



Centre for Northern Innovation in Mining

CNIM update

May 2023

YukonU.ca/CNIM



At a glance

- Heavy Equipment Technician
- Pre-Apprenticeship Millwright
- Surface Mining/Heavy Equipment Operator Training
- Class 1, 3 and Air Brakes
- Underground Mining Operations
- First Line Supervisor
- Contract Training
- Field Trip
- Community Outreach
- Earth Sciences
- Environmental Monitoring Certificate
- Other YukonU programming
- Applied research: Industrial Research Chair in Northern Mine Remediation



CNIM update - May 2023

Heavy Equipment Technician

Three Level 1 apprentices joined the Pre-Apprenticeship Heavy Equipment Technician (HET) class in January. Five Pre-Apprenticeship HET students graduated from the program and wrote the Level 1 apprentice exam. Three graduates found employment in the heavy-duty mechanics trade willing to provide apprenticeships.

In May, a HET Level 4 class began. The class includes Phil Todd, who is currently employed with Yukon Government's Central Workshop. Phil is the first HET apprentice to complete all 4 levels at Yukon University.

Pre-Apprenticeship Millwright

In March, the 2023 Pre-Apprenticeship Millwright program students Pelly Vincent-Braun and Axel Buchanan, along with Ginny Coyne, CNIM's Department Head and Faye Canty, CNIM's Project Officer, toured Hecla Mining Ltd's Keno mine and Victoria Gold Ltd.'s Eagle mine.

Between rotations at Newcrest's Red Chris mine, Justin Magill, Millwright, RSE, provided a motor alignment instructional module within the Pre-Apprenticeship Millwright program in early May. Pelly and Axel have successfully completed the program and are looking forward to local employment opportunities where they may apply their new millwrighting skills.



Pre-Apprenticeship Millwright students Pelly Vincent-Braun and Axel Buchanan conducting a motor alignment.

Surface Mining/ Heavy Equipment Operator Training program

CNIM is poised for the delivery of Surface Mining/Heavy Equipment Operator training with the support of industry and Yukon First Nations. The replacement components of the ThoroughTec surface mining simulator will be purchased once a Service Canada funding agreement is finalized. CNIM anticipates the delivery of programming to begin in July.

Class 1, 3 and Air Brakes



CNIM continues to develop commercial driver training in advance of the Yukon's Motor Vehicle Act revision to include mandatory entry-level training for new commercial drivers. In April, CNIM acquired a commercial driving simulator from Virage Simulation for use in community class 1 and 3 driver training. Virage Simulation Ltd. representatives will commission and provide training for CNIM's new simulator on May 16-18 to CNIM staff and training partners.

CNIM has permission from the Government of Saskatchewan to use their Mandatory Entry Level Training (MELT) curriculum in the Yukon Territory as recommended by Yukon's Motor Vehicle Branch. Yukon University continues to deliver Air Brakes courses and Class 3 instruction throughout the Yukon.

Underground Mining Operations

In April, representatives of Yukon University's Department of Continuing Studies visited the University of Alaska's Delta Junction Mine Training Center to tour the training facilities. CNIM representatives made use of this time to discuss future training partnerships. During the visit, Bill Bieber, Executive Director of Mining and Petroleum Training Service (MAPTS), expressed interest in the use of Yukon University's ThoroughTec Underground Mining Simulator for faster development of new underground mining equipment operator skills in future programming.



CNIM continues to explore responsive and responsible delivery options with Yukon's mining companies with underground operations to prepare the Yukon workforce for underground mining employment opportunities.

Heading underground University of Alaska's Delta Junction Mine Training Center.

CNIM update - May 2023

First Line Supervisor

The First Line Supervisor training courses and the start to certification process for Surface, Underground, and/or Exploration supervisors have been updated and made fully online. In partnership with the Yukon Workers Safety and Compensation Board (YWSCB), YukonU has created an online registration, declaration of mandatory pre-requisites, coursework and evaluation, leading to a digital certification process which eliminates the multi-step and in person examination process for the First Line Supervisor.

The course dramatically improves access to this mandatory certification. Next steps will be to work with YWSCB on the project to create a certification process in a similar fashion.

Contract Training

Multi-Trades for Mining programming - Baker Lake, Nunavut

Due to instructional and coordination capacity constraints, CNIM, ARB Arctic Ltd., and Agnico Eagle Mining have postponed training until Fall 2023, or later.

CNIM update - May 2023

Field Trip

Ilisagvik College, Utquiagvik, Alaska

In April 2023, representatives of Yukon University's Department of Continuing Studies visited Ilisagvik College to discuss community training, student services approaches and tour the campus. CNIM representatives learned how Ilisagvik College uses highway tractor and heavy equipment simulators in commercial driving and heavy equipment operation programming.

Ilisagvik College values the use of simulators to advance skill development of drivers and operators, without the wear and tear of equipment or fuel consumption.



Ilisagvik College's training simulators for light vehicles, highway tractors and heavy equipment operation.

Community Outreach

Exploration and Discovery Day- Shipyards Park

At the annual Exploration and Discovery Day event hosted by the Yukon Chamber of Mines on May 5, YukonU's Continuing Studies and Northern Mine Remediation staff assisted the Yukon Chamber of Mines with outreach activities including a geode-smashing station and an acid rock drainage chemistry demonstration. It was a lively outdoor event with pre-school, elementary, and secondary school children in attendance.



<< YukonU staff Nicole Erik and Phil LaPointe engage with young visitors at the Geode-Smashing station at Shipyards Park during the Exploration and Discovery Day event.



Northern Mine Remediation Research Assistant, Taylor Belansky, M.Sc. candidate, conducting a laboratory demonstration regarding acid rock drainage. >>

The Earth Sciences Program has finished a fantastic winter semester. Faculty taught six courses in both the first and second year of the diploma program, with only one field course left to complete:

Geological Field Methods and Mapping II (GEOL 216); taught by Dr. Joel Cubley (5 students)

We are excited to congratulate the first five graduates from the Earth Sciences Program in June. All five are planning to complete years 3 and 4 of a B.Sc. degree and have been accepted into programs at the University of British Columbia, Vancouver Island University (VIU) and Mount Royal University.

Faculty were involved in many collaborations this semester. This included visits to ALS Laboratories' sample prep facility and Yukon government's Heritage Branch to look at the local fossil collections. In addition, students in the geochemistry course, completed a semester-long project assaying and determining the geochemical properties of ore from Minto mine; this included crushing and grinding ore, froth floatation, XRF and Atomic Absorption Spectroscopy analyses.

Students in the hydrogeology course completed a semester-long project characterizing groundwater conditions around Army Beach, Marsh Lake, to support flood hazard assessment. This project was completed in partnership with Yukon government's Water Resources Branch and results were presented at a student research symposium attended by faculty, students, and government employees.

Funding was secured from Co-operative Education and Work-Integrated Learning Canada to send students to Quadra Island and run the second-year field school with VIU. As this report is being written, the students are working with their peers at VIU to map metasedimentary and plutonic rocks exposed along the coast and we look forward to growing this collaboration.

The first Virtual Geology field experience focusing on the Whitehorse Copper Belt has been released and can be explored at yukonu.ca/virtual-geology.



Another experience on Yukon Triassic Reefs will be released this month. Funding has been secured from NRCan's GEM GeoNorth Program for the next two years to complete additional experiences and create educational tools to promote Yukon's geology.

Faculty will spend much of the summer working on various research projects. One notable project is a newly funded investigation of metal(oid) contamination in the Whitehorse area. This project is funded through NRCan's Arctic and Northern Challenge Program until 2025 and will support students at the undergraduate and graduate levels. Samolczyk and Cubley are research partners collaborating with the University of Saskatchewan, the City of Whitehorse, Ta'an Kwäch'än Council, and Yukon government (Water Resources Branch, Yukon Geological Survey).



Yukon University Earth Sciences students on the ferry on their way to Quadra Island for Geological Field Methods and Mapping II field course, run in partnership with Vancouver Island University.



Hydrogeology students and faculty member Mary Samolczyk, seen here with Yukon government collaborators, presenting their final poster presentations that examined groundwater at Army Beach, Marsh Lake.



Earth Sciences student, Kieran McClenahan, conducting whole-rock fusion on Minto mine ores under the guidance of Dr. Cubley.

Environmental Monitoring Certificate

There are currently 16 students active in the Environmental Monitoring Certification Program. In February, Cohort 6 students completed the ENVM 095 – Earth Sciences course at the Ayamdigut campus. Course instruction included curriculum related to mining methods and terminology, acid mine drainage and metal leaching, groundwater movement and monitoring, and heritage resource monitoring (joined by KDFN land stewards). Guest instructors included industry experts in ARD/ML, heritage resource management and YukonU instructors in the Earth Sciences program.

During March and April, condensed courses were delivered to accommodate students unable to attend previous courses and will allow for students to complete all mandatory academic requirements in order to graduate in June 2023.

In April, eight Cohort 5 students and instructors traveled to Haida Gwaii for ENVM 099 – Capstone Project where the students engaged in land-based learning in Haida Nation territory.

Capstone Project for Environmental Monitoring Certificate students and instructors, Haida Gwaii, British Columbia.





Environmental Monitoring Certificate

This was a highly successful excursion that challenged students to identify similarities and differences in natural and cultural environments compared with their home communities. Local cultural and environmental monitoring experts led guided activities in heritage monitoring, goshawk bird monitoring in old growth coastal forests, and monitoring effects from logging activities. All participants spoke of an expanded worldview, sense of personal growth, and an excitement for bringing learnings from Haida Gwaii to their home communities and professional activities. Accommodation, meals, transportation, and guides were all provided by Haida House, a business owned and operated by the Haida First Nation.

May includes two courses in the program. Cohort 5 students are completing their final credit course: ENVM 092 – Trends in Long Term Monitoring. This course included delivery of the YukonU Climate Change modules and much discussion about mitigation and adaptation to climate change in Yukon. Students also learned about the YESAB process and how it developed from Umbrella Final Agreement, long-term trends in migratory bird monitoring initiatives, and integrated learned techniques and information into a comprehensive exercise developing a multi-component environmental monitoring program for theoretical mine projects.

Also in May, Cohort 6 students will attend the ENVM 093 – Aquatic Monitoring I course in Atlin, BC. This course will introduce aquatic monitoring methods and instrumentation using arctic grayling and hydropower generation as biological and industrial case studies. Students will visit placer mining reclamation projects led by the Taku River Tlingit First Nation Lands Department, learn the basics of hydrology monitoring and associated math and calculations, and use an array of instruments to conduct basic lake monitoring work.

Much effort has also been put into ensuring Cohort 5 students are prepared for graduation in June. Six students are scheduled to graduate with their certificates this spring, and they have been completing non-credit operator and safety certifications including Wilderness First Aid, Transportation of Dangerous Goods, Workplace Hazardous Materials Information System, and Pleasure Craft Operator's Certification.

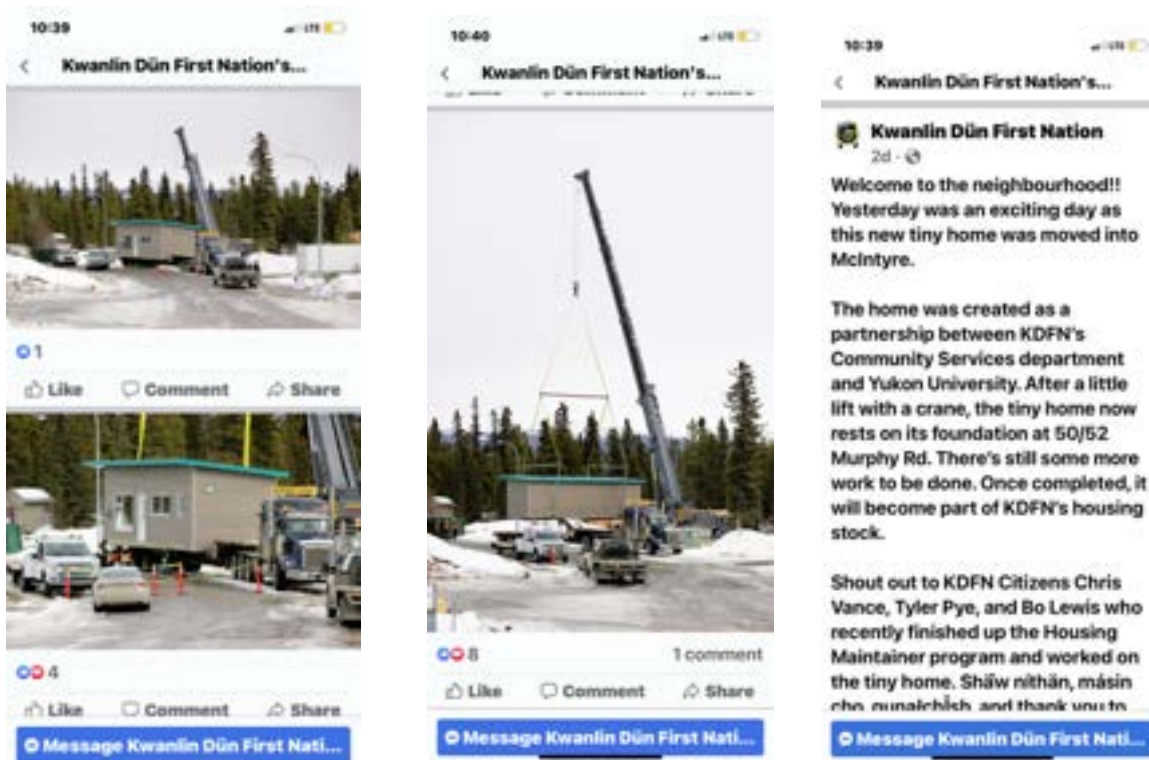
CNIM update - May 2023

Other programming

Housing Maintainer

March was a busy month in the CNIM shop with the relocation of a newly built house project for Kwanlin Dün First Nation to the McIntyre subdivision building site as well as the beginning of a new house project with Champagne and Aishihik First Nations (CAFN).

This is CAFN's third small house constructed within the Housing Maintainer program and the eleventh Housing Maintainer program since the program began in 2018. Currently, five Indigenous students hired by Champagne and Aishihik First Nations are participating in the program.



Photos from Kwanlin Dun First Nation's Facebook page regarding the house project.

Yukon University's NSERC Industrial Research Chair in Northern Mine Remediation leads applied research projects that address challenges facing the northern mining industry.

This research program supports the development of new evidence-based approaches to northern mine development and operations, and supports mining companies as they navigate the environmental assessment process and operate mines in northern Canada.

Areas of expertise are:

- passive treatments;
- tailing management; and
- mine revegetation.

Industry & academic partnerships

Our industry partners, known collectively as the Yukon Mining Research Consortium, include Newmont Corporation, BMC Minerals Ltd., Victoria Gold Corp., Casino Mining Corp., Selwyn Chihong Mining Ltd. Alexco Resource Corp. and Minto Explorations.

Our academic partners across the country help us ensure we build a successful, collaborative research team. Engaging students and faculty, we work with Yukon's mine-impacted and First Nations communities to reduce barriers between science and decision-making.

Working with the YukonU Research Centre allows CNIM to create a direct link between researchers and industry, facilitating projects and development related to mining. This coordinated, holistic approach addresses specific northern challenges and opportunities in the mining industry, making it more sustainable, more environmentally aware, as well as fostering innovation.

Taylor Belansky, MSc Candidate.
(ici.radio-canada.ca/nouvelle/1879928/yukon-mines-science-bacteries-nitrate-recherche-universite<https://ici.radio-canada.ca/nouvelle/1879928/yukon-mines-science-bacteries-nitrate-recherche-universite>).



General updates

New Master's degree student in Mine Revegetation at UofS and YukonU

Ben Budzey is a YukonU student, hired as an NMR research assistant that continues the adventure.



Frederik Paulsen Seminar

Mine Bioremediation in the Arctic

September 18-20

Whitehorse



Themes: • Bioremediation in Cold Climate • Mine revegetation in Cold Climate • What does your North look like?

Dr. Morgane Desmau, Post-Doc Fellow in the NMR team has accepted a permanent offer with the Canadian Light Source (Synchrotron).

Her accomplishments with the NMR team include:

- supervising the saturated cover project
- submitting a peer-reviewed paper to Water Research Journal (pilot scale BRs at Eagle Gold).
- drafting a peer-reviewed paper on the permeable reactive barriers (Newmont/Lorax).

Projects

Mine Revegetation

- 2022
 - snow surveys
 - shrub structure and survival
 - monitoring
 - Logger and Photopoint downloads
- 2023
 - snow surveys
 - shrub structure and survival
 - monitoring Logger and Photopoint downloads
 - natural regeneration survey
 - **Spring planting - 1st week of June**
- 2024
 - data collection and results

Snow survey at Minto

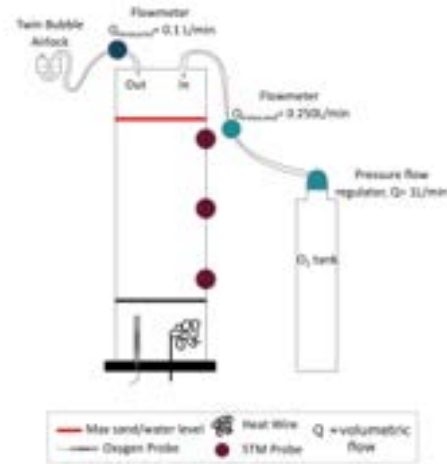


*Green alder and
Mountain Avens on site*



Oxygen Diffusion in saturated covers within a freeze-and-thaw cycle

Final report on phase 2 available on YukonU.ca over the summer



Semi passive treatment to remove Nitrate in cold climate at Minto Mine

What's been done:

- developed denitrifying biomass from sediment samples from Minto
- optimized denitrifying population
- used optimized denitrifying population to test different carbon sources at two different nitrate concentrations

What's next:

- DNA Characterization of biomass with UBC
- isolate nitrifying population
- test biomass and carbon source with various parameters in column tests o à HRT, flow rate, temperature
- scale up the optimum design to pilot scale
- pilot to be installed in the mobile lab at Minto site
- collaboration with Selkirk First Nation to collect white sweet clover

Permeable Reactive barriers

Project completed.

What to expect next?

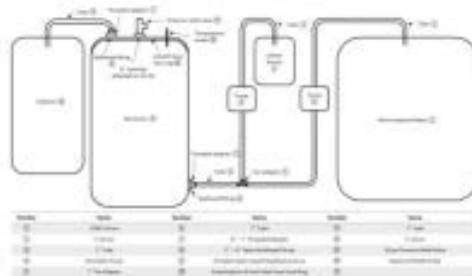
- finalization of the synchrotron results → additional analysis ordered by Lorax to support XAFS analysis
- XAFS report for NMR consortium partners
- peer-reviewed publication, in collaboration with Lorax and Newmont



Eagle Gold Bioreactors



Industrial 3-year Report available soon.



Research

Dawson NMR course - February



More to come!



Industrial Research Chair in
Northern Mine Remediation (NMR)

New Frontiers Exploration Grant 2021

Novel Application of Bio-cementation for Canadian Infrastructure approved by NSERC

York U: novel bio-cementation technique where natural bacteria from dairy waste are used for two critical applications concerning Canadian infrastructure: (i) stabilization of low-volume gravel roads, including cold regions in the North; and (ii) stabilization of mine tailings

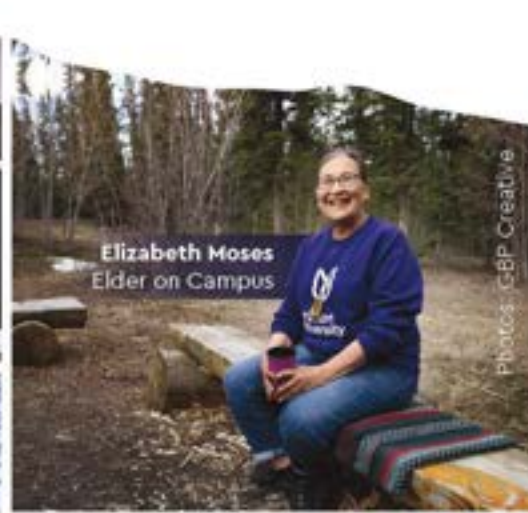
June 2023: 1 ton of tailings sampled at Minto Mine



Meagan Christie
Instructor
Carpentry



Dr. Guillaume Nielsen
Industrial Research Chair
Northern Mine Remediation
YukonU Research Centre



Elizabeth Moses
Elder on Campus

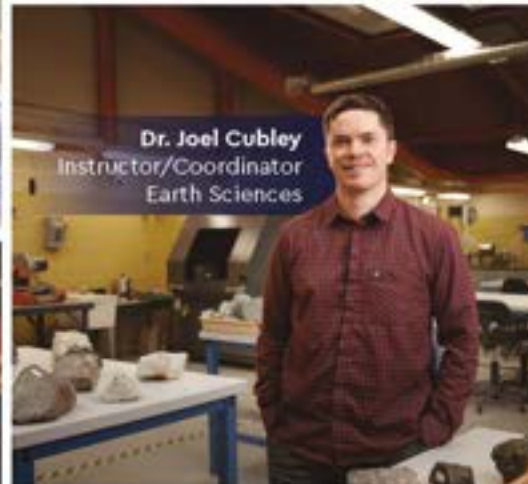
Photos: GBP Creative



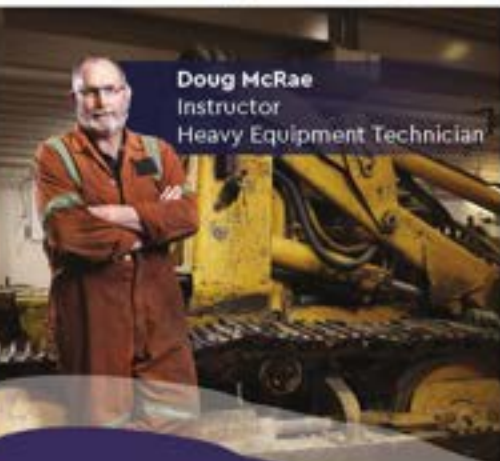
Samantha Piper
Instructor
Health Care Assistant



Dr. Benoit Turcotte
Senior Research Professional
Climate Change Research
YukonU Research Centre



Dr. Joel Cubley
Instructor/Coordinator
Earth Sciences



Doug McRae
Instructor
Heavy Equipment Technician



Dr. Victoria Castillo
Instructor, Anthropology
School of Liberal Arts



Dr. Katie Aitken
Instructor/Coordinator
Northern Environmental
and Conservation Sciences



Dr. Sara McPhee-Knowles
Instructor
Bachelor of Business
Administration

Leading
from the North

Collaborate, learn
and grow with us.

YukonU.ca/leading