



HIGHLIGHTS OF EOALRSD

Emergencies, Operational Analytical Laboratories and Research Support Division

Le français suit

Spring 2011

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

From the Director



The goal of the Division is to ensure that priority programs identified by the Department are adequately supported through the provision of analytical services and the development of methods to meet national needs. In this issue we look at some of the work that is being conducted to ensure the preservation of our natural environment.

On March 7, 2011 Canada's Environment Minister Peter Kent highlighted the Government of Canada's efforts to help clean-up the Great Lakes as part of Canada's Great Lakes Action Plan.

"The Great Lakes are the largest system of fresh surface water on earth and a crucial resource to Canadians," said Minister Kent. "With this investment, the Government of Canada is working in partnership with communities and other levels of government to protect and restore water quality in the Great Lakes."

The Division devotes over one third of its resources to monitoring activities, including the generation of high quality scientific data to support decision-making regarding the health of the Great Lakes. We are proud of our partnership with the Water Quality Monitoring and Surveillance Division to protect and restore this important ecosystem.

In addition to this work, the Division has committed resources to the highly publicized Oil Sands project. A plan for the Lower Athabasca Water Quality Monitoring Program was developed and highlights the need for water quality measurements to be taken more frequently, and in more places, which will ensure there is sufficient data available to track possible changes. Al Colodey is the Divisional lead and is coordinating efforts to ensure the successful delivery of the program. The Division's contribution to the plan included the provision of a Schedule of Services listing the parameters of specific interest to the program.

"This plan is the first step towards an improved surface water monitoring program," said Minister Kent. "This will take time, but we are on track, and are committed to getting it right. Our monitoring, research and other actions rise to the challenge of protecting the environment and ensuring the responsible development of the oil sands."

The laboratories across the country will be involved in the production of data for this high profile project and will provide advice with regards to standard methods appropriate to meet data quality objectives.

In the Spring 2010 issue, information was provided regarding the Division's involvement in the study of siloxanes. This study was a ministerial priority and the Division was able to respond in a timely manner to its requirements. The purpose was to better understand these substances and determine if further actions are needed to manage the risks posed by their presence in the environment.

These are just a few examples of the work undertaken by the Division to fulfill the mandate of Environment Canada. The Division is committed to the production of scientific data that is legally defensible and enables sound decision-making on the health of the environment. In the next issue we will highlight the work performed in support of enforcement, which is key to ensuring compliance with Environment Canada regulations.

IN THE SPOTLIGHT

EC support to Canadian Association for Laboratory Accreditation (CALA)

In this issue we give recognition to Environment Canada employees that contribute to CALA in a volunteer capacity. Environment Canada employees offer their services to CALA as accreditation assessors, provide members for the Advisory Panel, the Program Committee, the Accreditation Council and the Board of Directors. A letter of appreciation was recently sent to employees across Canada who devote time to CALA activities. Their contributions result in the successful delivery of CALA programs and ensure that the costs of accreditation are affordable to the entire lab community. The expertise of the contributors is evident in the consistent high quality of services. Management has been very supportive of the involvement of their employees in CALA activities and must also be recognized for their valuable contribution.

Accreditation promotes confidence in the data produced by the scientific community. It is very important in the selection of a suitable laboratory to provide analytical services to Environment Canada programs. Environment Canada has a data quality policy which states that all laboratory data generated for its programs must be accredited unless certain conditions exist. The goal of the policy is to ensure that data generated for Environment Canada programs are legally and technically defensible. In addition, procedures must be documented to allow the identification of any anomalies, deficiencies or sources of error. All data received by Environment Canada must be consistent with national and international standards.

The commitment of the volunteers is deeply appreciated and is instrumental to the continued success of the CALA accreditation program.

CEPA and FA Analysts

During April 19-21, 2011 several staff members of NLET participated in the Analyst Designation Course. The objective of the course was to prepare staff to become Environment Canada Enforcement Analysts. All participants were successful in achieving designation and are now able to perform Enforcement activities under the supervision of a fully designated Enforcement Officer. An analyst may be involved in inspections and investigations to ensure compliance with CEPA 1999 and 36(3) of the Fisheries Act. These acts were thoroughly examined during the course and pertinent information regarding sample protocols and chain of custody was provided. This experience is beneficial to NLET operations because NLET performs analysis on legal samples and must be aware of relevant regulations. Congratulations are extended to Beau Atkinson, Sharon Carrier, Anna Debenedetti, Ivy D'Sa, Sonya Pacheco, Gino Sardella and Helena Steer.

Analysis for Pharmaceuticals and Personal Care Products

The Organic Analysis Laboratory of the National Laboratory for Environmental Testing has developed a new method for pharmaceuticals and personal care products (PPCPs) to address emerging concerns. PPCPs have been present in the environment for as long as humans have been using them but advances in technology have improved our ability to detect and quantify these chemicals to determine the effects on human and environmental health. Studies are being developed at Environment Canada (EC) to improve our understanding of these chemical substances, which include a diverse list of over 45 compounds encompassing over-the counter therapeutic drugs, prescription and veterinary drugs. Classes of these chemicals include tetracycline's, sulfonamides and fluoroquinolones. The analytical method, to be offered routinely to lab clients in FY2012-13, requires a dual solid phase extraction for acidic and basic compounds and analysis by LC-ESI-MS/MS. NLET is committed to the development of leading edge technologies to ensure the Division is in a position to meet the priorities of EC programs.

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Pacific and Yukon Laboratory for Environmental Testing

Kin Lau, facilities technician at the Pacific Environmental Science Centre(PESC) in North Vancouver was presented with his 31 y service recognition certificate by Environment Canada's Pacific and Yukon Regional Director General, Paul Kluckner on Wednesday 15 March 2011. Kin began his career in the federal sector at Agriculture Canada and left the UBC Research facility to join the newly opened PESC in 1996, when he was hired by Manager Paul Kluckner.

Since then the PESC management team has relied on Kin for his varied knowledge on electrical, plumbing, mechanical and other building requirements to ensure that the building remained fully operational 24/7. Kin's innovation at work has earned him a number of awards, for example, designing a low-cost solution to extract the marine submersible pumps for periodic servicing without having to call in a crane-truck and open the roof of the pump-room to lift out the pumps.

Everyone at PESC celebrated with Kin and enjoyed watching the EC 40th Anniversary PESC slideshow which chronicled the evolution of 'lab technology' and the history of fashion from the 70's to the present. Kin will be missed and we all wish Kin good health and enjoyment of extended cruises with lots of opportunity for photography. Thank-you Kin and enjoy your retirement!

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Green Team Earth Day Events at PYLET

Earth Day was celebrated early at the Pacific & Yukon Laboratory for Environmental Testing (PYLET) this year.

- It all started with a bake sale on Tuesday April 19th which raised money for Shelters International Disaster Response (SIDR; <http://www.sheltersinternational.org/index.html>) an organization raising money for Haiti Relief (\$105). Generous bakers contributed savory scones, spanakopita, and lots of goodies.
- EC volunteers contributed their time and muscle to a one hour clean-up of the local Wild Bird Trust shoreline on Wednesday, April 20th. As incentive to participate in the shoreline clean-up, a draw was held in which the lucky participant received a free lunch. Craig Buday won the draw and donated part of his winnings to the Haiti Relief Fund.
- The shoreline clean-up was followed by a pizza and movie lunch. The Green Team organized the pizza lunch and showed two movies from the PYR library (Chickens in the City and The Cost of a Cup of Coffee). This fun event garnered over 60% participation.

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Quebec Laboratory for Environmental Testing

Something new at QLET organic laboratory!

Recently, QLET has completed the purchase of a GC-MS/MS instrument. Waters won the tender with its QuattroMicroGC. Previously, QLET had only a GC-NPD (which dated from the early 1990s) for the analysis of organochlorine pesticides and triazines. Now the team can develop different parameters to provide core services in organic chemistry.

The team is currently completing the development of the analysis of siloxanes on this instrument and is adding new congeners to the actual list. The next step will be to migrate the analysis of organophosphate pesticides and triazines from the NPD detector to the new instrument. Subsequently, we will assess the sensitivity of the instrument for the analysis of PCBs, PAHs, flame retardants, etc.

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Emergencies Science and Technology

Emergencies Science and Technology Section – Science and Security Activities

Oil Forensic Analysis

The Oil Research Laboratory (ORL) of the Emergencies Science and Technology Section (ESTS) is a leader in the field of oil forensic analysis. ORL scientists have been studying the chemical composition of petroleum products in order to forensically identify spilled oil or mixtures of petroleum products for the past two decades. Through these studies the ORL has developed the ability to differentiate between petrogenic and biogenic hydrocarbons, and to determine the source of spilled crude oils, heavy oils and lighter products like diesel. ESTS has recently published the results of two of these studies in articles in *Analytical Methods* and *Environmental Forensics*, brief details are provided below.

Z.Y. Yang, C. Yang, Z.D. Wang, B. Hollebone, M. Landriault and C.E. Brown, Oil Fingerprinting Analysis using Commercial Solid Phase Extraction (SPE) Cartridge and Gas Chromatography-Mass Spectrometry (GC-MS). *Analytical Methods*, 3:628-35, 2011.

This article introduces a use of commercial solid phase extraction (SPE) cartridges for rapid cleanup and fractionation of oil samples in oil fingerprinting analysis. The SPE-GC-MS method has various advantages in terms of analysis time, solvent consumption, and operational procedures compared with the conventional adsorption chromatography. The use of silica/cyanopropyl-based SPE cartridges and appropriate eluents, followed by GC-MS analysis can provide a performance that is comparable to the conventional adsorption chromatography for fingerprinting a series of target compounds including alkanes, biomarkers, and PAHs and their alkylated homologues. This would be particularly useful for the oil spill emergency response.

C. Yang, X.Z. Peng, Z.D. Wang, B. Hollebone, C.E. Brown, Z.Y. Yang and M. Landriault, Fingerprinting Analysis and Characterization of Hydrocarbons in Sediment Cores from the Pearl River Estuary, China, Environmental Forensics. 12: 49-62, 2011.

This article presents a forensic study on the marine petroleum contamination using the light petroleum biomarkers of diamondoids as a new tool. The Pearl River Delta (PRD) in southern China has undergone rapid urbanization and industrialization over the past few decades, leading to a substantial accumulation of hazardous organic compounds and a significant environmental impact. Forensic analysis of estuarine sediments is critical in order to uncover the contamination history and evaluate the level of contamination of the aquatic system and its ambient regions. A number of hydrocarbons and hydrocarbon groups including polycyclic aromatic hydrocarbons (PAHs), biomarkers, and diamondoids were found in representative sediment cores collected in the Pearl River Estuary (PRE). The results clearly suggest that the contamination in PRE sediment was derived from various inputs including petrogenic, biogenic, and pyrogenic sources. Because diamondoids are naturally absent from modern sediments that are free from petroleum contamination, in addition to the signatures of determined alkylated PAHs and biomarker terpanes and steranes, the presence of trace diamondoid compounds provides further evidence of petroleum contamination in the offshore and coastal areas of the PRE.

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CBRNE Consolidated Risk Assessment Workshop 2011

Scientists from the Emergencies Science and Technology Section (ESTS) have been involved in the Chemical, Biological, Radiological/Nuclear, and Explosives (CBRNE) Research and Technology Initiative (CRTI) since the terrorist events of September 11, 2001. ESTS leads the CRTI Chemical Science Cluster to help coordinate the response of Canadian federal departments and agencies to chemical terrorist events and to identify chemical related capability gaps and research priorities. Under funding from the CRTI program ESTS leads a number of research and development (R&D) and technology acceleration (TA) projects. ESTS is well positioned to undertake these activities due to its 30 plus years of hazardous materials spill R&D experience and operational response to spill emergencies. On April 18-19, 2011, ESTS scientists Patrick Lambert, Konstantin Volchek and Carl Brown attended the CBRNE Consolidated Risk Assessment (CRA) workshop and led the Chemical Science Cluster participation. This classified workshop was organized by the Centre for Security Science (CSS) and the Canadian Security Intelligence Service (CSIS). Members of the Cluster and representatives from the intelligence, law enforcement, responder, and scientific communities reviewed a number of scenarios for applicability, rated the threat/hazard scenario vignettes against 'feasibility' and 'impact' matrices, identified how current projects and cluster investments are addressing the risks, and then articulated the remaining capability, knowledge, technology and other gaps.

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Information and Quality Management

IQM Staff makes presentation at the Environmental Enforcement and Laboratory Services of the Region of Waterloo

Mr. Harold Malle was invited to attend the general quality meeting of the Environmental Enforcement & Laboratory Services (EELS), Region of Waterloo where he gave a presentation on trend analysis of laboratory QC data. The meeting was held on February 28th, 2011 and involved the Quality and Compliance group of EELS including laboratory and field staff dealing with logistics and quality control issues.

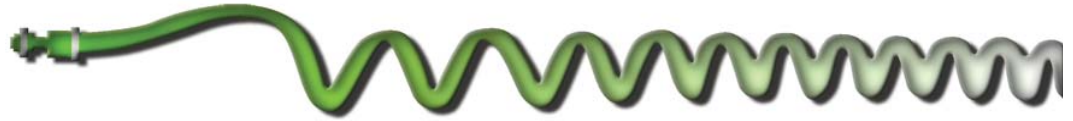
The presentation discussed control charting techniques for laboratory data to illustrate the use of trending rules as a means of preventative action in real time on Environmental Enforcement studies. This talk was also presented at the Canadian Association for Laboratory Accreditation Biennial Assessor Training meeting in Ottawa.

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Client Talk



As we begin the new year it is a good time to reiterate the proper procedures for shipping samples to the Divisional laboratories for analysis to ensure the integrity of the samples is maintained. This is an important step in the analytical life cycle of the samples and the same attention must be given to this activity as provided for analytical procedures in the laboratory. Samples that are preserved at prescribed conditions contribute to the reliability of reported results. This key step ensures that the sample is representative of the testing environment. To this end the following recommendations¹ are made in regard to shipping procedures:

- Ensure samples are refrigerated prior to shipment to achieve the desired temperature
- Insert additional insulation, such as Styrofoam, in coolers and use packing material to maintain the required temperature
- Use ice paks® or, as an economical alternative, freeze de-ionized water in clean plastic sample bottles (leaving head space) and use to keep the samples at the required temperature
- Tape the lid along the seal to lessen air transfer and temperature fluctuation
- Arrange for priority delivery for time-sensitive analyses, preferably overnight express, to increase reliability of analytical results
- Pre-arrange transportation to assist in keeping shipping time to a minimum
- Schedule delivery to ensure that shipments aren't stored in a warehouse over the week-end where there may be no refrigeration facilities
- Use a temperature data logger to monitor fluctuations, if any, to verify effectiveness of packaging
- Evaluate other products available on the market for suitability and/or options

¹ Marsh, Donald, A Study of Temperature of Samples Sent to the National Laboratory for Environmental Testing for Analysis, March 2002.

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.