



Current MITHE-SN Projects Metadata

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Arsenic Speciation in the Environment (Foods + Ingested Particles)

Objectives being Investigated

Further to the successful completion of our study that measured the arsenic and chromium levels on children's hands after playing in playgrounds, this study will extend to measure biomarkers of exposure. Chromium and arsenic speciation in saliva and urine samples from the participating children will be determined and will be used to assess children's overall exposure to arsenic and chromium.

To address some concerns over arsenic in game meat and traditional foods of the First Nations, moose and deer meat as well as cattail plant samples collected from First Nations communities in Northern Alberta will be studied for arsenic speciation. The chromatography and mass spectrometry techniques that have been developed during the previous period will be applied to the characterization and quantitation of arsenic species in these food samples. The skin and starchy tuber of cattail plants will be analyzed separately because our preliminary results have shown that elevated arsenic levels are found to be localized on the surface (skin) and fine roots of cattail. This separate analysis is important because it is the starchy tuber that is usually consumed.

The speciation techniques will further be adapted and applied to studies of vanadium speciation in oilsands and processing by-products. Release of relatively high levels of vanadium from oilsands is a potential environmental concern that requires attention.

Study/Sampling Design

(a) Initially, soil/sand samples were obtained from eight Edmonton playgrounds containing wood treated with chromated copper arsenate (CCA) and another eight playgrounds that did not contain CCA-treated wood. Hand-washing samples were then obtained from 66 children who played in the eight playgrounds containing CCA and 64 children who played in the other eight playgrounds that did not contain CCA-treated wood. We have recently collected urine and saliva samples from children following playing in the CCA and non-CCA playgrounds. Speciation analysis of arsenic and chromium in children's hand washing, urine, and saliva samples provides an assessment of children's exposure to arsenic and chromium.

(b) Market basket food samples were obtained from Vancouver, Edmonton and Kingston, representing larger, medium and small Canadian cities. Additional samples from First Nations communities were obtained from Northern Alberta. Speciation of arsenic compounds in these food items provides information necessary for the assessment of dietary ingestion of arsenic species by Canadians.

Number of projects providing material for study: 0

Location of Field Site(s)

- Playgrounds in Edmonton, Alberta (children's hand-washings, urine, and saliva samples)
- Northern Alberta (moose and deer meat and cattail samples from First Nations communities)
- Fort McMurray, Alberta (oilsand and coke samples)
- Vancouver, B.C. (market basket food samples)
- Kingston, Ontario (market basket food samples)

Human Studies

Outcome or Process Studied

Children's exposure to arsenic and chromium from contact with wood treated with chromated copper arsenate.

Exposure Medium, and Metals/Substances Quantified

Ingestion due to hand-to-mouth behaviour of children.
Arsenic and chromium in soil/sand, children's hand-washings, urine, and saliva.

Biological Endpoint(s) Monitored

--- none provided ---

Biota Studied

Species

Moose and deer meat, cattail and rattail, crayfish

Metals, etc. Quantified

Arsenic

Biological Endpoint(s)

--- none provided ---

Physical Material(s) Studied

Medium/Media

Soil/sand, hand-washing water, oilsand

Metals, etc. Quantified

Arsenic, chromium and vanadium

Bibliographic References on-file with Secretariat: No

Data Available: No

Data Archived with MITHE-SN: No

Collaborators

Dr. William Cullen (Co-Inv.) – , University of British Columbia

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Metals in the Human Environment Strategic Network

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