

Water Monitoring



Water security for Indigenous communities is an urgent issue. Approximately one third of Indigenous communities in Canada are currently grappling with safe drinking water access, compromised environmental water quality, and associated health issues. In some regions, these issues are exacerbated by resource extractive activities. Given limited federal and provincial involvement and funding to monitor water quality, community-based monitoring (CBM) programs provide user-friendly and cost-effective water monitoring tools that enable communities to have governance over their own water supplies. Decolonizing Water, in partnership with EBPI and the UBC Ecohydrology Lab, is developing tools that communities can use together to monitor water and identify locations of contamination.

Decolonizing Water EC-GPS Logger

This is a low-cost, open-source, DIY alternative to commercial water quality loggers. The logger is composed of a:

- Commercial sensor for electrical conductivity (EC) and temperature
- GPS circuit
- Microcontroller (small programmable electronics board)

The logger can be pulled across lakes or rivers behind a canoe or boat and, at programmed time intervals, record **electrical conductivity, temperature, and GPS position**, to an SD data storage card.

Approximate assembly time: 3 - 5 hours

Approximate Cost (parts): \$600



ELECTRICAL CONDUCTIVITY (EC)

While EC is not a pollutant, it is often associated with industrial pollution and can thus be used as a proxy for contamination to identify areas for further testing. EC is also widely used to assess water quality, and baseline and background information can inform understandings of seasonal or anthropogenic changes.



TEMPERATURE

Temperature is also an important water quality parameter--baselines and background data help to identify anthropogenic and climatic shifts. Specifically, temperature has implications for the impacts of dams, and fish ecology.



GPS

Location is integrated into the EC-GPS Logger to maximize ease of use, and minimize data recording errors.

For more information on the EC-GPS Logger contact water.partners@ubc.ca



EBPI Bioassays

Bioassays employ living organisms to assess water, soil and air samples for toxic substances. EBPI's goal is to provide bioassay tools for communities to independently detect spills from natural resource extraction, monitor industrial development close to human settlements, or monitor changes to important water sources.

Selected Bioassays Test for:

- Heavy metals and industrial pollutants
- General toxicity as well as DNA damage (cancer-causing)
- Cumulative chronic effects

Benefits of Bioassays:

- Used in the scientific literature and regulations
- Low per sample costs
- User friendly and can be deployed to remote areas

Combination Testing: Samples that demonstrate toxicity can be lab-analyzed to identify the pollutant.

Specific Tests

THE LUMINESCENT BACTERIA TEST

A bacteria called *Vibrio fischeri* produces bioluminescence (light) that is altered by toxins. The bacteria are very sensitive to oil and gas pollutants and the test can be conducted in a matter of minutes using a portable device. This test is already used in the mining, oil and gas, wastewater and chemical industries.

Approximate Cost: Portable Luminometer = \$2000, cost per test = \$5.00

SOS-CHROMOTEST™ GENETIC TOXICITY TEST

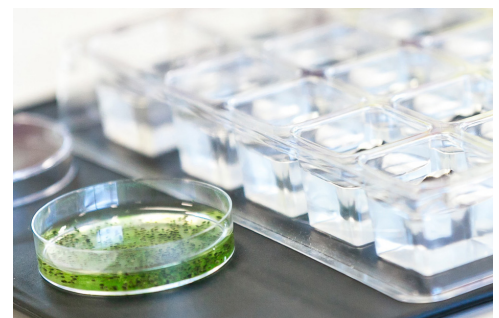
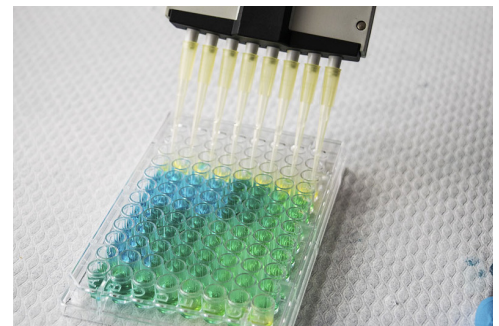
A modified bacterial strain changes colour in response to DNA damage. The assay is sensitive to genetic toxins and can provide information on agents in the environment that may cause cancer at chronic low-level exposures.

Approximate Cost: Incubator \$1,000, cost per test = \$15.00

DAPHTOX™ DAPHNIA MAGNA TOXICITY TEST

Daphnia are an invertebrate sensitive to toxins in the environment. After a predetermined incubation period, living and dead organisms are counted to measure toxicity. These assays are widely used throughout environmental and industrial sectors to and are mandated as part of regular quality control and assessment systems.

Approximate Cost: Incubator \$1,000, cost per test = \$30.00



For more information on bioassay test methods and kit options, visit www.biotoxicity.com or contact Dr. Aaron Witham directly at awitham@biotoxicity.com.