



Pesticides in Salmonid-Bearing Streams Using Continuous SPE Low Flow sampling

Marion Drain in Toppenish, Washington was chosen for this study based on the drains use by salmonids, agriculture diversity, and a fluctuating pattern of pesticide presence and water flow. The site has been monitored by the WDOE for pesticides since 2003. Daily and weekly pesticide grab sample data, as well as passive SPMD's and POCIS sampling qualitative data are available on this site.



Aqualytical Services conducted an 85 hour continuous low flow sampling event at this site, using the new CLAM sampler. During the sampling event a total of 28 liters of irrigation water from the drain was drawn through a field designed SPE disk. This SPE media was designed to sequester both polar and non-polar pesticides, and used special lofted glass fiber filters to prevent media clogging. The test was terminated after 85 hours due to time restrictions. The CLAM sampler and the SPE filter has the ability to run for weeks on 4 AA batteries, and sequester up to 100 liters of water through the SPE media. The SPE disk was then taken to the WDOE laboratory in Manchester WA. They extracted it as they extract the grab samples using SPE techniques and analyzed the extract for 120 target pesticides using Ion-Trap GC/MS/MS. The results of the detected pesticides are in the table below.

Pesticide Target	Response	Concentration ug/l	Concentration/28 liters	Sample Results
Diuron	9067	285.3	10.2	0.0102
Treflan	3956	16.9	0.61	0.0006
Chlorpropham	22474	296.6	10.59	0.0106
Terbacil	140194	6389.5	228.19	0.2282
Malathion	10238	76.4	2.73	0.0027
Metolachlor	15419	16.6	0.59	0.0006
Chlorpyrifos	78709	449.5	16.05	0.0161
Pendimethalin	11684	38.5	1.38	0.0014
Disulfoton Sulfone	55534	283.9	10.14	0.0101
Atrazine	19300	175.5	6.26	0.0063

The results of the detected pesticides are representative of what has been found in prior grab sampling. The ratios and amounts change daily, fluctuating with application and irrigation usage. These fluctuations of parameters offer a challenge to determine the total pesticide loading of the drain. To illustrate these extreme fluctuations, the picture above shows the sample point at the start of the sampling event and the picture below shows the same sampling point 48 hours into the event. Large volumes of irrigation water have flooded the drain drastically



affecting concentrations of pesticides from the day before. Using the CLAM continuous flow sampler, the whole event is captured within the SPE disk. The detection or reporting level is also 28 times lower than a standard one liter grab sample which is at best a snap shot in time. The CLAM can sample without the SPE disk into a liter bottle or bottles over a long periods of time, providing conventional laboratory samples for TSS, BOD, metals, Bacteria ect. With the CLAM, the environmental professional has a new tool

and technique to capture the complete storm event, episodic events and illicit discharges, and to obtain a realistic and magnified picture of the aquatic environment.

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