

## Chemical Metering and Control System

*Delivers a constant, monitored flow of chemicals where needed—especially over fluctuating flow systems*

### Bottom Line

This patented method provides a constant concentration of a chemical, regardless of changes in water flows, in a cost-effective and reliable way.

*“We are looking for partner companies to expand this prototype for a wide range of applications. Opportunities to use this system to more precisely measure chemicals in fluctuating flows are endless.”*

David Sisneros  
Principal Investigator

### Faster, Better, Cheaper

This system provides immediate feedback and can control injection rates based on flow amounts. It is accurate, uses little power, is self-contained, easy to install, and can run unattended.

### For More Information

Sisneros, D., M. Lichtwardt, and T. Greene 1998. Low-Dose Metering of Endothall for Aquatic Plant Control in Flowing Water, *J.Aquat. Plant. Manage.* 36:69-72.

Chemical Metering Patent  
[www.google.com/patents/S5902749](http://www.google.com/patents/S5902749)

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### Problem

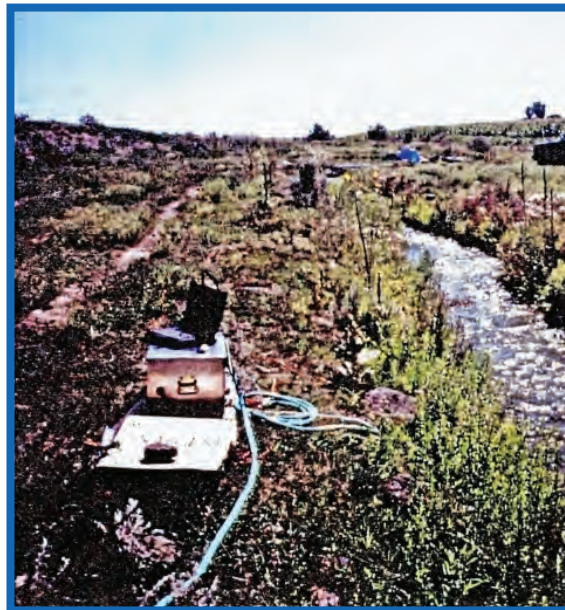
Releasing chemicals into a fluctuating flow system is complicated, as the ratio of chemicals to flow needs to remain the same. If the chemical is either over or under applied, problems ranging from label violations to lower effectiveness can result. Even small differences in flows and chemical concentrations can impact how well the chemical application will work. Controlling the concentrations of chemicals injected into flow streams usually requires directly measuring the chemical concentration or the flow rate.

However, measuring these concentrations in real time is impossible with some chemicals or under some conditions. Sometimes, it may be necessary to take multiple water samples, analyze the water outside of the stream, and extrapolate results—which gives a reading of past events rather than present conditions. Further, it may not be possible to accurately measure the flow rate of the stream. For example, closed channel flows may require a straight section of full flowing pipe, while open channels may require expensive weirs or gates.

Chemicals may need to be injected into flowing water for many applications including controlling aquatic weeds or algae in a canal, treating storm or wastewater, injecting nutrients or antibiotics to ensure fish health, detecting seepage from one water source to another, analyzing flow patterns, or reducing toxic metals in drainage. Similar injection systems can even help maintain nutrients in large systems like aquariums or be used in food processing and health care.

### Solution

We developed and patented the Chemical Metering and Control System (patent no. US5902749), which can automatically control the injection of any chemical into any flow stream—regardless of the stream characteristics or the ability to detect and measure the injected chemical. The system adds non-toxic, fluorescent dyes to the injected fluid to monitor chemical concentrations in real time. This system can tell the exact composition of the chemicals based on the correlation with the dye indicators (e.g., if the chemical is 2 parts per million [ppm], then the dye is 0.2 ppm).



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This system offers many advantages, such as:

- **Environmentally safe.** The system ensures that the correct amount of chemical is injected, according to specified label rates or Environmental Protection Agency regulations.
- **Automated.** The system automatically compensates for changes in chemical properties and can be left to operate unattended for extended periods of time.
- **Durable and low maintenance.** The system can operate from a battery power, DC power, and solar panels.
- **Portability.** The system can be installed and activated in less than 30 minutes.

### Application

We have successfully used a prototype system for aquatic weed and algae control in the Salt River Project, Arizona; the Northside Canal near Jerome, Idaho; and the Farmer Independent Ditch near LaSalle, Colorado.

### Benefits

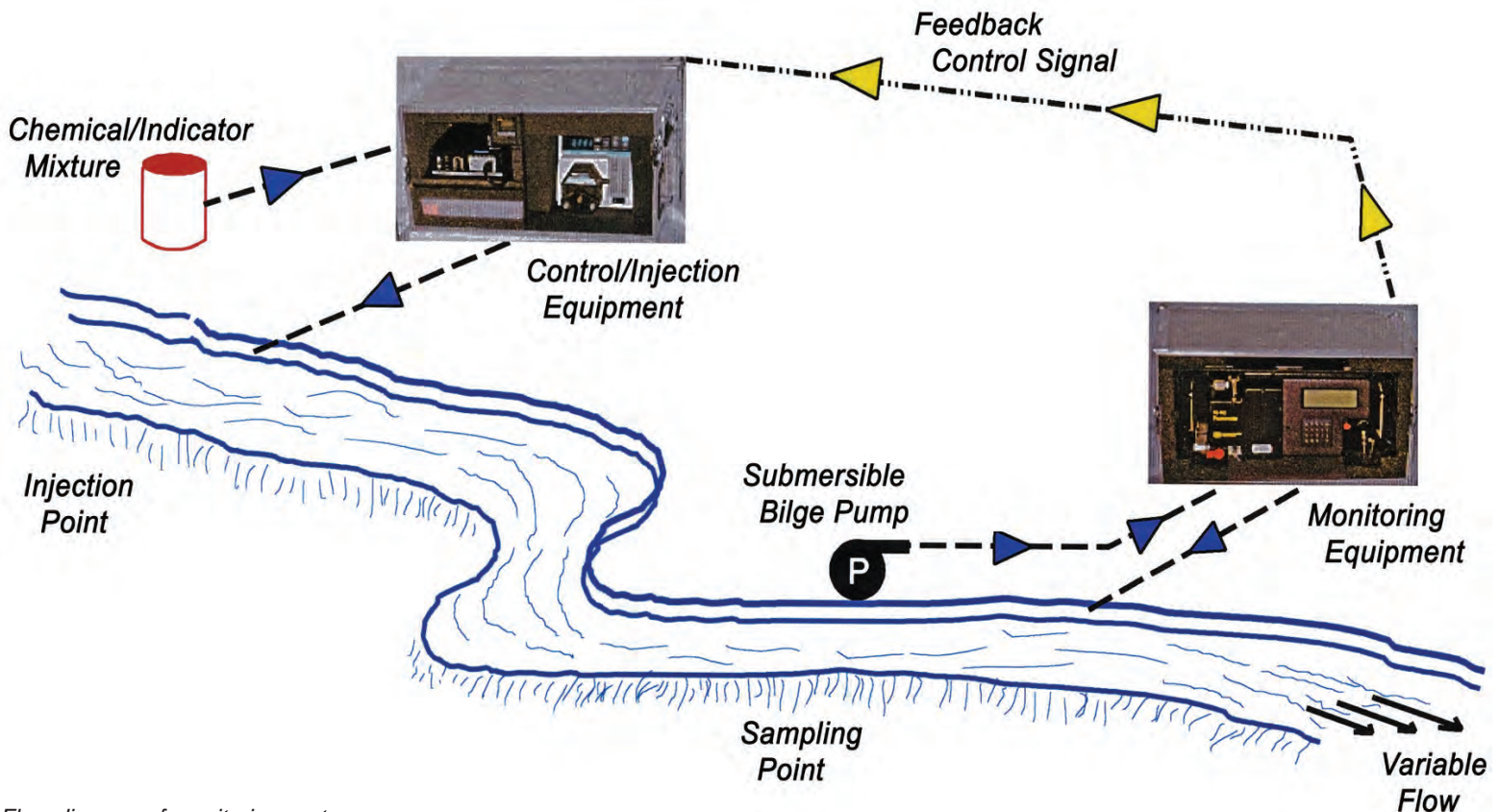
Reclamation has advanced the state-of-the-art for automated control and measurements of injected chemicals into open or closed flow streams. Reclamation can use this system for more effective operations, environmental restoration, and canal and facility maintenance.

### Future Plans

This system is now patented and available for licensing. Reclamation is seeking companies interested in licensing and commercializing this technology.

**“The control system in conjunction with the pumping system has excellent potential for precision delivery of herbicides in linear flow systems. The ability to deliver these defined doses should spur future studies with which to determine the minimum rates and exposures needed to control given nuisance species.”**

David Sisneros,  
Principal Investigator



Flow diagram of monitoring system.

