



A turbidity sensor was installed in a tributary of the Cedar River watershed to monitor water quality conditions for the city of Seattle, Washington.

**CR10X ensures high-turbidity conditions will not affect city's high-quality water**

## Monitoring and alarm in Seattle's major watershed

The Cedar River Watershed provides a major portion of the culinary water to Seattle, Washington, and several nearby cities. The watershed produces high quality

water that does not require a sand filter. To maintain that high quality, the city monitors and controls all uses within the watershed. The Bonneville Power Authority (BPA) needed to install a second major transmission line across the watershed (with all attendant soil disturbing activities associated with a job of this scope) and agreed to install an alarm system which would allow the city to turn off the water supply intakes in the event of a high turbidity condition in the river or in a selected tributary stream.

BPA contracted with Electronic Data Solutions to provide that alarm system. The system uses an FTS

### APPLICATION AT A GLANCE

**Application type:**  
Water Turbidity Monitoring

**Project area:**  
Cedar River Watershed, near Seattle, Washington, USA

**Author:**  
Rusty Munn, Electronic Data Solutions

**Contracting agencies:**  
Bonneville Power Authority, Electronic Data Solutions

**Datalogger(s):**  
Campbell Scientific CR10X

**Communication links:**  
Existing low-band radio network

**Measured parameters:**  
Turbidity, Water Temperature, Conductivity



Instrument Enclosure with CR10X and MCC low-band radio.

*Continued on back*



The system's solar panel was mounted off the side of a bridge spanning the Cedar River to avoid shading from the surrounding forest.

### *Continued from front*

DTS-12 turbidity sensor, a Campbell Scientific, Inc., CR10X datalogger with a custom program written by Electronic Data Solutions, a low-band radio from Meteor Communications Corp. (MCC), and solar charged batteries for power.

A special challenge of this project was to get the alarm notification to Seattle Public Utility (SPU) rapidly so that action could be taken before the low quality water could reach the intakes. The area is mountainous and heavily timbered. Cellular coverage was spotty and deemed unreliable for this purpose. Standard satellite communication was judged too slow for this requirement and an on-site receiving station was too expensive for the project's budget. Typical radio communication was hampered by terrain and the heavy timber.

The solution was found by using an existing low-band radio network already installed using repeaters on a series of high peaks throughout the area. The system was installed to track the locations of locomotives for the Burlington Northern Railroad. It has plenty of bandwidth for additional users and the low frequency has a large enough waveform to weave its way through the timber. The data is transmitted to a server in Kent, WA and the server automatically calls BPA and SPU when an alarm condition occurs.

For additional information on Electronic Data Solutions visit:  
<http://www.elecdata.com>



Above: A custom-built sensor stand holds the FTS DTS-12 turbidity sensor in the Cedar River.



At left: Mounting the low-band antenna on a topped tree.



**CAMPBELL SCIENTIFIC, INC.**

815 W. 1800 N. • Logan, Utah 84321-1784 • (435) 753-2342 • FAX (435) 750-9540  
Offices also located in: Australia • Brazil • Canada • England • France • South Africa • Spain

AP No. 032

Copyright © 2005  
Campbell Scientific, Inc.  
Printed January 2005