Canadian Network of Toxicology Centres

Metals In The Environment News

Sources Processes Impacts

Volume 1
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Winter 1999

New Initiatives

Metals in the Environment (MITE) Research Network

Novel partnership of government, academia and industry spurs metals research network.

Metal research in Canada is at the dawn of a new era, thanks to the Metals in the Environment (MITE) Research Network.

Government and MITE officials gather to endorse the MITE initiative.

(Sitting, from left: Ms. Brenda Chamberlain, M.P. (Lib.), Guelph-Wellington; The Honourable Ralph Goodale, Minister of Natural Resources Canada; Mr. John Carrington, Chief Operating Officer, Barrick Gold Corporation. Standing, from left: Dr. Michael Sopko, Chairman and Chief Executive Officer, Inco Limited; Mr. Dave Goldman, Executive Vice President and Chief Operating Officer, Noranda Inc.; Mr. Logan Kruger, President and Chief Executive Officer, Hudson Bay Mining & Smelting Co.; Len Ritter, MITE Research Network Program Director)

The MITE Research Network was formally initiated on July 1, 1998, after the Mining Association of Canada (MAC) agreed on the importance of MITE and committed $1.25 million and in-kind support for the research network for a five-year period. Ontario Hydro, reflecting its commitment to environmental stewardship, is providing $200,000 in financial support and in-kind support for the network for 1998 and 1999, with the potential for continued support in subsequent years.

Similarly, research partners at Environment Canada, Natural Resources Canada and Fisheries and Oceans Canada also pledged support for the objectives of, and cooperation with, the MITE Research Network. MAC has also committed an additional $100,000 per year over five years in support of government/MITE related research activity. The government/MITE funds will be released upon finalization of a formal agreement now being discussed within the relevant government departments.

MITE aims to understand the sources of metals in the environment, how metals move and transform within the environment, and how they can affect ecosystems and human health. This understanding is essential for assessing the risk they may pose and determining how to reduce that risk. As one of the world's largest producers and exporters of metals, Canada has a vital interest in developing effective ways to deal with these issues.

Through a series of workshops, the Canadian Network of Toxicology Centres (CNTC), in cooperation with its partners in government and industry, has identified important gaps in metals research and developed a multi-disciplinary research program.

Metals are naturally present throughout the Earth in varying concentrations. The concentration of a metal in a particular area can also be affected by human activities. Metals have been used for millennia as tools, building materials and decorative objects, and their use has expanded over time.

But too much – or not enough – of a metal in a bioavailable form (a form that plants or animals can absorb) can damage ecosystems and human health. Reducing the release of metals into the environment is good, but what should the ultimate goal be? Is existing "best available technology" good enough?

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A firm commitment between the MITE Research Network and Ontario Hydro.

(Clockwise from bottom left: Len Ritter, MITE Research Network Program Director; Andy Hoffer, Senior Environmental Advisor, Corporate Environment; Helen Howes, Director, Corporate Environment; Rob Lyng, Senior Advisor, Environmental Programming, Fossil Business Support)

IN THIS ISSUE

MITE Research Priorities for 1998 - 99

SOURCES

University Based

Domain Leaders: Dr. Grant Edwards (University of Guelph), Dr. R. Garrett (Natural Resources Canada / Geological Survey of Canada)

Project S1: ***Measurement of volatile metals air surface exchange rates over natural settings.***

Research Team: Grant C. Edwards (University of Guelph, School of Engineering) - PI
Collaborators: Pat Rasmussen (NRCan, Geological Survey of Canada)
W.H. Schroeder (Atmospheric Environment Service)

Project S2: ***Geochemical mobility of metals in surface sediments: Influence of sediment diagenesis.***

Research Team: Richard Carignan (Université de Montréal)- PI
Collaborators: Bernard Boudreau (Dalhousie)
André Tessier (Université du Québec (INRS-Eau))

Project S3: ***In situ solid state chemical speciation of metal pollutants associated with ground level airborne particulates.***

Research team: Marc Lamoureux (St. Mary's University) - PI
Collaborator: C. Gregoire (NRCan, Geological Survey of Canada)

Government Based

Summaries: 1. ***Forms and sources of mercury in mercury-contaminated lake sediments and fish.***

Research Team: L.J. Evans (University of Guelph) - PI
Collaborator: M.L. Diamond (University of Toronto)

PROCESSES

University Based

Domain Leaders: Dr. Beverley Hale (University of Guelph), Dr. R. Pierce (Department of Fisheries and Oceans

Project P1: ***Field determinations of metal bioavailability in aquatic and terrestrial systems.***

Research Team: Beverley Hale (University of Guelph) - PI
Landis Hare (Université du Québec, INRS-Eau)
William Hendershot (McGill University)
Gary Hogan (Canadian Forest Service)
Andre Tessier (Université du Québec, INRS-Eau)
Norman Yan (Ontario Ministry of Environment and Energy)

Project P2: ***Modeling Metal Speciation, Attenuation and Movement in Shield Watersheds and Lakes.***

Government Based

Summary: ***Historical trends of total mercury in arctic marine biota.***

Research Team: P. Outridge (Geological Survey of Canada, Ottawa) - PI
Collaborators: A.S. Dyke, R. McNeely (Geological Survey of Canada)

Summary: ***Metal accumulation in coniferous and deciduous trees - Comparing dendrogeochemistry and phytogeochemistry near the Horne Smelter (Rouyn).***

Research Team: M. M. Savard, Delta-Lab, Geological Survey of Canada, Québec Geoscience Centre, Ste-Foy, Québec. PI

IMPACTS

University Based

Domain Leaders: Dr. Peter G.C. Campbell (Université du Québec / Institut national de la recherche scientifique - eau), Dr. U. Borgmann (Department of the Environment / National Water Research Institute)

Project I1: ***Detection of metal-induced effects in indigenous fauna.***

Research Team: Peter G.C. Campbell (Université du Québec, INRS-Eau) - PI

Collaborators: Laurie Chan (McGill University)
George Dixon (University of Waterloo)
Alice Hontela (Université du Québec à Montréal)
Joseph B. Rasmussen (McGill University)
Uwe Borgmann (NWRI)
Tony Scheuhammer (CWS)

A. *Links between metal body burdens in aquatic invertebrates and metal-induced toxicity.* Dixon and Borgmann

B. *Links between tissue body burdens in indigenous fish and metal-induced effects at the organism and population levels.* Campbell, Hontella, and Rasmussen

C. *Metals in waterfowl and other wild birds in Northern Ontario and Northern Québec.* Chan and Scheuhammer

Project I2: ***Biomarkers of metal exposure in terrestrial woody plants.***

Research Team: Ron R.H. Martin (University of Western Ontario) - PI
Collaborator: Wilfried Rauser (University of Guelph)

A. *Dendroanalysis as a historical record of metal phytoavailability.* Martin

Researcher: T.A. Jackson (National Water Research Institute, Burlington, Ontario) - PI
Collaborators: J. Carrier and others (National Laboratory for Environmental Testing)
K. Telmer (University of Victoria)
J. Azcue (Laboratorio Nacional de Engenharia Civil)

Summaries 2. ***Investigation of metals and other elements in various microscopic components of sediment samples from smelter-contaminated lakes.***

Researcher: T.A. Jackson (National Water Research Institute, Burlington, Ontario) - PI
Collaborators: G.G. Leppard (NWRI)
M. West (McMaster University)

Summary: ***Mercury trends and distribution as recorded in Bowhead Baleen.***

Researcher: R.W. Macdonald (Department of Fisheries & Oceans) - PI

Summary: ***Evaluation of metal stratigraphy in marine sediments as a record of atmospheric deposition of metals.***

Researcher: John N. Smith (Department of Fisheries & Oceans Bedford Institute of Oceanography, Nova Scotia) - PI

The Canadian Network of Toxicology Centres, Metals in the Environment (MITE) Research Priorities for 1998 - 99 year are highlighted on this page. The full descriptions of these research projects may be viewed on our website at http://www.uoguelph.ca/cntc/mite/research/research.htm

Metals Research Network Adopts Integrated Approach

Critical environmental policy questions addressed by scientists

For the first time in Canada, a network of Canadian research scientists will address the most important research questions surrounding metals in the environment in an integrated, holistic manner.

The Metals in the Environment (MITE) Research Network fulfils this unique mandate. Although many individual research papers on the fate and effects of metals in the environment have been published in the past, this Research Network will provide a unique opportunity for teams of researchers to conduct integrated research studies in direct response to critical questions being asked by both scientists and policy makers at the domestic and international levels. The linkage between scientific investigations into the sources, cycling, mobility and effects of metals in the environment will be further strengthened by the co-location of research teams conducting joint studies in well defined Canadian ecosystems representing a range of conditions from low to high metal concentrations.

We anticipate that the following specific benefits will result from the establishment of the MITE Research Network:

- The relative inputs of “metals” to Canada's surface environment via natural and anthropogenic processes will be more clearly understood. This will enable policy and regulatory actions to more specifically identify the benefits of controlling anthropogenic releases and the unique circumstances of site-specific actions.
- The research will relate metal-induced effects (toxicological endpoints) to metal speciation, providing a scientific framework for managing the fate of metals.
- The Research Network will provide a forum for universities, industry and government to work together, a critical step as Canada seeks to establish a sound risk management foundation for “metals”.
- The Network will educate and develop a new generation of individuals whose skills and knowledge will be particularly valuable for Canadian industry in the future. The issue of metals in the environment will continue to be of prime importance as risk management strategies are developed.
- The results of the Network research program will help the metals resource industries in their desire to manage their businesses responsibly, while enabling these businesses to thrive and provide meaningful employment to Canadians and a healthy balance of trade for the Canadian economy.

Dr. Peter Campbell ❖

New Initiatives,
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Many metal products are recycled — metals like gold, copper, iron and lead are the most recycled materials used by society. But some smaller consumer products end up in landfills or incinerators. Does such disposal pose a long term risk? Should use of certain metals in some products be discontinued? National governments and international organizations are currently discussing these questions.

To ensure the objectivity and continuing scientific excellence of the MITE Research Network, all MITE research projects will be peer reviewed annually, and all funds are held and administered in trust through the Canadian Network of Toxicology Centres/University of Guelph head office. Other sources of funding, including the Natural Sciences and Engineering Research Council are currently being explored.

A steering committee was formed and worked through 1997 to develop a structure and research plan for a MITE research network which would help coordinate and integrate existing research and foster research necessary to fill gaps.❖

MITE Management Structure

The Metals in the Environment research program management structure in place for the 1998-99 fiscal year began with the appointment of a program director, Dr. Len Ritter, Executive Director of the Canadian Network of Toxicology Centres; a program Secretariat, with an administrative and a financial manager; a support staff member; and two research domain leaders for each of the three domains: "Sources", "Processes", and "Impacts". (*See page 2 for Domain Leaders and Research Teams*)

Dr. Ritter's working history at progressively senior levels in the federal government and with key decision makers of important sectors in the metals industry in Canada, has facilitated collaborative partnerships with government and industry and will promote effective dissemination and utilization of research results from the MITE research network. MITE program management will mirror the very successful management structure of research programs already utilized by the Canadian Network of Toxicology Centres.

The MITE Secretariat will provide overall administrative services in support of the research network. This includes development of a project-reporting management scheme, providing information regarding research network contacts, producing a MITE newsletter and web site, and facilitating MITE Science Steering Committee communications and meetings, and organizing the annual research symposium.

Contact information for the MITE Secretariat:

Len Ritter, Ph.D.,
MITE Research Network Program Director

Donna Warner,
Administrative Manager

Jim Cooper,
Trust Accounting Manager ❖

Announcements

CNTC Annual Symposium

The CNTC 1999 Annual Research Symposium will be held on March 29 - 30, 1999 at the Holiday Inn, Plaza La Chaudière in Hull, Québec. This symposium will feature:

- Metals research presentations on day 2 (March 30th).
- Day 1 presentations will be from the CNTC's Endocrine & Reproductive Ecotoxicology Research Team and the Risk Assessment and Methodologies Research Team.
- The MITE Science Steering Committee thanks Mr. Andy Hoffer of Ontario Hydro for his valuable input and guidance during the critical initial development of the MITE Research Network.

The New MITE Web Site

Our new web site was launched in November 1998. The web site may be accessed from the main menu of the CNTC web site at: http://www.uoguelph.ca/cntc or directly at: http://www.uoguelph.ca/cntc/mite.

The web site contains MITE related information on:

- Background of the MITE Research Network.
- Expanded descriptions of the MITE research priorities for the 1998 - 99 fiscal year.
- Electronic copies of newsletters and publications as they become available (in HTML and PDF formats).
- Contact information for all researchers, committee members, and MITE secretariat
- Links to other MITE related world wide web sites

MITE News *is a communication produced by the MITE Secretariat, the Canadian Network of Toxicology Centres, University of Guelph, Bovey Bldg., Gordon Street, Guelph, Ontario N1G-2W1.* ***MITE News****' executive editors: Dr. Len Ritter and Donna Warner.*

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Articles appearing in ***MITE News*** *may be reprinted; acknowledgment appreciated.*

Visit the Metals in the Environment (MITE) web site: http://www.uoguelph.ca/cntc/mite

If you would like to be added or removed from our mailing list go to http://www.uoguelph.ca/cntc/mite/newsletters/newsletters.htm or contact us directly at the number above.

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The MITE Science Steering Committee

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