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**CARIBOO GOLD PROJECT**

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# MESSAGE FROM THE RESOURCE CONNECTOR NORTH

**A**nother year has come and gone and 2023 is full of promise. Let's look back at RCN's 2022 accomplishments that came from a year of getting back to normal.

In November we were very pleased to host the team from Artemis and they presented to over 70 industry people at the Sandman Hotel. The Artemis team presented a project update, the process for registering your business for the bid process, and the projected positive social and economic impacts for the Central Interior of B.C. The presentation was then followed by an extensive question and answer period, and the evening was filled with networking opportunities.

The RCN's bursary program grew again this year. We are currently setting up a bursary in Trades at the Williams Lake campus of Thompson Rivers University (TRU). Last year we added a bursary at the University of Northern B.C. in Engineering bringing our total bursary program for northern advanced education to six. We are very proud of this!

At the November 2022 AGM, the Resource Connector North Board welcomed Garrett Turner and Nolan Nicolson as directors. The Board thanks Pat McGuire, Nevin Paxton, and Jacques Fournier for their contributions to the Board and to Northern B.C. The Board is further

supported by Directors Cameron Braun, Fraser Deacon, Sydney Hall, and Sidney Roy. If you would like to join our Board, please get in touch with me, Greg Hanks, via email: [admin@resourceconnector.ca](mailto:admin@resourceconnector.ca).

Resource Connector North has continued to reach out via social media to connect with more of our members. Check out our website [www.resourceconnector.ca](http://www.resourceconnector.ca) and if you would like to become a member, you can now register online at [www.resourceconnector.ca/membership/become-a-member](http://www.resourceconnector.ca/membership/become-a-member). We are on LinkedIn at [www.linkedin.com/company/resource-connector-north/](http://www.linkedin.com/company/resource-connector-north/) as well as Facebook and Twitter.

We are working with DEL Communications to develop our 2023 RCN Membership directory and magazine. You can check out past issues here: [www.resourceconnector.ca/resources/magazine](http://www.resourceconnector.ca/resources/magazine)

With the return to normal, we are making plans to attend the Natural Resource Forum in January 2023. We will be bringing our publications with us, and we would love to chat with you while we are there.

We wish you the best and look forward to connecting with you in 2023.

*Greg Hanks*  
*Chair, RCN Board* ★



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## MISSION STATEMENT:

*To promote economic growth in the natural resource sector for the benefit of all British Columbians.*

## VISION AND POSITIONING STATEMENT:

*We serve business and industry related to natural resource development. We are a conduit of connectivity between business and natural resource sectors by:*

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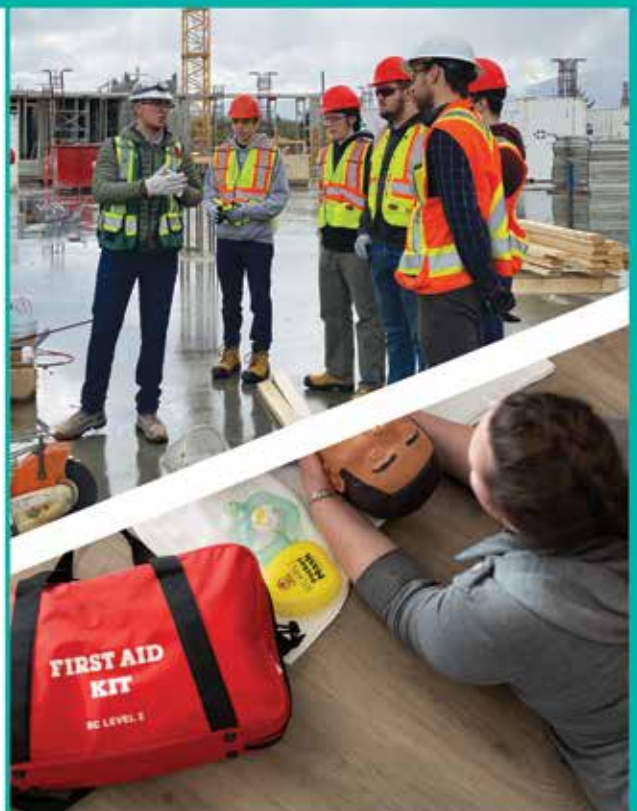


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# RESOURCE CONNECTOR NORTH

## Bursaries



**T**he RCN's bursary program was established to help encourage future generations who have chosen to pursue careers in the resource sector. RCN provides bursaries to students at the University of Northern British Columbia (UNBC), Coast Mountain College, College of New Caledonia, and Northern Lights College who are enrolled in trades programs with an emphasis on the resource industry. We are proud to support our many recipients and celebrate their success.

While the 2022 RCN bursaries are in the process of being awarded, the RCN would like to congratulate bursary recipient Quinn Dunphy, who is studying at the College of New Caledonia.

The RCN currently offers:

- Two bursaries in the amount of \$1,000 each are given to the College of New Caledonia in Prince George.
- One bursary in the amount of \$1,000 is given to Coast Mountain College in Terrace.
- One bursary in the amount of \$1,000 is given to Northern Lights College in Dawson Creek.
- One bursary in the amount of \$1,000 is given to University of Northern BC.

*For more information about RCN bursaries, visit the College of New Caledonia at [cnc.bc.ca](http://cnc.bc.ca), Coast Mountain College at [coastmountaincollege.ca](http://coastmountaincollege.ca), Northern Lights College at [nlc.bc.ca](http://nlc.bc.ca), or the University of Northern B.C. at [unbc.ca](http://unbc.ca). ✨*



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## **WORKING TOGETHER KEY TO BUILDING A STRONG RESOURCE SECTOR AND AN ECONOMY FOR EVERYONE**

**A**nother year has passed since the last issue of Resource Connector North and with it, much has changed. We have come through the worst of the pandemic, only to be faced with rising global inflation and disrupted supply chains as uncertainty grips the global economy.

One thing though remains certain: the strength and resilience of B.C. industry. As we close out the year, our province has been a leader in the country on job creation and economic recovery. As many as 105,000 more people are working now in B.C. than before the pandemic, the majority of them in the private sector, where the resource sector is a major employer.

People are moving here for opportunity and finding it – we set a record last year for the number of people who moved to B.C. from other provinces and other countries. This year we’re expected to do the same.

The resource industry is critical to our recovery and to the health and strength of B.C.’s economy as we grow and as we face global headwinds. It’s a critical engine of opportunity and source of prosperity, particularly in Northern, Interior, and rural communities.

We have much to do to build on the successes of our resource sector.

Over the next year we will be working as a provincial government to

accelerate and improve the efficiency of our permitting system. We will be building new trading relationships to develop international markets for our resources. We will be investing in innovation and training to improve the number of products we can produce in British Columbia from our natural resources. We will be working on land use plans to increase certainty for resource development and ensure protection of vital wilderness and watershed areas.

We will be supporting our forest workers in building a strong and sustainable forest industry for generations to come, and pushing back against unwarranted and unfair duties in the United States. We will support low carbon innovation in our mining sector to add value to our resources on the global market as our metals and minerals fuel the low-carbon transition worldwide.

2023 will be an important year for the resource sector! Next year will also bring expansion of our work with Indigenous Peoples. Endless lawsuits between government, resource companies, and First Nations in our province have made clear to everyone that a high-conflict relationship will not improve the long-term sustainability of our resource industry, or the prosperity of our province as a whole. That’s why our government is working differently.

We are building partnerships with First Nations to unlock benefits

from the land base for everyone. This isn’t just a path to increasing certainty – it can also help lead to new opportunity and new innovations, bringing prosperity to every corner of the province. For example, we just announced CleanBC funding to expand the Indigenous Forest Bioeconomy Program. This program focuses on using waste that is left over from logging, wildfire debris, and damaged wood to make new, low-carbon forest-based products, while increasing First Nations participation in the sector.

If these last few challenging years have taught us one thing, it’s that going it alone does not work. We are all in this together. And it’s by all of us working together—industry, workers, all levels of government, in partnership with Indigenous Peoples—that we will build a stronger economy for everyone.

I believe British Columbia should be a place where everyone can build a good life. Where the doors of opportunity are open and accessible for all. We can’t build that future without expanding the sustainable opportunities in our resources sector – and taking action to solve the challenges that stand in the way.

I know that if we work together, we can build on our strengths and deliver an even stronger and more prosperous province to our children and generations to come. ★

# CHARGED UP ON ENTHUSIASM TIMING IS RIGHT FOR TURNAGAIN



*Views of Turnagain camp.*

By Melanie Franner



*Geologist examines core samples.*

**A**nticipation is in the air at Hard Creek Nickel Corp., the joint venture (JV) between Giga Metals Corporation and Mitsubishi Corporation that officially came to fruition on September 1, 2022.

The JV marked the start of an exciting period for Hard Creek's primary asset: Turnagain Nickel Deposit (Turnagain). Under terms of the JV, Mitsubishi acquired 15 per cent equity interest in the asset in exchange for \$8 million. Giga Metals retained 85 per cent of the asset.

Located in north-central B.C., an area known for its rich mineral deposits, Turnagain holds the promise of becoming one of Canada's leading Class 1 nickel operations. "Turnagain is an extremely large,

undeveloped sulphide nickel and cobalt resource,” says Mark Jarvis, CEO, Giga Metals. “It’s a giant deposit by any definition.”

## BY THE NUMBERS

The Turnagain deposit covers approximately 40,000 hectares of land. “We think we’ve drilled off 25 per cent of what’s prospective so there is room to grow,” says Jarvis. “But it is already pretty big.”

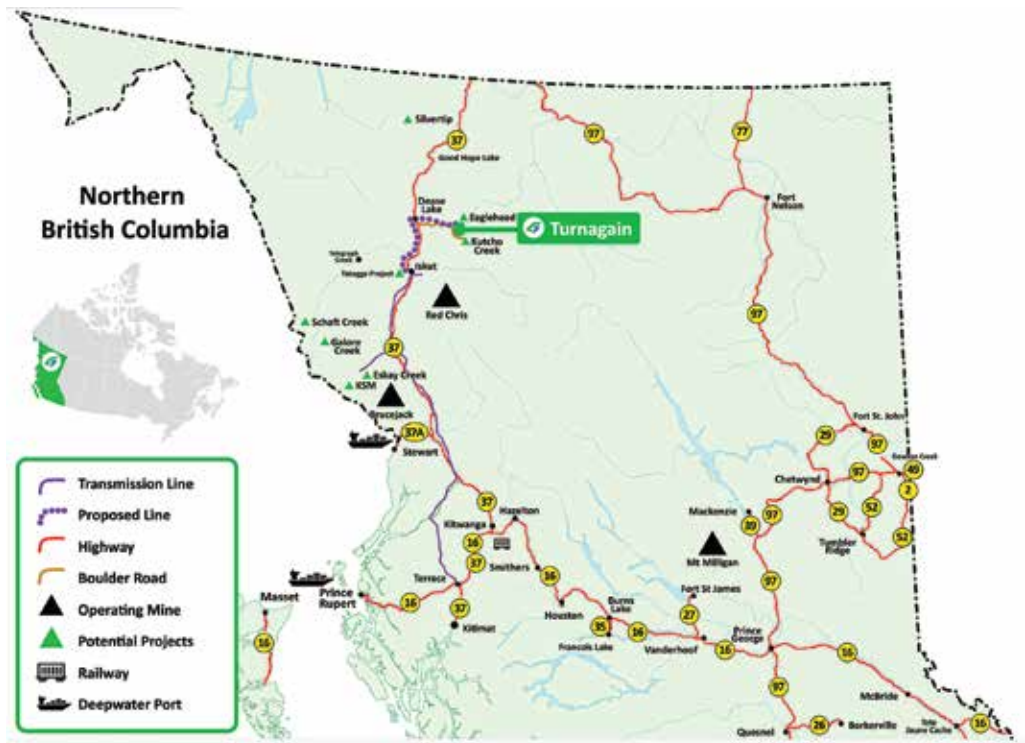
The company recently released an Updated Mineral Resource for Turnagain in October 2022 that shows Measured and Indicated resources of 7 billion pounds of nickel and 433 million pounds of cobalt, and inferred resources of 5.5 billion pounds of nickel and 325 million pounds of cobalt.

With an estimated life of around 37 years, the Turnagain project is anticipated to produce an average of 33,000 t/y of nickel and 1,800 t/y of cobalt.

Based on the Preliminary Economic Assessment, capital costs for the initial site construction are US\$1 billion. Initial infrastructure and owners’ cost is an additional US \$400 million, while a proposed Phase 2 expansion (which will double initial capacity) is expected to cost US \$500 million.

Add to this the economic boon for the province and the numbers become even more impressive.

Estimates show that construction work at the mine will contribute upwards of \$2.5 billion and generate a total of 25,200 jobs (direct and indirect). Annual operations will contribute another \$375 million and 3,000 total jobs – for a total of \$16.3



billion and 136,300 jobs. “There is no doubt that this project will have huge economic benefits,” says Jarvis.

And, with development described as being “one of the greenest and most environmentally friendly nickel projects globally”, it will also have minimal environmental impacts.

According to Jarvis, one of Turnagain’s strongest attributes, especially in this heightened global market, is its simplicity. With 99 per cent of the project’s nickel and cobalt contained in one mineral (Pentlandite), the recovery process

will be easy: crush – grind – froth flotation.

“Processing will be simple and low risk, with very few steps needed to recover the minerals from the concentrate,” says Jarvis, who compares the processing ease of sulphide deposits like Turnagain to the more complex oxide-laterite nickel deposits.

“With an open-pit mine like Turnagain, surface impact is relatively small,” he says. “It’s not as low as an underground mine but it is much less harmful than strip mines,

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like the type found in Indonesia and other tropical places. Those laterite deposits are very complex and ecologically harsh.”

### TIMING IS EVERYTHING

According to Jarvis, a trifecta of factors has come together to make the timing perfect for the development of Turnagain.

First off, he says, the interest in

electric vehicles (EV) is on the rise. More EVs translate into increased demand for batteries, and two of the most critical minerals needed for EV batteries are nickel and lithium.

According to Jarvis, the EV market saw a rise in nickel use from five per cent of the total five years ago to 16 per cent this year. He adds that EV batteries are currently the second largest use of nickel – and the fastest growing one by far.

“I think automobile manufacturers now realize that if they are going to compete in the electric vehicle market with China, then they are going to need to own the critical supply chain, or at least part of the chain,” says Jarvis. “The whole U.S. Inflation Reduction Act has added wind to the sail.”

The other factor at play, adds Jarvis, is the war in Ukraine. “The war in Europe has reminded people that the geopolitical risk is real,” he says. “Manufacturers prefer to have their suppliers close to home.”

### IT’S YOUR NICKEL

It seems that all factors are aligning to make Turnagain an increasingly appealing proposition. Plans and funding are already in place to complete a Prefeasibility Study in the first half of 2023. This is expected to be followed by a Feasibility Study and the launch of an Environmental Assessment in 2024.

“The great thing about Turnagain being in a Canadian jurisdiction is that buyers can be quite reassured about the ethical sourcing of their materials,” adds Jarvis.

Every step in the development process of Turnagain is one step closer to production. But to get there, the JV is looking for one more minority interest partner.

“We’re looking to fund our way to being shovel ready by bringing another minority partner onboard for around 20 per cent of equity in the asset,” concludes Jarvis. “We can be operational in as little as five years. All we need is the money to get there.” ★

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# COPPER BRITISH COLUMBIA'S MOST ABUNDANT CRITICAL MINERAL

By Gordon Clarke, Director Mineral Development Office,  
British Columbia Geological Survey

*Diamond drill setup, testing the  
Red Chris mine east zone.*

**L**ow-carbon energy technologies require raw materials produced by mining. The global demand for these raw materials, currently referred to as 'critical minerals', is projected to increase significantly in the next several decades and shortages may result. Based on specific demands and vulnerabilities to supply, different countries have produced different critical minerals lists. Canada's list, released in 2021, includes a suite of 27 elements, two groups of elements (platinum group metals and rare

earth elements) and two minerals (fluorspar, potash). The list is considered critical for the continued economic success of Canada as it transitions to a green economy.

Of the elements on the Canadian critical minerals list, British Columbia mines currently produce copper, molybdenum, and zinc. The province also has near-term potential to produce nickel, rare earth elements, niobium, magnesium, and tungsten and potential for chromium, cobalt, graphite, platinum group metals, scandium, tantalum, vanadium (as primary or accessory

commodities). Other critical minerals may also be produced as by-products.

By far, copper is the most significant item on Canada's critical mineral list produced in the province. British Columbia is Canada's largest producer of copper, typically accounting for almost half the national production, and copper typically makes up close to 30 per cent of the total provincial mine production value, second only to metallurgical coal. Of the nine major producing metal mines in British Columbia, eight produce copper. Of these, seven are porphyry deposits

**British Columbia is Canada's largest producer of copper, typically accounting for almost half the national production, and copper typically makes up close to 30 per cent of the total provincial mine production value, second only to metallurgical coal.**

and one is a volcanogenic massive sulphide (VMS) deposit. Proposed mine projects include large porphyry deposits (Galore Creek, KSM, and Kemess Underground) and one VMS deposit (Kutcho). Advanced porphyry deposit projects with reported resources include Shaft Creek, Tatogga, Kwanika, Lorraine, Woodjam, Ootsa, Berg, Lac La Hache (Aurizon South) and North Island. Other copper deposit types in the province include VMS (Yellowhead), epithermal (Homestake Ridge), carbonatite replacement (Stardust and Lac La Hache, Spout and G1) and quartz vein (Bull River). New discoveries are continuously being made.

Without mining, a green future will never be realized. Low-carbon technologies will increasingly need copper, and long-term global shortages have been predicted. There may be pressure to source copper from jurisdictions that do not operate with the high environmental, sustainability, and governance standards practiced in British Columbia. Continued exploration and development in British Columbia will help reduce global supply pressures with ethically sourced copper.

To meet the general critical minerals challenge, the British Columbia Geological Survey (Ministry of Energy Mines and Low Carbon Innovation) has initiated a multi-year program to inventory all critical minerals in the



province, assess the geological settings most favourable to host deposits, and

develop exploration techniques to guide future discoveries. ★

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# B.C. OIL AND GAS COMMISSION GETS EXPANDED MANDATE AND NEW NAME: BC ENERGY REGULATOR



**E**xciting changes are coming to the British Columbia Oil and Gas Commission as we begin our 25th year of operations.

With the passage of Bill 37 – the Energy Statutes Amendment Act – by the B.C. Legislature last fall, our organization’s mandate has

expanded. In addition to our current responsibilities with respect to oil, gas, and geothermal development, we will soon become the single-window, life-cycle regulator for the production of hydrogen, ammonia, and methanol; and have an expanded role in carbon capture and storage.

Hydrogen, methanol, and ammonia have been identified by the Province of B.C. as having a key role in the net-zero economy. All have usefulness as a fuel source and methanol and ammonia have versatility as a fuel carrier for hydrogen. They’re capable of being produced in many different

ways which will include production from non-fossil fuel sources, such as clean electricity, and from fossil fuels sources often in conjunction with carbon capture and storage.

The B.C. government recognized our staff have the technical skills, experience, and knowledge required to regulate complex facilities. Our staff have experience working with and adopting complex technical standards and Board regulations, plus adjudicating permit approvals related to land, water, air, and archaeology. We also have broad experience with many aspects of safety oversight and



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“The BC Energy Regulator name reflects a renewal of our organization and is a testament to all of the incredible work our staff has accomplished as the BC Oil and Gas Commission; and sets us up for future success in the years ahead.”

a proven framework for restoration timelines and an established orphan fund.

With the passage of Bill 37, the Commission will also receive a new name – the British Columbia Energy Regulator. The new name reflects our updated and expanded mandate, which goes far beyond the regulation of oil and natural gas development. Our new name and expanded mandate will be brought into force by government regulation, expected by Spring 2023.

“The BC Energy Regulator name reflects a renewal of our

organization and is a testament to all of the incredible work our staff has accomplished as the BC Oil and Gas Commission; and sets us up for future success in the years ahead,” says our CEO, Michelle Carr.

Established in 1998, the organization is the Province of B.C.’s single-window, life-cycle regulatory agency and has been protecting public safety and safeguarding the environment through the sound regulation of energy activities in B.C. for nearly 25 years.

Through Bill 37, the new British Columbia Energy Regulator will

“regulate energy resource activities in a manner that protects public safety and the environment, supports reconciliation with Indigenous peoples and the transition to low-carbon energy, conserves energy resources, and fosters a sound economy and social well-being.”

It is intended the renewed mandate and name will better reflect our new functions, better align with the range of parties we regulate, and modernize our look and interface with Indigenous nations, communities, industry, stakeholders, and the public. ★

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# NEW IDEAS. GREAT FORESTRY. B.C.'S STORY.



*Photo: Moresby Creative, courtesy naturallywood.com.*



**F**or over a century, British Columbia's forest industry has been foundational to the province, putting pay cheques in pockets, helping small businesses pay their bills, and supporting a better quality of life for British Columbians. And while the sector's deeply rooted history has paved the way for generations of people to find meaningful work, new ways to take care of forests, and innovation that helped us grow new markets and product offerings, there are big ideas sprouting as the sector looks to continue getting better so that we can continue contributing to people and the planet.

We need to keep growing ideas around how B.C.'s forest sector can help fight climate change. We need to do more to acknowledge and promote the role of sustainable

forest management and forest products – from lumber and food packaging to biofuels – as tools to fight climate change and plastic pollution. It is critical that Canadians and customers around the world know the facts about our globally leading regulatory regime, certification, and products. It's also critical that we show the world that we're doing the work to continuously evolve and strengthen our forest management regime to keep forests and biodiversity healthy and deal with the impacts of climate change, forest fires, pests, and more.

Secondly, we must backstop this fact-sharing and promotion with policy, regulation, and resources that support certainty on the land-base and enable product adoption. This means adopting integrated approaches to everything we do. This includes maximizing climate-smart forestry and managing forests for all the values they represent from conservation and nature-based climate solutions to jobs. It also includes doubling down on important buy clean, net-zero, and low-carbon building materials innovation initiatives.



Photo: Michael Bednar, courtesy naturallywood.com.



Photo: Candace Kenyon, courtesy naturallywood.com.

As we look to the future, we also need to continue to drive ideas on both market and product diversification. Over the last two decades, in partnership with the provincial and federal governments, B.C. has developed new, overseas markets particularly in Asia. Our partnerships with Forestry Innovation Investment and NRCan through the Emerging Market Opportunities Program are gold star examples of how to get partnerships right and deliver results. We have a real opportunity to continue to evolve programs to grow focus on global green building initiatives, co-create greater opportunities for Indigenous participation, and further diversify our reach from a market and product perspective.

Lastly, and crucially – we need to continue to grow

relationships with Indigenous Nations as true partners in the sector. B.C. became the first jurisdiction to adopt and begin to implement the UN Declaration on the Rights of Indigenous Peoples, and as Canada looks to implement its own legislation, ensuring Nations have the capacity, resources, and big ideas needed that will be key.

Looking ahead to 2023, we invite you to join us at the 2023 COFI Convention from April 12-14, 2023 in Prince George, where we will talk about all of these topics and hear new ideas from Indigenous, industry, government, community, and labour leaders that will help shape the next chapter of B.C.'s forest sector story.

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# FULL SPEED AHEAD

## *Progress accelerates at LNG Canada*



By Melanie Franner

*LNG Canada site in Kitimat.*

**C**argo shipments of Canadian LNG could begin as early as mid-decade – that is if all continues as planned with the LNG Canada project. The largest private-sector investment project in Canada’s history, LNG Canada will represent the culmination of years of planning, cooperation, and execution. And one that will mark a first for Canada in many ways.

“LNG Canada began with a bold vision: To work collaboratively with First Nations, Indigenous groups and local communities, non-governmental organizations, and local, provincial and federal levels of government,” says Teresa Waddington, Vice President Corporate Relations, LNG Canada. “We have our sights set on being the benchmark for economically, environmentally, and socially

responsible LNG development in Canada.”

### **YEARS IN THE MAKING**

Estimates put the total budget for the entire LNG Canada project in the neighbourhood of \$40 billion. This includes construction expenditures along the entire value chain, from upstream, along the 670-kilometre Coastal GasLink pipeline, and at the export facility in Kitimat.

Industry insiders suggest big-ticket items include the TransCanada Coastal GasLink pipeline (which could represent upwards of \$11+ billion), the Kitimat terminal project (which could cost around \$17-\$18 billion), and upstream natural gas assets.

The greenfield Kitimat terminal project includes construction of

a brand-new LNG Canada plant consisting of a natural gas receiving and LNG production facility, as well as a marine terminal with the capacity to accommodate two LNG carriers, storage tanks, a rail yard, a water treatment facility, and flare stacks.

The operation will be capable of exporting 14 million tons of LNG per year, with the potential to double that amount in Phase 2.

“The LNG Canada project has now surpassed the 70 per cent completion mark overall,” says Waddington. “This is a cumulative figure that covers all of our work scopes combined, including work performed to date at fabrication yards overseas, engineering and procurement, and construction at site.”

Waddington confirms that the cumulative value to date of the



Modular delivery at LNG Canada Kitimat.



LNG Canada site at Kitimat.

project's contracts to local, Indigenous, and other businesses in B.C. has exceeded \$3.8 billion as of September 2022. That includes more than \$3 billion to Indigenous-owned and local-area businesses.

### MORE TO COME

Approximately 5,000 individuals are employed currently at the LNG Canada construction site in Kitimat.

“The number of workers on site on any given day is about 30 per cent less than the total employed, given the rotational nature of the work,” says Waddington. “We anticipate reaching peak employment in 2023.”

Waddington says that the site will remain busy throughout 2023, as they continue to receive critical infrastructure and continue construction of the marine terminal, non-process buildings, and central control facilities, as they prepare for testing and operational readiness in 2024.

Once functional, the LNG Canada site in Kitimat is anticipated to create between 250-350 full-time jobs.

“Hiring for additional roles related to the project but work outside of the LNG Canada organization will also be needed. For example, HaiSea Marine will require its own workforce

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LNG Canada 2018 project rendering.

“The province’s abundant hydro-electric power supply offers industries across B.C. the opportunity to be some of the lowest carbon-producing in the world,” adds Waddington. “That’s why we’re examining options to introduce additional electrification along the value chain in Phase 2, including at the plant site in Kitimat, which is already designed to take electricity from BC Hydro for certain power requirements.”

to operate and maintain harbour and escort tugboats to provide ship-assist and escort towing services to LNG carriers calling at LNG Canada’s export facility,” says Waddington.

The LNG Canada project also has the potential to double its projected export output of 14 million tonnes of LNG per annum (mtpa). Pronouncement on if and when that will happen is still sometime in the future.

“A final investment decision will take into account factors which include competitiveness, affordability, technologies, and the individual

joint venture participants’ portfolio considerations,” says Waddington, adding that there are five joint venture participants involved in the LNG Canada project.

Carbon intensity is another important consideration. “With our engineering, procurement, and construction contractor, JGC Fluor, we’ve already designed a project with the lowest carbon intensity of any large-scale LNG export facility operating in the world today,” says Waddington.

But there may be ways to lower it further.

## FINAL STRETCH

Waddington describes the LNG Canada project as a long-life asset with a 40-year export license that will be a once-in-a-generation opportunity to benefit local communities and provincial and national economies.

“Our project will provide security of supply for global markets that rely on Canada’s natural gas reserves to fuel their economies, reduce GHG emissions as natural gas replaces the use of coal, and bring significant economic growth and stability to northern British Columbia communities and all of Canada,” she says.

It will also mark a pivotal point in Canada’s history at a time when world geopolitical events highlight the increasing need for safe and secure energy supplies.

“We will export LNG with the lowest GHG emissions of any large-scale facility currently operating anywhere in the world – about 60 per cent lower than the average facility and 35 per cent lower than the best performing facility,” says Waddington. “Our project puts Canada on the map of LNG exporting countries.” ★

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# ENGINEERING STUDENT DESIGNS UNIQUE MACHINE TO ASSESS WORKPLACE EXPOSURES



*Madeline Clarke adjusts one of the sampling nozzles on the rotating WAM she built as part of her summer job with UNBC's Northern Analytical Laboratory Services.*

**T**asked with putting a new spin on a standard machine used to assess industrial hygiene, environmental engineering student, Madeline Clarke, rose to the challenge.

As her summer project with Northern Analytical Laboratory Services (NALS) at the University of Northern B.C., Clarke designed and built a rotating indoor Workplace Atmosphere Sampler (WAM). It is believed to be the first of its kind in Canada and one of only a handful in the world.

Clarke, currently in second year at

UNBC, constructed the industrial hygiene air sampling machine at a fraction of the cost of the comparable professionally built WAMS.

Funded in part by WorkSafe BC, Canada Summer Jobs, and PacifiCan's recently established Environmental Solutions Innovation Hub, Clarke researched, designed, and created the WAM in less than four months while working at NALS at UNBC.

The design is based on the first WAM developed by the Belgian Center for Occupational Hygiene's founder Steven Verpaele, who is one of the NALS partners in the lab's

industrial hygiene projects. Clarke's WAM features a battery-operated turntable that can be set to sample 12 different parameters at a time.

NALS Quality Assurance Officer, Ann Duong, says the current industry standard for workplace atmosphere sampling is to use individual pumps on employees or a stationary stand with one sampler.

"That's basically the standard that is sold commercially, even for outdoor settings, so to have something like this where you can fit 12 samplers has never been done before," says Duong. "There are different concentration gradients that may be

missed by a static sampler that will be captured by the rotating samplers on this WAM.”

In addition to providing better analysis of indoor industrial hygiene, Duong says the implications could be even larger if the WAM can be used for outdoor sampling, as well.

While the task was a mechanical engineering challenge rather than an environmental one, Clarke says engineering, in general, is about solving problems. “It had to spin at three rotations-per-minute, it had to be battery-powered, and it had to sample at a specific height, so it was more about figuring out ways to solve those problems.”

In addition to researching how motors work, the industrious student from Trail, B.C. learned how to solder and use a 3D printer as she developed her tabletop WAM built from a display turntable for information pamphlets.

While it’s too early to say if this project has sparked any future career paths, Clarke is thrilled with her summer job experience, “It almost doesn’t feel real that I’m doing this kind of work, especially when I’ve only completed one year of university. It’s incredible.”

Clarke is enrolled in the joint UNBC/ UBC Bachelor of Applied Science in Environmental Engineering program, which sees students attend UNBC for the first two years, UBC for years three and four and then a final semester at UNBC that includes a capstone design project. “I thought it would be really great to get the small university experience and the larger school experience and, so far, it’s

been even better than I imagined.”

Clarke says the WAM will be used for a project with WorkSafe BC. “The plan right now is to use it to evaluate workers’ exposure to welding fumes because those are really harmful, so it would help ensure ventilation systems in the workplace are working and could help determine if special

protective equipment needs to be used.”

Duong says this initial project speaks to the importance of housing a WAM at NALS, as it will be used for future research projects and could also be used or loaned to industries and businesses for workplace exposure assessments. ★



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*Quesnel Foot Bridge. Credit: Robin Malherbe*

# DIG DEEP IN QUESNEL



**T**he City of Quesnel is hosting Minerals North 2023 Dig Deep, the 32nd annual conference and trade show, from May 31 – June 2, 2023. The City is thrilled at the opportunity to invite upwards of 300 new and returning visitors to the community to network and learn about new and current technologies and best practices in the northern B.C. mining sector.

“Quesnel is a perfect place to stage Minerals North,” says Andrew Webber, President of the Minerals North Conference Association. “It’s a resource dependent community witnessing transformation in its historic economic sectors. Minerals North is very much a forward-looking event. It endeavours to

answer questions about the minerals sector’s potential to contribute to community development in northern B.C., responsive to critical issues such as climate change, reconciliation, environmental protection, and local employment.”

Becoming a hosting community is a strategic goal within the City’s Economic Development Transition Strategy. “Hosting Minerals North is an important part of our Economic Development Transition Strategy,” says Amy Reid, Manager of Economic Development and Tourism. “This event allows us to showcase our community as a base for the mining sector, while providing opportunities for local businesses and contractors to network and expand their business.”

The City of Quesnel and the Cariboo Regional District contract an event coordinator to manage small to large scale events. After successfully hosting the Men’s and Women’s B.C. Provincial Curling Championships in 2019 and looking forward to hosting the 2024 B.C. Winter Games, the City is confident that the amenities and community support from non-profits, businesses, First Nations, school district, and local residents will meet and exceed the expectations of the Minerals North Association.

Pre-conference tours will be offered to provide an opportunity for delegates and trade show participants to explore the area and local mining sector. The opening ceremonies will have a Cariboo flavour, celebrating First Nations culture, and the spirit



Gold Panning on the Fraser. Photo: Six Sigma



Quesnel Hosting Precinct. Photo: Six Sigma

for work-life balance that embodies the community.

Guests are invited to take the opportunity to tour the City. Maybe stay a little longer and explore the outdoors, shop at unique small

businesses, and dine in restaurants. The Visitor Centre provides fishing rods and tackle so you can travel light and still fish for trophy rainbow trout on Dragon Lake. Find some more adventure on the extensive mountain bike networks with trails

for both the beginner and the expert. Mountain bikes are available for rent at the Arts and Recreation Centre. Visit [tourismquesnel.com](http://tourismquesnel.com) for more ideas to make the most of your stay in Quesnel. ★

## MINERALS NORTH CONFERENCE ASSOCIATION

Andrew Webber, President  
250-615-2397 | [minerals@mineralsnorth.ca](mailto:minerals@mineralsnorth.ca)  
[mineralsnorth.ca](http://mineralsnorth.ca)

## CITY OF QUESNEL

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## Tentative Schedule

### WEDNESDAY, MAY 31, 2023

Choose one of the pre-conference activities

- Enjoy a nine-hole round of golf at Richbar Golf and Gardens.
- Tour the second largest Canadian open pit copper mine at Gibraltar Mine.
- Venture to Barkerville Historic Town & Park to see where it all began, followed by a visit to Barkerville Mine.

Get your plaid on for a good ol' Cariboo-style tailgate party at the Welcome Reception from 6:00 – 10:00 PM, at the Quesnel Hosting Precinct

### THURSDAY, JUNE 1, 2023

Prepare for a full day of guest speakers, networking, and tradeshow, followed by a banquet and entertainment from 6:00PM – 12:00AM. Breakfast, lunch, and refreshment breaks will be provided.

### FRIDAY, JUNE 2, 2023

Join us for breakfast at the tradeshow from 7:30 – 8:30AM, followed by a half day of guest speakers and a closing lunch.

Please visit <https://civicinfo.bc.ca/event/2023/mineralsnorth> to register. ★



*Jeremy Langford, President and COO  
Artemis Gold.*

*Blackwater Mine will be one of the first fully electrified process plants in the gold mining sector with all traditional diesel and propane equipment replaced with electrical equipment. Photo: Artemis Gold*

# A VISION IN GOLD

## ***Blackwater Mine to be one of the lowest carbon-footprint gold mines in the world***

By Lisa Kopochinski

**A**rtemis Gold Inc., a relatively new British Columbia-based development company, is the result of a spin out from Atlantic Gold Corp. which was acquired by St. Barbara Limited in July 2019.

With its primary focus on advancing its 100 per cent-owned Blackwater Mine in central B.C. through construction and into commercial production, Artemis Gold President and Chief Operating Officer Jeremy Langford said the company is very proud of its efforts.

“Our mission is to create and grow long-term sustainable value by applying leading, technically excellent, and differentiated approaches to managing mining assets and unlocking their unrealized potential, while being

firmly committed to protecting the health, safety, and wellbeing of our employees, the environment, and the communities in which we work,” says Langford.

Artemis Gold and its subsidiaries have 77 employees with offices in Vancouver, Vanderhoof, and Prince George. The board and management comprise largely the same team that built and operated Atlantic Gold’s Moose River Consolidated mine in Nova Scotia.

### **BLACKWATER MINE**

Langford says the past year has been both busy and exciting for Artemis Gold and the Blackwater Mine.

“We acquired the Blackwater Mine from New Gold in August 2020. The Blackwater project is an open-pit truck, conventional Load

and Haul gold and silver mine with a Measured and Indicated (M&I) resource base of 11.7 million ounces of gold and 122.4 million ounces of M&I silver resources. The project is to be developed in three phases, with the Stage 1 operations first gold pour expected in Q3 2024. The operation is then expected to go through two expansions over the first 10 years of operations, eventually developing into one of the largest gold operations in Canada.”

With a multi-decade mine life providing employment and economic activity for the region and province, Blackwater is located 110 kilometres southwest of Vanderhoof, B.C., 160 kilometres southwest of Prince George, and takes 2.5 hours travel time to site from Vanderhoof.

**“The Blackwater Mine has been designed to some of the highest environmental standards and in accordance with accepted best practices.”**

*— Jeremy Langford, President and COO, Artemis Gold*

## ENVIRONMENTAL EFFORTS

A positive decision statement for Blackwater Mine was issued by the Canadian Environmental Assessment Agency in April 2019. Also, an Environmental Assessment Certificate was issued by the BC Minister of Energy, Mines and Petroleum Resources and BC Minister of Environment and Climate Change Strategy in June 2019.

“The mine has been designed to some of the highest environmental standards and in accordance with accepted best practices,” says Langford. “We have implemented an Environmental Monitoring Committee (EMC) where members are drawn from the company, government, and First Nations and meet regularly to discuss concerns and action items. This will continue throughout the life of the mine.”

Blackwater Mine will be one of the first fully electrified process plants in the gold mining sector with all traditional diesel and propane equipment replaced with electrical equipment.

“This investment increased the cost of the process plant, but reduces the carbon footprint for the mine,” says Langford. “Artemis has also signed an agreement with Caterpillar Inc. that gives Artemis the option to order a zero-emission mining fleet with potential delivery in 2029,” he says. “This technology is still in development, but it gives Artemis a pathway to substantially reducing its carbon footprint with the potential to eventually achieve net zero. A new 225KV transmission line will also be built connecting and powering the site with BC Hydro’s renewable hydroelectricity.”

## PROJECT BENEFITS

With the first pour of gold and silver expected to take place in the third quarter of 2024, this project will offer numerous benefits.

Construction activities alone for Blackwater Mine are expected to generate nearly \$335 million in Cariboo, Fraser Fort George, and Bulkley Nechako Regional Districts. The total regional economic impact—in terms of value added from operating expenses—is estimated at \$464 million per year, or a total of \$10.7 billion over 22 years of mine operation.

“It is estimated that the region’s economy could capture 80 per cent of the total benefits in terms of value added over the life of the mine,” says Langford. “Our employment projections for the first phase of Blackwater include 500 construction jobs, 100+ direct hires, 400 contractors, and 300 operation jobs.”

With its primary focus on advancing Blackwater through to construction and commercial production, additional permit applications have been filed to allow for full construction and operation of the mine and transmission line, which are expected in further quarter 2022.

“For most of 2023 and 2024, Artemis will be focused on construction activities and preparations for a start of operations,” says Langford. “The company expects to start pouring gold in Q3 2024, with 2025 expected to be the first full year of production for the Blackwater Mine.”

The project site is located within the ancestral lands of Lhoosk’uz Dené Nation and Ulkatcho First Nation, and other components of Blackwater Mine cross the traditional territories of Nadleh Whut’én First Nation, Saik’uz First Nation, Stellat’én First Nation and Nazko First Nation. ★



**Interested in working at the Blackwater Mine?**

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[artemisgoldinc.com/careers](https://artemisgoldinc.com/careers)





# NYC BILLBOARDS FEATURE MESSAGE ABOUT IMPORTANCE OF CANADA'S ENERGY TO RECONCILIATION

*Partnerships with Canada's energy sector offer an incredible opportunity to pull our next generation out of poverty*

By CEC staff

*A billboard featuring Canadian Indigenous leader Dale Swampy during climate week in New York City on September 20, 2022.*

**A** Canadian Indigenous leader lent his voice to a Manhattan billboard campaign in September, hoping to bring global awareness about the country's energy industry and the important role it's playing in bettering the standard of living of many First Nations People in Canada.

"Partnerships with Canada's energy sector offer an incredible opportunity to pull our next generation out of poverty," says Dale Swampy, President of the National Coalition of Chiefs. "These partnerships advance the path of Reconciliation."

Swampy, whose organization represents about 80 First Nations communities across Canada, hopes his message during New York's Climate Week – one of the largest environment-focused events in the world – helps shine a light on the

strong relationship many Indigenous communities have with Canada's oil and gas and cleantech industries and the role economic and environmental partnerships have in the pursuit of Reconciliation.

"It's important people also understand that the oil and gas industry is taking its commitment to tackle climate change seriously and that the inherent relationship our people have with the environment is helping projects to be developed more responsibly," says Swampy.

Canada ranks number one among the world's top oil reserve holders in all three areas of ESG (environmental protection, social progress, and governance), according to international third-party assessments, and oil and gas employs more Indigenous people than any other industry in the country.

In fact, overall Indigenous representation in the oil and gas sector was more than six per cent in 2019, according to Statistics Canada. For comparison, Indigenous peoples make up about 3.3 per cent of Canada's total workforce.

More First Nations communities and businesses are entering into equity partnerships and mutual benefit agreements on major pipeline and energy infrastructure projects. Canada's oil sands producers have spent \$15 billion with Indigenous businesses since 2012, reaching a record \$2.4 billion in 2019, according to the Canadian Association of Petroleum Producers.

"Yet unfortunately there are some coordinated groups who are preying on the desperation of some of our people to turn world opinion against Canada's oil and gas industry," says Swampy, a member of the Samson Cree Nation.

**"Yet unfortunately there are some coordinated groups who are preying on the desperation of some of our people to turn world opinion against Canada's oil and gas industry."**

Swampy says that as a result, Indigenous communities lost out as governments have in the past bowed to extremist pressure and denied projects such as the Keystone XL and Northern Gateway pipelines, which would have brought hundreds of millions of dollars of economic growth to communities.

The \$65,000 campaign, sponsored by the Canadian Energy Centre (CEC), features Swampy and the simple message "Indigenous partnerships with oil and gas advance the path of Reconciliation."

The campaign ran from September 20 to 25 on three large outdoor electronic billboards in high-traffic New York locations targeting Climate Week speakers, delegates, and media.

CEC President and CEO Tom Olsen says Swampy has been an integral

voice for Canadian First Nations involvement in beneficial equity partnerships.

"Dale has been a courageous voice for many years now on the important role First Nations leaders, businesses, and monitors can play in supporting stronger and more sustainable projects," says Olsen. "It's time the world gained that understanding too."

More examples of equity partnerships with First Nations communities including the Haisla Nation + Cedar LNG and the Nisga'a Nation + Ksi Lisims LNG projects in B.C. can be found at the campaign website at [responsiblecanadianenergy.com](https://responsiblecanadianenergy.com).

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# THE MISSING LINK

## *Coastal GasLink project aims to connect to the proposed Cedar LNG Project*

### Coastal GasLink

**T**he proposed Cedar Link Project is designed to connect to and receive natural gas from Coastal GasLink for delivery to the Cedar LNG Project, a proposed floating liquefied natural gas (LNG) facility in Kitimat, B.C., owned by Haisla Nation and Pembina Pipeline Corporation, within the traditional territory of the Haisla Nation. The Cedar Link Project includes an approximately 10-kilometre pipeline and a new meter station that is owned by Coastal Gaslink and operated by TC Energy. The Project is in the early stages of planning and engineering on the additional facilities required to support the Cedar LNG Project.

#### ABOUT THE PROJECT

In order to deliver natural gas from Coastal GasLink to Cedar LNG, the following components are being considered as part of the proposed Cedar Link Project:

- Proposed Cedar Link Pipeline: an approximately 10-kilometre pipeline starting from the Coastal GasLink Kitimat Meter Station and joining the Cedar LNG project via a connection point in the District of Kitimat, B.C. The pipeline will follow the existing Coastal GasLink pipeline route where practical and technically feasible.



- Proposed Cedar Link Meter Station: a new meter station is required to measure the gas that will flow to Cedar LNG. The Cedar Link meter station will be located adjacent to the existing Coastal GasLink Kitimat Meter Station within the District of Kitimat.

#### WORKING WITH INDIGENOUS GROUPS AND LOCAL COMMUNITIES

The Cedar Link Project is committed to creating meaningful opportunities for Indigenous and local communities to participate in the Project. Should a decision be made to move ahead with the construction and operation of the project facilities, construction of these facilities will create new construction jobs and contracting opportunities. Coastal GasLink is committed to investing in communities in the long term, through investments, sponsorships, and programs that go beyond corporate operations. The organization is also committed to hiring local Indigenous and non-Indigenous people first on the project.



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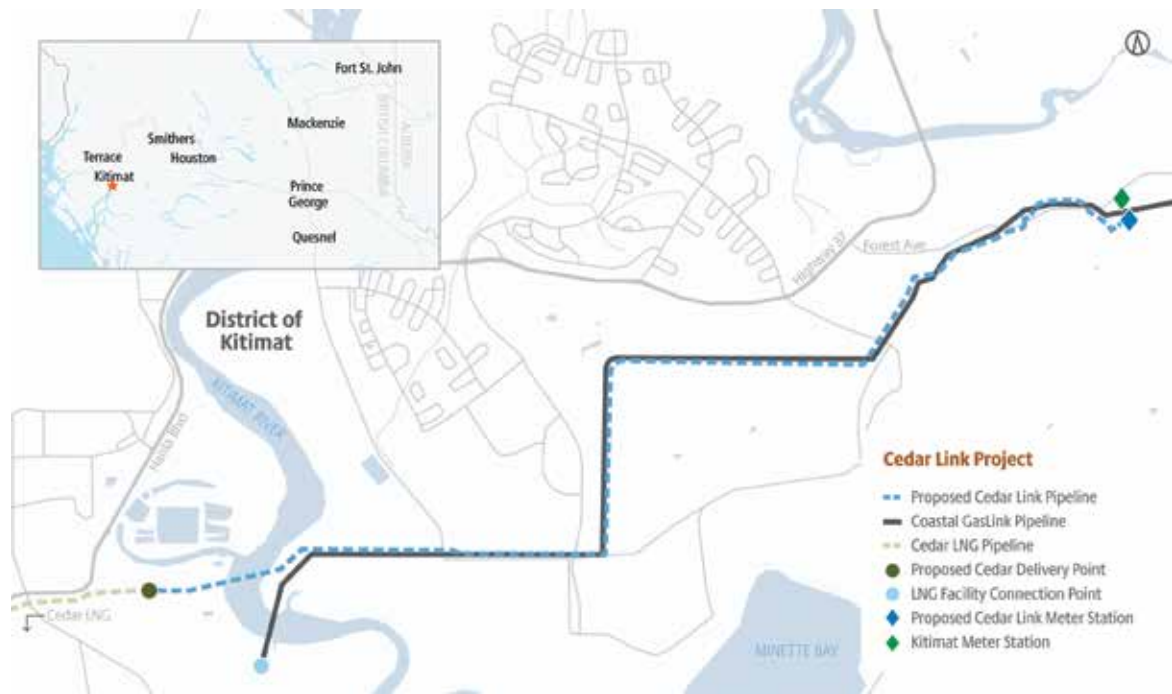


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The Cedar Link Project is currently conducting early stakeholder and Indigenous community engagement, engineering, and execution planning to support the request for B.C. Oil and Gas Commission permitting and in anticipation for a Cedar LNG final investment decision.

Environmental Assessment Certificate for the proposed Cedar LNG Project. It has been referred to provincial decision-makers and provided to the federal Minister of the Environment and Climate Change to inform the federal decision.

As of November 2022, the Environmental Assessment Office completed its assessment of the application for an

A decision is expected in early 2023.

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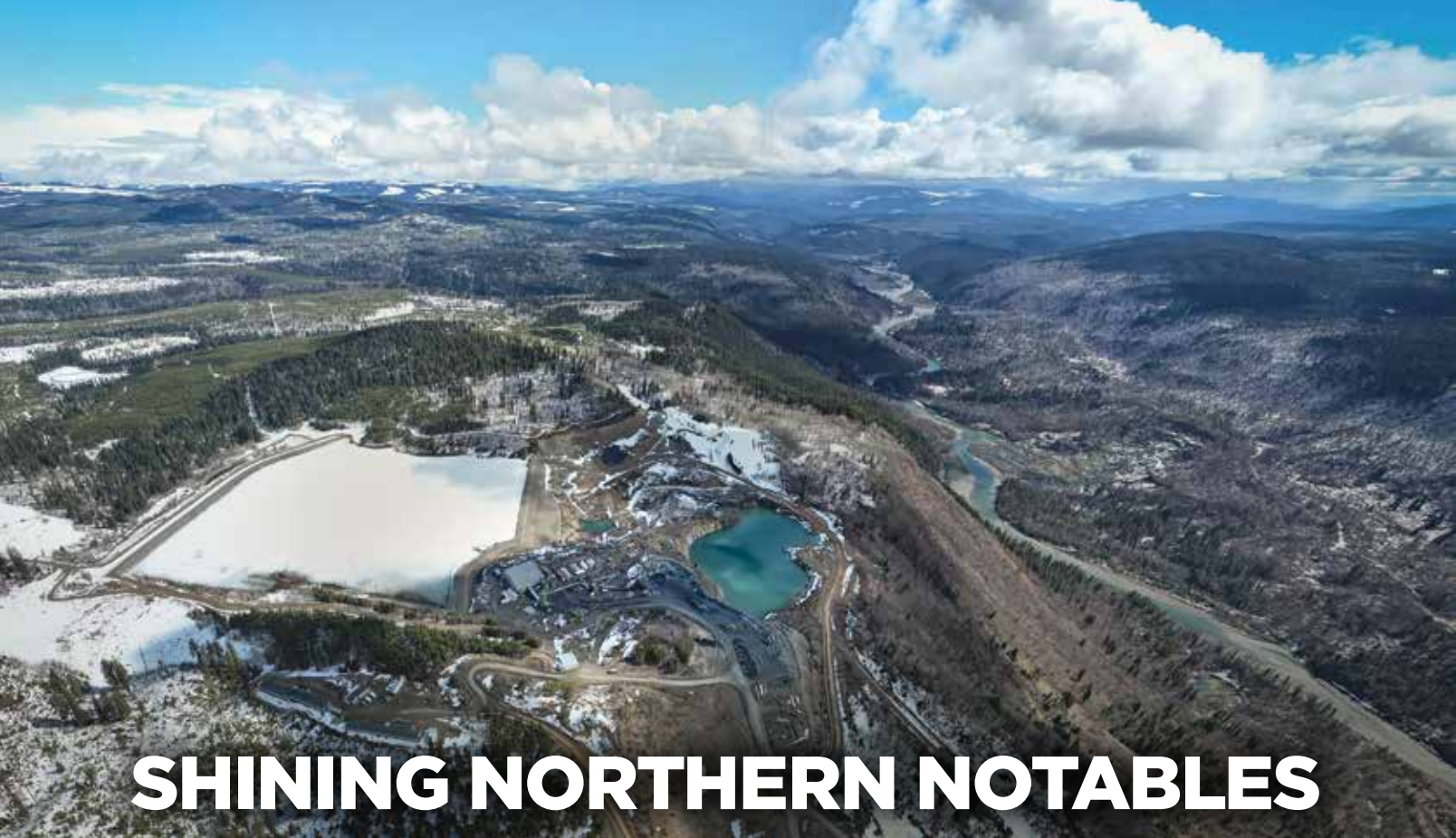
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# SHINING NORTHERN NOTABLES

By Melanie Franner

*Aerial views of the Cariboo Gold Project.*

**N**orthern B.C. continues to be a hive of mining activity this year, with many mining companies reporting significant milestones in exploration and development. We shine a light on a few of the bigger moves that have taken place and preview what's to come in one of the province's hottest regions.

## UPDATED LOM FROM CENTERRA GOLD

Centerra Gold Inc. recently released an updated Life of Mine (LOM) for its Mount Milligan project. Highlights show an increase in proven and probable gold mineral reserves from the 2021 year-end mineral reserve and resources summary by 1.1 million contained ounces (1.8 million to 2.9 million) and copper mineral reserves by 260 million contained pounds (736 million to 996 million). The Mount

Milligan Mine deposit contains mineral reserves totaling 246.2 million tonnes at 0.37 g/t gold and 0.18% copper.

The updated LOM also extends the open pit mining and milling operations by over four years to 2033.

Other news from Centerra Gold shows an increase from the 2020 Mount Milligan Technical Report LOM in total payable gold ounces produced by more than 0.8 million ounces (1.1 million to 1.9 million) and payable copper pounds produced by 191 million pounds (560 million pounds to 751 million pounds) from 2022 onwards.

The company is still on track to update and disclose the Mount Milligan Mine's 2023-2025 production and cost guidance in early 2023.

The company states that significant

exploration potential exists for new areas of mineralization.

## LET THE WORK BEGIN

Artemis Gold Inc. has announced the start of site works on its Blackwater project. The work will prepare the way for major works construction activities to begin in Q1 2023, following receipt of the BC Mines Act Permit (expected by end of 2022).

The scope of the site works program includes:

- Expanding the capacity of the existing exploration camp by 90 rooms;
- Construction of a 245-room construction camp;
- Installation of a wastewater treatment plant;
- Upgrading the potable water storage and treatment system;
- Installation of well pumps and pipelines;



*Aerial views of the Cariboo Gold Project.*



*The Blackwater Project by Artemis Gold Inc.*

- Electrical upgrades;
- Upgrading existing access roads to improve safety standards;
- Further geotechnical drilling and site investigation activities; and
- Other ancillary activities required to support the commencement of major works.

The majority of the site works activities is expected to be completed by the end of this year, with final installation of a full-capacity wastewater treatment system and drainage system scheduled for completion in Q1 2023.

Artemis has also begun early works – including site clearing, bulk earthworks and sediment/erosion control works – to prepare the Blackwater plant site.

## CARIBOO GOLD EDGING CLOSER

A recent update from Osisko Development Corp. puts its Cariboo Gold Project in the advanced stages of permitting and economic studies. The company anticipates that the Feasibility Study will be completed before the end of the 2022 calendar year.

Having submitted its Revised Application for the Environmental Assessment process to the Environmental Assessment Office of British Columbia on October 14,

2022, Osisko Development expects to receive the EA Certificate in the first quarter of 2023 for an operational capacity of 4,750 tonnes/day.

It also began an official application for the permitting of the Cariboo Gold Project with the submission of the Project Description to the Ministry on September 30, 2022, with expectations to receive final permits in the fourth quarter of 2023.

And the company also participated in a Signing Ceremony in October with Lhtako Dene First Nation’s Elders and Members in Wells and Quesnel to highlight the importance of the partnership and mutual support and benefits.

## IT’S OFFICIAL

New Gold Inc. has announced receipt of the Mines Act M229 Permit Amendment from the Ministry of Energy, Mines and Low Carbon Innovation, enabling mining of the New Afton C-Zone. This significant development clears the way for the commencement of production, which is expected to begin in the second half of 2023.

Other 2022 highlights at the New Afton mine include:

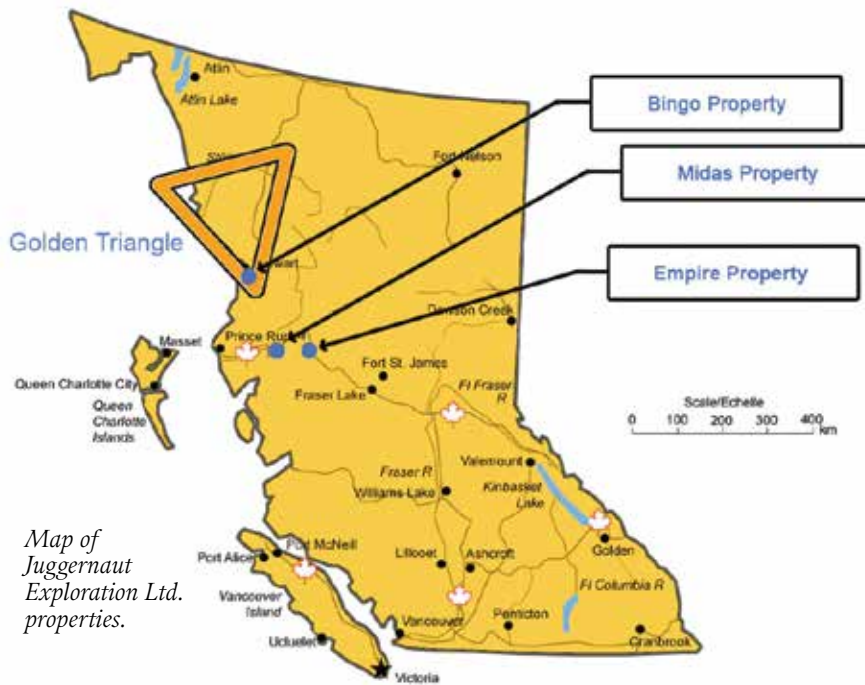
- Underground mine averaged 6,523 tpd - decrease over the prior-year period due to completion of Lift 1 mining activities, as well as closure

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Map of Juggernaut Exploration Ltd. properties.

company has completed the drill program on the Gold Star property, where drill hole GS-22-06 intersected sulphide mineralization in a shear-hosted quartz vein over 5.8 m, and was successful in expanding the footprint of the Goldilocks zone by 120 m along strike to a total of 410 m with 160 m of vertical relief and 90 m down-dip.

The most significant drill intercept (5.8 m of stringers and aggregations of sulphides within shear-hosted quartz veins) observed in hole GS-22-06 drilled towards the East-Northeast suggests that the system is most prominent in that direction.

of low-grade/higher-cost recovery zone in June;

- Mill averaged 7,764 tpd - incorporating lower grade surface stockpiles to supplement lower tonnes mined;
- Gold – average grade of 0.59 g/t at 85% recovery; Copper – average grade at 0.64% at 85% recovery;
- Underground exploration program continues to deliver high-grade mineralization;

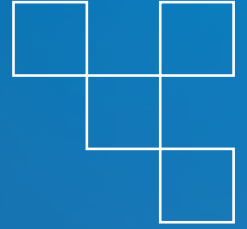
- B3 development and drawbell construction complete; mining rates expected to reach 8,000 tonnes per day by early-2023; and
- C-Zone development advanced 998 metres; undercut initiation planned for mid-2023; on-track for first ore in second half of 2023.

### DRILLING SUCCESS

Juggernaut Exploration Ltd. announced in August 2022 that the

Juggernaut also conducted initial exploration work on its Bingo property, focussed on adding to existing targets for the planned maiden drill campaign. The Bingo Main zone is an original drill ready discovery containing gold mineralized grab, chip and channel samples over an area of 420 metres x 320. The zone is open both on strike and to depth. Multiple holes are planned over a strike length of 550 m.

Juggernaut Development’s field crew also started prospecting and mapping activities on its Midas property, with the goal of expanding the known footprint of the Kokomo discovery in preparation for the planned maiden drilling. The Kokomo showing is a newly discovered Eskay-style Volcanic-Hosted Massive Sulphide (VHMS) target 5 m wide and 30 m along strike where a 1 m chip sample assayed 9.343 gpt Au, 117 gpt Ag, 1.58 % Cu and 1.77 % Zn that remains open in all directions. The same or similar lithology extends from the Kokomo discovery along strike for several hundred meters and remains to be mapped and sampled. ✪



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