping Samplers

From Liz Keppeler, Ft. Bragg (e.keppeler@fs.fed.us)

Pump tubing replacement

Increasingly, we have been experiencing ISCO sample volume problems with our 3-year old 3700 ISCO samplers (mostly overfilled samples on an intermittent basis). In years past, when the tubing life counter has reached the 500,000 warning we have inspected the pump tubing and reset the counter if no problems were evident. More recently, we have increased the warning counter to 600,000 if no obvious problems were observed when the pump tubing was inspected. In hindsight, this is not a good idea. We will now replace the pump tubing automatically when the 500,000 warning is reached. ISCO factory testing found that the pump tubing splits between 600,000 and 1,000,000 revolutions. In addition, it is important to check the rollers for silicone buildup and to verify that the rubber liners are snug. As the pump tube wears, it also becomes less flexible (does not rebound to the original shape/volume) and the sample volume can be reduced if the liquid level detector is disabled (volume is based on pump revolutions).

Sampler intake mounting in Montana Flumes

Another problem affecting sample volumes is the position of the ISCO intake mounted in the flume. When the intake is only marginally submerged, the ISCO pumps an air/water mix which impairs the ability of the liquid detector to detect the correct volume. The positioning of the ISCO intake in the fiberglass flumes at Caspar Cr. is not securely fixed and the more the nozzle protrudes from the flume the more likely it is to pump air at low stages. We are installing a clamp on the backside of the intake, under the flume, to keep it in position. In the future, new installations should be equipped with a secure clamping mechanism, under the flume, to hold the intake in position and flume installers should allow access to the back of the flume for intake maintenance.

From Rand Eads, Redwood Sciences Lab (reads@fs.fed.us)

Recommended intake line diameter

It is important to use 3/8" id intake tubing (not 1/4") in order for the liquid level detector to work correctly with the 6712 samplers. Apparently, the transition from 1/4" intake to the 3/8" pump tubing (near the liquid level detector) causes air bubbles to form. This usually results in the bottles overfilling because the detector cannot deliver the correct volume when air bubbles are present. We have verified this problem at two sites and now only use 3/8" intake. The reasoning for using 1/4" intake in the past was to increase the line velocity and improve sampling efficiency. Ideally, the sample velocity in the intake line would be the same as the stream velocity (isokenetic condition) to prevent enriching or starving the sample SSC. Isokenetic conditions are usually not present during sampling because the stream velocity varies with stage, as does the line velocity as the head (stage) rises and falls. In almost all sampling conditions, the sampler intake velocity is less than the stream velocity, and the problem is exacerbated with increased intake length and larger pump lifts. These field observations lead to the idea of reducing the intake diameter to increase the line velocity.

The newer ISCO 6712 pump speed is faster than previous sampler models and it now appears that the 3/8" intake produces adequate line velocities for moderate line lengths and lifts with this model (this is based on field observations, not on laboratory testing). For sites pushing the maximum pump lift and line length it might be advisable to use 1/4" intake and disable the liquid level detector.