



HIGHLIGHTS OF EOALRSD

Emergencies, Operational Analytical Laboratories and Research Support Division

Le français suit

Fall 2010

The Highlights of EOALRSD provide information on the activities in the Emergencies, Operational Analytical Laboratories and Research Support Division within the Science and Technology Branch of Environment Canada. The purpose is to enhance communication and promote an awareness of the laboratory science being conducted across Canada and around the world.

The mission is to ensure credible, legally-defensible science to enable sound decision-making and accountability while aligning efforts on a national basis, using a single window access, to support an integrated, strategic approach to water issues.

Atlantic Laboratory for Environmental Testing

National Laboratory for Environmental Testing

Pacific and Yukon Laboratory for Environmental Testing

Prairie and Northern Laboratory for Environmental Testing

Quebec Laboratory for Environmental Testing

Emergencies Science and Technology

Research Support

Information and Quality Management

IN THE SPOTLIGHT

AEMRD's Urban Water Management Section located at the Wastewater Technology Centre (WTC), Burlington, ON is actively involved in the development and evaluation of treatment and disposal technology for municipal and industrial wastewaters and associated residues. The analytical laboratories at the WTC joined the National Laboratory for Environmental Testing in 2009, expanding its capabilities to include the analysis of sewage and biosolids.

One study currently supported by NLET is led by Jane Challen Urbanic to conduct research on the treatment of wastewater in Canada's Arctic region. In 2009, the Canadian Council of Ministers of the Environment (CCME) endorsed a Canada-Wide Strategy for the Management of Municipal Wastewater Effluent. This Strategy outlined wastewater effluent guidelines that will be applied nationally through the development of an Environment Canada regulation. The effluent guidelines include cBOD5 (carbonaceous biochemical oxygen demand) and TSS (total suspended solids) limits of 25 mg/L. However, due to the unique climatic conditions in Canada's Arctic region, the Strategy has provided a 5 year window to research the factors that affect performance of wastewater treatment in northern conditions. This research will provide information necessary for the development of performance standards for wastewater treatment in the north.

Communities in the north typically treat wastewater through passive means, such as lagoons often followed by wetlands. In 2010, research teams from Burlington, Montreal and Yellowknife travelled to 13 communities across Canada's Arctic region including locations in the Northwest Territories, Nunavut, northern Quebec and northern Labrador. A range of wastewater samples were collected including raw sewage, lagoon effluent, wetland-treated effluent and sludge. For systems that discharged continuously over the ice-free season (typically June through September), samples were collected twice (i.e. once in the spring and once in the fall). For systems discharging once annually, samples were collected during the discharge period. Samples were analyzed for solids, organic matter, nutrients, and metals and in-situ measurements of pH, dissolved oxygen, temperature and solids build-up were collected on site. In addition, operational data and design information including volumetric flows, dimensions of the lagoon and wetland and years in service was also collected at each site. Field work in northern communities is expected to continue through 2013. Data collected at these sites will be used to assess the performance of existing wastewater treatment facilities in the north. This data will also be used to model northern sewage lagoons and wetlands and provide some conceptual optimization of these systems. Finally, this research will provide scientific support for the development of recommendations for wastewater performance in Canada's Arctic region.

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Photo: Mary Kelly

Atlantic Laboratory for Environmental Testing

Atlantic Laboratory for Environmental Testing Involvement in Studies of Pesticide Fate and effects from Aquaculture Operations

The Atlantic Laboratory for Environmental Testing of Environment Canada in association with researchers from S&T Branch in Dartmouth, the Department of Fisheries and Oceans, the province of NB and the aquaculture industry, have been partaking in a study on the fate and effects of pesticides and some management practices in the Aquaculture Industry in Southern NB. The chemicals are used to treat and manage parasites (sea lice) which affect the health and marketability of the cultured fish. The culture of fish is intensive and is in areas where other species such as lobsters, shrimp and zooplankton co-habitat and are exposed to these specific salmon treatments when the treatment chemicals are discharged. Studies underway are looking at the release practices after treatment using these chemicals and their fate in the immediate environment. Dispersion studies using real time measurement of florescent dyes, and discrete pesticide sampling are used to track the plumes of discharged pesticide solutions. Additional sampling is conducted for bioassay using a sensitive amphipod *Euhaustorius estuarius*. All pesticide determination and toxicological assays are conducted at the Atlantic Laboratory for Environmental Testing (ALET) in Moncton, New Brunswick. It is hoped that this study will lead to better management practices by the industry.

J. Aubé, A. Cook, K. Doe, Bill Ernst



Photo: Benoit Lalonde, EC, Dartmouth, NS

Barge installing tarpaulin around salmon aquaculture cage



Photo: Jamie Aubé, EC, Moncton, NB

Salmon sea lice treatment on well boat in Passamaquoddy Bay



Photo: Jamie Aubé, EC, Moncton, NB

Treatment plume analysis for pesticides

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Siloxane Express Results Workshop

Enzo Barresi and Lewina Svoboda, Organic Analysis Laboratory, NLET presented the findings of their method development work on biota and biosolids, respectively, at the Siloxane Express Results Workshop held September 27-28, 2010 at the Canada Centre for Inland Waters. The purpose was to provide an update on progress being made to address the ministerial priority on the occurrence and fate of siloxanes in the environment. Siloxanes are widely used in personal care products across Canada and in other applications and are entering the environment in relatively large quantities. Investigations are being conducted to determine if further studies are warranted to safeguard fish and aquatic organisms from any harmful effects. The workshop included discussion on long term planning and future directions in regards to research initiatives to address knowledge gaps.

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New Mercury System

NLET has recently acquired a DMA-80 Direct Mercury Analyser, which will be used at the laboratory for the analysis of sediment and biota. The advantages of the system are that samples can be run direct without any sample pretreatment or waste disposal. The 40 position autosampler allows for unattended operation. Memory effects are avoided through the development of special high purity quartz boats, which result in improved reproducibility and a longer lifetime. The DMA-80 Direct Mercury Analyser has a detection limit which is approximately a fourfold improvement over the method previously used. With the elimination of the sample preparation step, the TMU has decreased. Validation of the sediment procedure is currently underway and it is expected that Hg analysis for sediment samples using this new instrumentation will be offered to clients in the new fiscal year.

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EOALRSD Support to Environment Canada Enforcement Programs

EOALRSD provides analytical, technical and other support to Environment Canada Enforcement programs under the Canadian Environment Protection Act (CEPA), Fisheries Act and the Migratory Birds Convention Act. The Prairie and Northern Laboratory for Environmental Testing (PNLET) in Edmonton has contributed to the successful completion of some recent enforcement cases.

Two of these cases involved enforcement of the Tetrachloroethylene (PERC) Regulations. PERC is designated as a toxic substance under CEPA. PNLET provided analysis for PERC in a variety of matrices from the dry-cleaning operations. Two Alberta dry-cleaning companies pleaded guilty to offences under the PERC Regulations.

In another enforcement case an Alberta Oil company pleaded guilty to an offense under the Migratory Birds Convention Act for depositing a substance harmful to migratory birds in an area frequented by birds. Approximately 14,500 litres of crude oil had leaked from an oil well site near Ralston, Alberta due to improperly sealed well. The spill affected 1,200 square metres of land in the southwest corner of the Canadian Forces Base (CFB) Suffield approximately 48km from a National Wildlife Area. An investigation by Environment Canada discovered that about 300 birds including migratory birds, songbirds and raptors died by landing in the spilled oil. PNLET was able to apply oil fingerprinting analysis to match oil from oiled-bird carcasses to that which was spilled from the well.

All three of the above cases began in 2008 but were finalized within the last two months. The total fine for the 3 offences was in excess of \$135K which went into the Environmental Damages Fund.

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QLET Outreach – Ecotoxicology Sector

Recognition of the contribution made by the Quebec Laboratory for Environmental Testing (QLET) to ecotoxicology goes well beyond our division. This year, the QLET Ecotoxicology Sector has been called upon several times by various Environment Canada colleagues and organizations to offer visits to familiarize people with ecotoxicology. The team had the pleasure of introducing college (Cégep Ahuntsic, Collège de St-Félicien, Cegep Vanier) and university (Université de Montréal) students to ecotoxicology. The laboratory also welcomed Gatineau colleagues from the Prevention and Recovery units of the Environmental Emergencies Division. Julie Carpentier, Joffré Bourgeois, Kerry Ketcheson and two students were on hand. It was an opportunity for QLET to showcase its expertise in ecotoxicology and, more specifically, in conducting standardized bioassays. Based on these discussions, QLET could be asked to provide scientific expertise to the Prevention and Recovery units as part of a risk analysis project.

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QLET and the Siloxane Project

As part of the “Siloxanes Express” departmental project, four members of the QLET organic chemistry laboratory team—Suzie Proulx, Karen Kate Alforque, Nathalie Côté and Dr. Serge Moore—conducted more than 200 analyses of siloxanes (D4, D5 and D6) in triplicate on soil from the Ottawa Biological Assessment & Standardization Section for Dr. Juliska Princz. QLET participation in this study, under the responsibility of Dr. Mehran Alaei, is now complete. We contributed to and supported the analytical component of soil and sediments in an ecotoxicological study.

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QLET Participation in an Environmental Enforcement Directorate (EED) Workshop

On October 19, 2010, EED employees in the Quebec region met for information sessions. They invited two QLET representatives—Sylvain Trottier of the Ecotoxicology Sector and Sylvie Roberge of the Inorganic Chemistry Sector—to participate in a simulation of taking legal samples. The purpose of the exercise was to share all aspects of the process, from documenting samples to submitting samples to laboratory representatives. The thoroughly enjoyed exercise strengthened connections between the two divisions.

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Photo: EOALRSD

The QLET Team Participates in the AEPRD/FER LRTAP Survey Project

In September and October, the QLET field team participated in the sampling of 200 lakes as part of the LRTAP Survey project. The field team's work consisted in taking water samples from each of the lakes from a floating helicopter and taking a sediment core for 98 of the lakes. The inorganic chemistry laboratory analyzed 21 parameters for each of the lakes. The challenges of this project were the logistics of delivering the samples and the short analysis periods (24 hours and 48 hours). The analysts accomplished a tremendous feat in conducting all the analyses within these very short time frames. Congratulations to the field team and the Inorganic Chemistry Sector!



Photos: EOALRSD

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The QLET Ultra-Trace Mercury Analysis Laboratory Centre of Excellence is now Recognized by CALA

In October 2010, the ISO/IEC 17025 accreditation of the Quebec Laboratory for Environmental Testing (QLET) was renewed for a two-year period by the Canadian Association for Laboratory Accreditation (CALA). This year, the scope of accreditation was broadened with the addition of three inorganic chemistry parameters: ammonia nitrogen, major ions by ion chromatography and ultra-trace mercury by cold vapour fluorescence spectroscopy. It should be noted that this accreditation provides the QLET Ultra-Trace Mercury Analysis Laboratory Centre of Excellence with external recognition of the laboratory's high-quality work in a very specialized field. Once again, QLET is proud to be recognized for its skill and innovation. This recognition bolsters the reputation of Environment Canada's services and leads clients to trust in their quality.

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Emergencies Science and Technology

ESTS Staff Participate in Exercise Firedrake in Alberta

On October 25, 2010, Michael Goldthorp and Benjamin Fieldhouse of the Emergencies Science and Technology Section (ESTS) participated in the live-chemical component of Exercise Firedrake at Canadian Forces Base Suffield in Alberta. Exercise Firedrake was a multi-day event organized by the RCMP National CBRNE (Chemical, Biological, Radiological, Nuclear, and Explosives) Response Team. It is part of an ongoing effort to integrate a broad network of federal emergencies response teams harnessed over the past several years to prepare for a CBRNE response. ESTS staff assumed the role of subject matter experts (SMEs) for chemicals in conjunction with representatives from Department of National Defence, Defence Research and Development Canada (DRDC-Suffield). During the exercise, Mr. Goldthorp and Mr. Fieldhouse had the opportunity to observe and participate in the evolving protocols of federal CBRNE response and meet with personnel from the other federal response teams.

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Conference and Exhibition on Membrane and Water Reuse in Istanbul, Turkey

The International Water Association held its Conference and Exhibition on Membrane and Water Reuse in Istanbul, Turkey on October 18-22, 2010. The event was attended by over 300 participants from 50 countries. The focus of the Conference was on membrane separation technologies, including industrial and municipal wastewater treatment and reclamation, removal of emerging pollutants, novel technology developments, new membranes for water reuse and case studies.

The removal of emerging pollutants, such as pharmaceutical compounds, was one of key themes of the event. Most of the research in this field focuses on the use of membrane bioreactors (MBR). This approach results in a faster and more complete removal of the pollutants when compared to conventional biological treatment. Membrane separation can also be used in combination with conventional methods such as adsorption or advanced oxidation.

Konstantin Volchek of the Emergencies Science and Technology Section attended the Conference and presented a paper titled "Membrane Treatment of Liquid Wastes from Decontamination Operations". The paper was based on results of a collaborative research study funded by Defence Research and Development Canada and led by Environment Canada.

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ESTS hosts the 33rd AMOP Technical Seminar on Environmental Contamination and Response

The Emergencies Science and Technology Section (ESTS) hosted the 33rd AMOP Technical Seminar on Environmental Contamination & Response in Halifax, Nova Scotia from June 7-9, 2010. The scientific findings presented and ensuing discussions at AMOP help contribute to the setting of S&T priorities for the department's Environmental Emergencies spill emergencies research and development program. AMOP is a peer-reviewed international forum for researchers in the field of oil and chemical spills R&D and emergency response to meet and discuss current scientific findings. The Technical Seminar hosted approximately 181 attendees, of which about 60 were federal employees from Environment Canada, Transport Canada, Fisheries and Oceans Canada, the Department of National Defence, and the Canadian Coast Guard. Delegates also included internationally renowned scientists from Canada, the United States, England, France, Norway, Finland, Denmark, Russia, Armenia, Slovenia, Kyrgyzstan, Ukraine, Singapore and China, representing government, industry and academia. About 70 plenary presentations, 30 speaker's corner and 20 posters were presented at the seminar.

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Brazilian Scientists visit IQM

Two environmental scientists from Rio De Janeiro, Brazil visited IQM on October 29, 2010 to tour facilities at CCIW in Burlington and consult on analytical technology and proficiency testing of organic compounds in petroleum.

Gilson Cruz Da Silva from PETROBRAS and Arthur L. Scofield from PUC (Pontifical Catholic University) are involved in petroleum technology and their impact on environmental monitoring and assessment. They visited various Universities and Institutes in Canada with expertise in laboratory analysis and proficiency testing of petroleum related organic chemicals. Both scientists manage analytical laboratories and their laboratories are members of the Canadian Association for Laboratory Accreditation.

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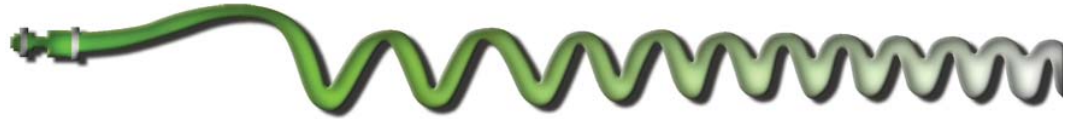
Photo: Halka Klement

Left to right: Harold Malle, Arthur L. Scofield, Gilson Cruz Da Silva, Jayne Simser and Haig Agemian

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Client Talk



Changes in the Division

The Emergencies, Operational Analytical Laboratories and Research Support Division (EO-ALRSD) has undergone a number of changes in an effort to standardize operations across the regions. Changes have been made to better define the strategic direction for science activities undertaken by the Division and to meet the goals of the Science Plan for the Department. The Division is continuously seeking more efficient ways to deliver its scientific and technical services. In addition, the Divisions strives to offer a higher level of service across the country. Collaborative opportunities among the lab community will be pursued to ensure the best use of a valuable but limited resource. As we move forward we are interested in engaging our clients in meaningful dialogue to ensure the delivery of sound science. One way we have addressed this is to solicit your feedback in the 2010 Client Survey.

Results of the Client Survey revealed that you are mostly satisfied with your interactions with EOALRSD staff and feel that the quality of service is high. This is very positive. Areas that were identified for improvement include communication, turnaround time and the ability to respond to emerging issues. The Division is committed to improving its performance in these areas through follow-up meetings between individual client groups and the laboratories, as well as formalized discussions at the management team level to establish divisional client service standards and address other issues identified through the survey. Together we will fulfill the science needs of the Department to ensure the protection of the environment, human health and safety and economic prosperity.

For more information on the activities of EOALRSD access the website at www.ec.gc.ca/inre-nwri or contact Sharon Carrier at Sharon.Carrier@ec.gc.ca or 905-336-6261.

