



L U C A S

# ATRC

## Lakehead University Aquatic Toxicology Research Centre

ATRC is CAEAL accredited

### LAKEHEAD UNIVERSITY CENTRE FOR ANALYTICAL SERVICES

ATRC specializes in monitoring the effect of effluents from pulp and paper mills, mines and related industrial discharges in Northwestern Ontario. A full range of toxicity testing services is offered including acute testing with rainbow trout and daphnia (water fleas). The acute tests provides essential information for resolving toxicological events with 24-96 hours depending on the test, helping process and environmental engineers protect the environment remain competitive.

The aquatic facilities at Lakehead University are unique to the region. Environmental managers rely on access to the toxicology expertise and the rapid turnaround from a regional service, especially when challenging environmental challenges present themselves. The expertise of Mr. Al Smith is readily available for consultation and there are opportunities to engage Lakehead University students in R&D projects for longer term solutions.

#### SERVICES

##### ACUTE LETHALITY/TOXICITY TESTING

- ☒ Daphnia-Acute Lethality Water (SOP101:EPS1/RM11, EPS/RM14)
- ☒ Trout LC50-Acute Lethality (96hr) (SOP1: EPS1/RM9;RM13)

#### Aquatic Biology at Lakehead University

The ATRC has been operating at Lakehead University since 1970. Lakehead University was a major contributor to the acute test, now a tool that is used to monitor environmental discharges across Canada. The 'bag test' was developed by Professor George Ozburn in association with the Canadian Environmental Protection Services. ATRC currently employs five staff, all Lakehead University or Confederation College graduates.



[www.lucas.lakeheadu.ca](http://www.lucas.lakeheadu.ca)

Lakehead University technologies at work for you today.

Lakehead  
UNIVERSITY



## THE FACILITIES

- ☒ Holding tanks for fathead and trout
- ☒ Daphnia stocks
- ☒ Temperature controlled tanks for rainbow trout and daphnia tests
- ☒ Environmental chamber for sample holding
- ☒ Varian Prep. HPLC
- ☒ Varian 1200 GC-MS



# LAKEHEAD UNIVERSITY CENTRE FOR ANALYTICAL SERVICES

## Moving Toxicology Technologies Forward...

Dr. Lee, the Director of ATRC, is currently involved with a number of organizations, supervising graduate student research that continues the development of aquatic toxicology as a tool for improving productivity and protecting the environment. Over the past two years, Dr. Peter Lee and associates from the Lakehead University departments of Biology and Physics, Bowater Canadian Forest Products (BCFP) and the Pulp and Paper Research Institute of Canada (PAPRICAN) have lead a research team of two graduate students and two technicians to develop novel toxicity prediction systems for the pulp and paper industry.

The project has two components, one aimed at Toxicity Identification Evaluation (TIE) and the other at Toxicity Early Warning (TEW). These are applicable for both the mining and pulp and paper sectors. The research project has been funded by FEDNOR, CRESTech and BCFP.

### TIE

The refinement of a two phase Toxicity Identification Evaluation (TIE) methodology will allow the isolation and characterization of compounds in pulp and paper mill effluent responsible for adverse effects in receiving water biota. This is

done through broad characterization of causes of effects (e.g. filtration, pH adjustment, removal of organic compounds). The procedures progressively narrow the list of potentially causative compounds until one or a few are identified. Tests in Phase Two are determined by positive results in Phase One, i.e. SPE removes toxicity, but toxicity returns with methanol elution, proceed to non-polar organic compound determination. Tailoring Phase Two reduces cost and time associated with lengthy analytical procedures. Test organisms reduce possibility of false positives, based on biologically available toxicant. Once fully developed, this technology will result in the only chronic TIE procedure for pulp and paper effluent in Canada

### Ceriodaphnia dubia Feeding

Another test under development is a short-term feeding activity suppression test taking a one hour period of exposure. It relies on monitoring the feeding habits of *Ceriodaphnia dubia* gut using fluorescently dyed yeast and optical reading devices.

### TEW

The research team has also devised an innovative system for Toxicity Early Warning (TEW) which utilizes a continuous flow bioassay system, designed and owned by Bowater Canadian Forest Products (BCFP) Inc, Thunder Bay, and facilities at the Lakehead University Aquatic Toxicology Research Centre (ATRC).



[www.lucas.lakeheadu.ca](http://www.lucas.lakeheadu.ca)

The Laboratory is located in basement of the Centennial Building in CB3022 (across from the double elevators). Phone 807 Lab: 807 343-8179.

For information on research contact Dr. Peter Lee, Academic Director. 807 343-8662. peter.lee@lakeheadu.ca. For your toxicity results contact Mr. Alistair Smith, Toxicologist Phone/Fax: (807) 343-8592