



Mineral Exploration

WINTER 2020

The Official
Publication of

AME

REMOTE ROUNDUP 2021

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AME'S FIRST VIRTUAL
CONFERENCE AND
TRADE SHOW

Exploration in B.C.

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WINTER 2020



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Potential, partnerships and progress

Canada's Northwest Territories is blessed with an extraordinary wealth of resources. Our geology is one of the richest in the world; and a storehouse for critical, technology metals which will help realize a sustainable, carbon-reduced economy.

Mining is empowering and shaping our future - with capacity building, education, training, business opportunities' and jobs. Development corporations and joint ventures have taken root and grown, thanks to the foresight and investments of Indigenous governments, Northern and Indigenous-owned companies.

Partnerships between the NWT's Indigenous and public governments and industry players are striving to set a new bar in Canada, of meaningful Indigenous participation, decision making and resource revenue sharing.

As we look past the COVID-19 pandemic to the resumption of our rich mining story, our government is committed to further growing the NWT's mining sector and its contributions to investment, employment, and Indigenous participation in the economy.

We've laid the groundwork for our residents to work with investors and resource companies. We're putting new legislation in place that is more in line with our priorities and today's streamlined and socially responsible practices. We're investing in energy and transportation infrastructure and pursuing new and relevant geoscience.

We are a politically stable, secure jurisdiction poised with the resources to power the clean economy of the future.

You can invest in resources anywhere. But if you want the assurance of a territory where your investment will empower a people and inspire a future... come invest in the NWT.



Caroline Wawzonek
Minister of Industry,
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ROB McLEOD, P.GEO | Chair of the Board of Directors

When Bob Dylan penned “The Times They Are A-Changin’” in 1964, he was documenting an era of remarkable transformation in western society. Over 56 years later, this anthem of change in the tumultuous 1960s is wholly applicable the new decade of the 2020s for your Association for Mineral Exploration. The COVID-19 pandemic has been the catalyst for many changes to our business and of course necessitated our first virtual Roundup. Our tradition of coming together at the annual conference at the end of January is certainly different in 2021, but I believe that this change to a virtual component will become permanent and we will embrace the opportunity to reach more explorers and stakeholders both at home in British Columbia, particularly in rural communities, as well as around the world.

It has been a wild ride for explorers in B.C. over the past year! The crash in commodities and capital markets with the rapid, global spread of the pandemic quickly rebounded. Gold prices achieved record highs midway through 2020 and along with resurgent silver, copper and other commodities, junior companies’ share prices surged and capital markets opened, allowing for B.C. explorers to fill their coffers and get to work. Other jurisdictions saw similar rebounds; however, our province was certainly one of the hottest locations on the planet for explorers from grassroots through to advanced-stage projects.

During the spring of 2020, concern and uncertainty was understandably widespread; I would like to commend AME’s CEO, Kendra Johnston, for her strong and steady leadership. The Association was a first mover in developing and distributing COVID-19 safety protocols. Most of our work is obviously in rural and remote areas, however the potential for spreading the virus in a camp environment or to small communities, particularly to Indigenous

people, has been of critical concern. As of this writing, our industry’s track record through the crisis has been excellent. My social media feeds during the summer were full of masked faces in helicopters and introductions of camp COVID coordinators!

I am excited for the future of the mineral exploration and mining industry, with hopes of renewed mining in the short to medium-term at past producers such as Eskay Creek, Bralorne, Premier, Barkerville, Kemess, Scottie and Dolly Varden. It is also exciting to see progress at large projects with significant metal endowment like Blackwater, Galore Creek and Treaty Creek. The jobs and business opportunities at these deposits through exploration, development, operations and closure, particularly to rural British Columbians and First Nations, is and will be significant.

The COVID-19 pandemic introduced another major challenge to AME; maintaining the Association’s operating revenue. This required significant and very difficult managerial decisions, including having to make staff cuts. Additionally, the transition to a virtual conference with significantly reduced revenue has made the importance of sponsorship by member companies even more important. I am proud of the diligence and leadership over the past year by the AME Board and staff and the Roundup Organizing Committee as they researched, planned and implemented these timely and important changes.

Societal change continues to drive the evolution of our industry. From increased awareness of systemic racism through the Black Lives Matter movement to the provincial acceptance of UNDRIP, ESG components have become the most important consideration to investors and financiers of natural resource companies, large and small. I believe that AME continues to be a leader amongst mineral exploration and mining associations in these progressive movements.

Our NDP provincial government changed from minority to majority during the fall of 2020. During its first term, we were grateful for its commitment to responsible mineral exploration and an inclusive permitting process driven by science and consultation. We look forward to the implementation of the remaining items in the Mining Jobs Task Force and for further progress in clearing the permitting backlogs faced by many of our members over the next year.

Finally, further change and the end of two eras: first, this is the last print version of AME’s *Mineral Exploration* magazine. Our transition to a digital version will dramatically increase the reach of the excellent content in this quarterly publication. Second, I am reaching the end of my tenure as the chair for AME. It has been a privilege to serve you, our members. Many thanks to the Executive Committee and particularly to vice-chairs Jill Tsolinas and Tara Hassan, to our diverse and outstanding board of directors and to the outstanding staff of AME, particularly CEO Johnston. **A**

The logo for the Association for Mineral Exploration (AME) is displayed in a large, white, sans-serif font. The letters are bold and modern, with the 'A' and 'M' being particularly prominent. The logo is set against a background of a mountain landscape with a teal overlay.

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KENDRA JOHNSTON | President & CEO

Mineral explorers are resilient and optimistic by nature, both coveted qualities that proved essential during a very turbulent 2020. Looking back to Roundup 2020, we could not have predicted how much the world would change in 12 short months. I am proud of our province, our industry and our members for how we dealt with the pandemic and the current reality of living with COVID-19. As an essential industry, we continued to work and we went on to have one of our most active years in recent history, raising more than \$350 million for mineral exploration in B.C. and drilling more than 900 kilometres of core!

At AME, we were busy right along with you. We hit the ground running when the pandemic struck, advocating to governments on your behalf. We made sure mineral exploration was on the list of essential businesses, we helped ensure B.C. was the first province to announce extensions to mineral claims and assessment work, and we were integral in composing the guidance documents for COVID-19 safety in industrial camps. We regularly communicated these developments through our website and member communications channels.

As explorers moved back into the field, AME continued to monitor the COVID-19 situation and advocated for the return of B.C. Mineral Exploration Tax Credit funds to our members and for an extension of the flow-through expenditure deadline. We then began planning for a new and different year – one where AME would need to do everything differently.

AME prides itself on supporting our corporate and individual members both through advocacy and by providing opportunities for members to connect and network with each other. The AME team has been working hard to expand and adapt interactive webinars, workshops and short courses into our annual programming, and we're working hard on preparations for our first ever *Remote Roundup* – a must-attend event.

We are excited to welcome over 5,000 geoscientists, technical experts, prospectors, suppliers, government officials and Indigenous partners from around the world as we virtually gather for AME's Remote Roundup 2021. We will digitally connect, exchange ideas, be inspired by new exploration projects and stay on the forefront of innovative advancements in mineral exploration. Attendees will be able to access live and on-demand programming from anywhere in the world, whether at work, at home or even in camp if the internet connection is strong enough!

This year's Roundup theme is "Leading through Change" and will feature relevant conversations of the day across a variety of topics, including Responsible Resource Development; Open and Smart Exploration; Advocacy and Access; and the Transformation of Mineral Exploration.

Safety is a core value for AME and its members. By hosting Roundup virtually, we will safely facilitate one of the largest gatherings of the global exploration industry, ensuring that you remain healthy while networking with our exceptional industry leaders. We lead by looking after our people, our communities and our companies, as all responsible explorers do.

Today, as you read this magazine, you are also marking a point in history: our last print issue. The end of an era, but not the end of our communications or of the work we do on your behalf. AME is adapting to keep you better informed and engaged. Our magazine content will be available on our website and in our e-news found in your inbox every third Thursday of the month. We will continue to share mineral exploration stories, community highlights, profiles of exceptional members and regulatory updates that you need to know to be successful in our ever-changing landscape.

We can't be sure what the year ahead holds. But we are steadfast in our commitment to be your trusted partner and advocate, helping you make discoveries, ensuring projects prosper and making our

industry better. Your passion, perseverance and creativity is our passion, perseverance and creativity.

For us to do this work effectively, we need to hear from you. You can reach any one of our team members by phone or e-mail and we will happily talk to you and assist in any way we can. Please reach out and share your stories with us – both accomplishments and challenges. All stories, shared experiences and knowledge transfer helps us shape our advocacy efforts, our member programming and the way we connect with you, our trusted partners.

Finally, a big thank you. To all of our volunteers, our board, our committee members and event volunteers, we couldn't do what we do without your support, time and energy. Thank you for helping us serve our membership and our industry. A special thank you and our appreciation to our outgoing board chair, Rob McLeod, who has been a fabulous support throughout a difficult and challenging year. And to Dale Mah, our 2021 Roundup chair, who has been steadfast in his support and in maintaining the core content of Roundup as we have transformed the show around him, thank you.

From all of us at AME, we look forward to advancing our goals next year and we can't wait to connect with you at Remote Roundup 2021. **A**

We would like to thank all of our **Association Sponsors**, who support **AME**'s work to provide clear initiatives, policies, events and tools on behalf of our members.

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If you would like to support AME through sponsorship and learn more about the different ways you can benefit, contact Roxanne Finnie, Director, Events & Membership rfinnie@amebc.ca, 604.630.3927.

AME REMOTE ROUNDUP.

AME Remote Roundup 2021

Leading through Change

Remote Roundup 2021 is the virtual debut of the annual AME Roundup conference. Leading through the change caused by the global pandemic, we are going virtual to safely facilitate one of the largest gatherings of the global exploration industry.

Over 6,000 geoscientists, technical experts, prospectors, suppliers, governments and indigenous partners from around the world are anticipated to virtually gather for AME Remote Roundup 2021 to network, share knowledge and stay on the forefront of the innovative advancements in mineral exploration. Attendees and participants will be able to access live and on-demand programming from anywhere in the world, whether from home, at work or at camp.

Hosted by explorers for explorers, this is an opportunity to digitally connect, exchange ideas and inspire new exploration projects that are critical to a strong economic recovery and sustaining vibrant regional and global economies for generations to come.

The theme for AME Remote Roundup 2021 is "Leading Through Change." The conference will feature relevant conversations of the day, touching on a variety of topics including Responsible Resource Development; Open & Smart Exploration; Advocacy and Access; and the Transformation of Mineral Exploration.

Register at roundup.amebc.ca.

“

AME Roundup is the must-attend conference to kick off the annual mineral exploration calendar, setting the trends and establishing connections with passionate leaders who are moving our industry forward. Our content is relevant to the on-the-ground realities of today, delivered by high-calibre speakers, through engaging exhibitors and by participating in interactive short courses.



—Kendra Johnston
AME President and CEO

AME REMOTE ROUNDUP.

#LeadingThroughChange

January 18 - 22, 2021

Register at roundup.amebc.ca

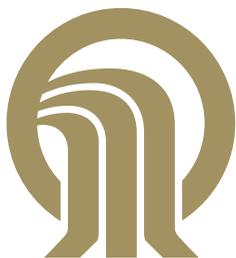
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The **Association for Mineral Exploration** sincerely thanks the sponsors of **Remote Roundup 2021** (as confirmed at the time of printing) for their support.

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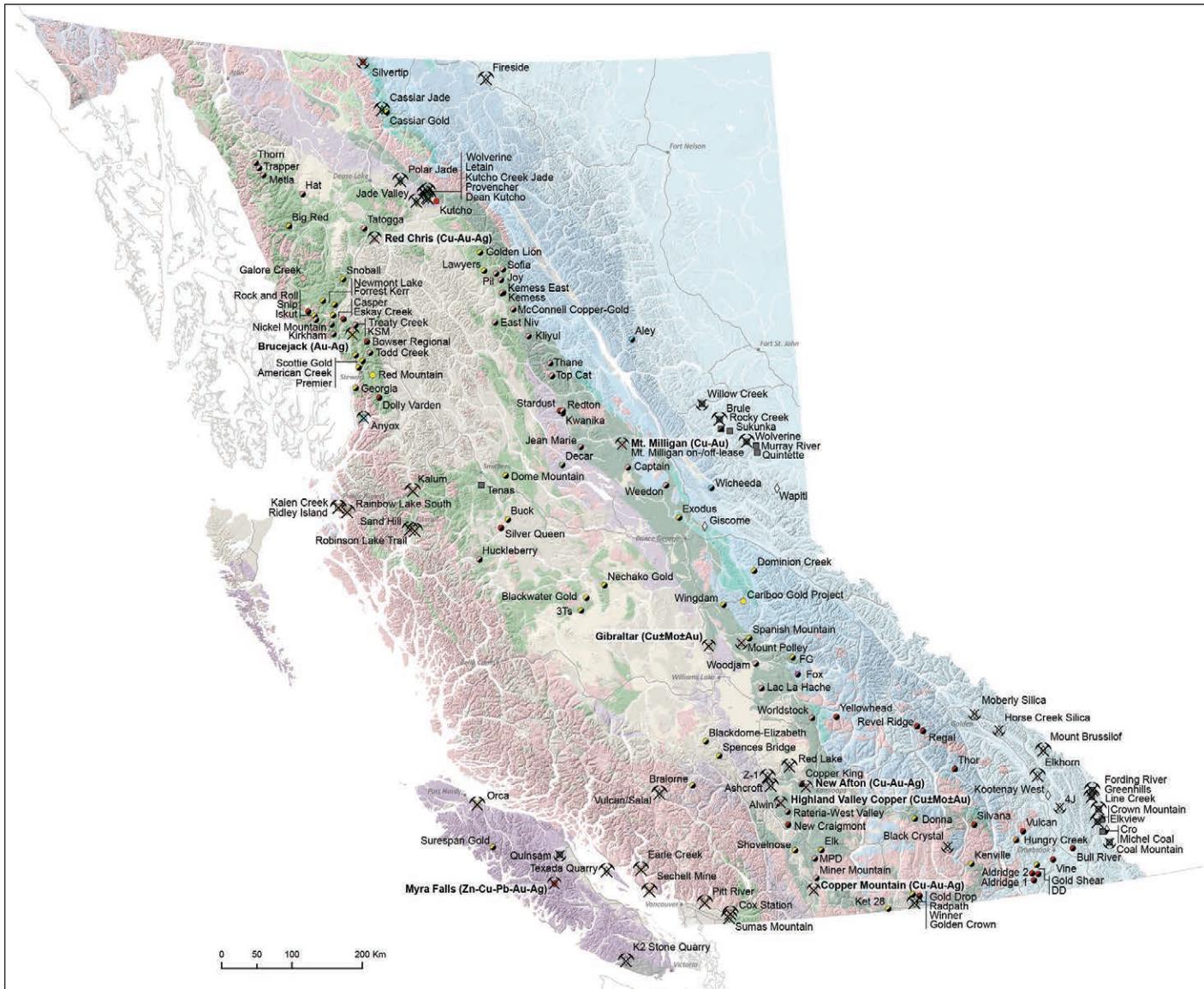
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Exploration in British Columbia

2020 in review

By **GORDON CLARKE, FIONA KATAY, BRUCE NORTHCOTE, SEAN TOMBE AND NEIL WILDGUST,**
BRITISH COLUMBIA MINISTRY OF ENERGY, MINES AND PETROLEUM RESOURCES



The year 2020 will be remembered for the COVID-19 pandemic. Despite the pandemic, exploration activity in British Columbia rebounded following initial disruptions. Likely stimulated by the pandemic, a significant increase in the price of gold and, to a lesser extent, copper spurred financing and exploration for precious metal and Cu-Au projects in the province.

At the time of writing, Regional Geologists of the Mineral Development Office in the British Columbia Geological Survey (Ministry of Energy, Mines and Petroleum Resources) had not yet completed the annual exploration expenditure survey. British Columbia may have avoided the global trend of declining expenditures and activity due to the resourcefulness of B.C. mineral explorers and the innate mineral endowment of the province, coupled with the provincial government's declaring exploration and mining as essential services. Reports of new discoveries and significant results continue to date, supporting British Columbia's reputation as a premier jurisdiction for mineral exploration and mine development opportunities.

Property status coloured by project type

- Operating mine
 - Care and maintenance*
 - Proposed mine
 - Exploration project
- *Operated within the last 3 years

Project type

- Cu-Mo, Cu-Au-Ag, Mo (porphyry)
- Precious metals
- Base and precious metal
- Cobalt, base and precious metal
- Ni-Cu-Co-precious metal
- Specialty metal
- Tungsten
- Jade
- Industrial mineral
- Coal
- Aggregate

Geologic setting

Post accretionary assemblages

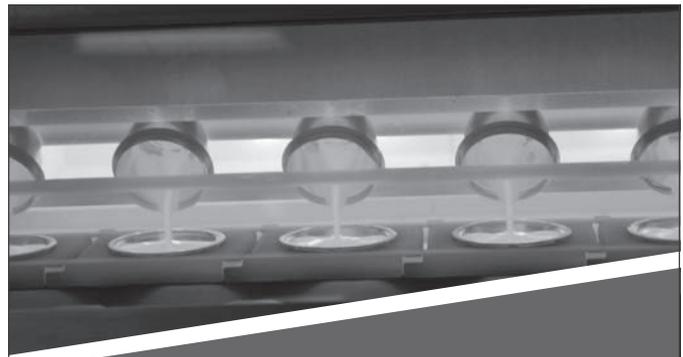
- Intrusives
- Neogene to Quaternary volcanics
- Supracrustal

Terranes

- Outboard
- Alexander
- Wrangellia
- Cache Creek and affiliates
- Slide Mountain
- Stikine
- Quesnel
- Yukon-Tanana

Ancestral North America

- Cassiar
- Deep-water basin strata
- Platformal strata



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Precious metal projects

Mountain Boy Minerals Ltd. is exploring its **American Creek** project, where fieldwork included a property-wide lidar survey, an IP geophysical survey and 4,000 m of drilling. Drilling tested the geological model and the extent of known mineralized prospects near historic mining operations.

Using results from a recent ZTEM geophysical survey and geological mapping and geochemical sampling, a 2,800 m reverse circulation drilling program was initiated by Libero Copper & Gold Corporation to test the Ridge and ME-18 targets at the **Big Red** project. Surface sampling at the Ridge prospect returned a highlight assay of 104.0 g/t Au.

San Marco Resources Inc. carried out geological mapping, geochemical sampling and ground magnetic and induced polarization surveys at its **Buck** project. These data, used in conjunction with historic geological, geochemical and geophysical data, were used to define drill targets. Initial drilling, which included 1,806 m of core, yielded highlights of 91 m grading 0.75 g/t Au within 156 m of 0.59 g/t Au. By the end of this year, the company anticipates drilling an additional 5,000 m to test the extent of structurally controlled Au-Ag epithermal-veins.

The **Casper** Au-bearing quartz vein, discovered late in 2019 by Garibaldi Resources Corp., is 13 km north of the company's **Nickel Mountain** project. Highlights from this past season include a channel sample assaying 93.3 g/t Au and a trench sample returning 5.69 g/t Au across 52 m.

A 5,000 m drill program is underway on the **Cassiar Gold** project, where Cassiar Gold Corp. is focusing drilling on infill, extension and exploration targets near the Taurus resource area. Mapping and sampling are also being done to further guide target generation.

At the **Dome Mountain** project, Blue Lagoon Resources Inc. is completing 3,000 m of drilling to upgrade Inferred resources into the Indicated category. Property-wide radiometric, electromagnetic, and magnetic airborne geophysical surveys were also completed. A \$7.5-million private placement was recently completed and will be used to further exploration.

Mineralized surface rock samples returning 10 - 43.4 g/t Au, 29.2 - 46.0 g/t Ag, and 1.3 - 4.6 per cent Cu are guiding a drill program at Aben Resources Ltd.'s **Forrest Kerr** project testing Boundary Valley targets. A drill hole in 2019 intersected a mineralized horizon more than 19 m directly below the surface samples.

At the **Georgia** project, AUX Resources Corporation is completing 3,500 m of drilling near the past-producing Georgia River mine. Drilling is being used to extend and assess known mineralization at the mine and to test newly developed targets outside of the known mineralization.

Enduro Metals Corporation continues to focus exploration at its **Newmont Lake** project, where geophysics, hyperspectral, geochemical rock and soil sampling, and alteration mapping are underway. In addition, 6,000 m of diamond drilling will be completed on targets along the McLymont fault.

Ascot Resources Ltd. continues to explore its **Premier** project, focusing on the Premier West, Silver Hill, Lost Valley and Woodbine zones, with prospecting, geophysics and diamond drilling. The company anticipates drilling 15,000 m of core; early drill highlights include 40.78 g/t Au across 6.0 m at the Premier West zone. An updated Feasibility Study was also prepared for the Premier and Red Mountain projects earlier this year.

Scottie Resources Corp. continues to explore the **Scottie Gold** project, which includes the past-producing Scottie Gold mine, with 7,000 m of drilling to test zones such as the Bend, Bow and Blueberry. Several zones at the Scottie Gold mine are also being targeted to delineate the lateral and vertical mineralized extents. The recently discovered Domino zone, where a grab sample previously taken from a gossanous east-trending shear zone assayed 536 g/t Au, is also being drilled.

An underground-constrained mineral resource estimate was announced in July for Skeena Resources Limited's **Snip** project. Indicated resources of 244,000 oz of Au are in 539,000 t at 14.0 g/t Au, and Inferred resources of 402,000 oz of Au are in 942,000 t grading 13.3 g/t Au. Expansion drilling at the 200 Footwall Corridor and other near-mine targets will be the near-term drilling focus.

Cu-Mo, Cu-Au-Ag, Mo (porphyry) projects

Doubleview Capital Corp. continues to explore its wholly owned **Hat** project in the northern reaches of the Golden Triangle. An initial 4,000 m drill program will focus on the Lisle zone and follow up a diamond drill hole from 2019 that returned 235 m grading 1.04 g/t AuEq. This zone was first targeted from a deep-penetrating 3D induced polarization survey completed in 2018.

Imperial Metals Corporation is re-exploring the limits of mineralization at the past-producing **Huckleberry** mine and testing below the East zone pit at depth. Historic drilling previously ended in Cu-mineralization; approximately 2,400 m of initial drilling will be used to test the mineralized extents of the system.

Seabridge Gold Inc. slated 8,000 m of drilling to test below the Quartz Rise lithocap at its wholly owned **Iskut** project. Geophysics, surface mapping and sampling, and preliminary drilling guided the program, which was mainly designed to evaluate an 800 m-deep IP geophysical anomaly approximately 750 m long. Also, geotechnical drilling commenced at the **KSM** project in July, where 4,000 m will be drilled in 10 holes to obtain geotechnical information along the proposed route of the Mitchell Treaty tunnels. These tunnels will serve to transfer ore from the mine to the mill and transport consumables to the mine site.

Metallis Resources Inc. conducted field mapping, drill-core relogging and short-wave infrared analysis on its **Kirkham** project. Preliminary data will help guide planned 5,000 m of drilling focused on the southern section of the Hawilson monzonite porphyry.

Two drill programs were underway in October at the **Red Chris** mine, a joint venture between Newcrest Mining Limited and Imperial Metals Corporation, with resource definition on East Zone and brownfields exploration along the Red Chris porphyry corridor. Discrete pods of Au-Cu mineralization were intersected in the definition drilling, including highlights of 232 m grading 2.6 g/t Au and 1.5 per cent Cu that included a 122 m interval grading 4.5 g/t Au and 2.3 per cent Cu.

Evergold Corp. completed 2,800 m of drilling at the **Snoball** project, focusing

NORTHWEST REGION

on the Pyramid Peak showing, where Noranda Mines Ltd. reported Au and Ag anomalies in fine-grained talus in the 1990s. Drill highlights included 20.8 g/t Au and 54.5 g/t Ag across 0.7 m.

In June, GT Gold Corp. released a maiden resource for the Saddle North porphyry discovery on its **Tatogga** property. The resource included Indicated resources of 298 Mt grading 0.28 per cent Cu, 0.36 g/t Au and 0.8 g/t Ag and Inferred resources of 543 Mt grading 0.25 per cent Cu, 0.31 g/t Au and 0.7 g/t Ag. The Quash Pass area, part of the Tatogga property, is currently being mapped and drilled; 5,000 m of drilling is planned.

Brixton Metals Corporation is drilling the West and Central Outlaw Au targets of its **Thorn** project, where more than 3,000 m have been drilled, and plans deep diamond drill holes for the Camp Creek target. More than 5,400 soil and 1,200 rock samples were collected; separate rock samples yielded highlights of 36.9 g/t Au, 2,890 g/t Ag, and 7.2 per cent



Drill core from GT Gold's Saddle North porphyry discovery on its Tatogga property (drill hole TTD109)

Cu. The company expanded its land package by optioning adjoining properties from Stuhini Exploration Ltd. (**Metla**) and Kodiak Copper Corp. (**Trapper**).

P2 Gold Inc. is exploring its recently optioned **Todd Creek** property in the Golden Triangle. Satellite hyperspectral and airborne magnetic and radiometric surveys were completed to guide maiden drilling that tested the Yellow Bowl zone and Cu-Au showings five km southeast of Yellow Bowl. Three holes were drilled totalling 1,027 m.

Tudor Gold Corp. is the operator of the **Treaty Creek** project, where exploration this season was mainly focused on the Goldstorm zone. A 40,000 m drill program was planned to test the limits of known mineralization to the southeast and northeast and expand the mineralization of the Goldstorm system. Drill highlights include 348 m of 2.12 g/t AuEq in a broader 930 m intersection averaging 1.16 g/t AuEq. The company anticipates combining results from new and previous drilling to produce an initial resource estimate.

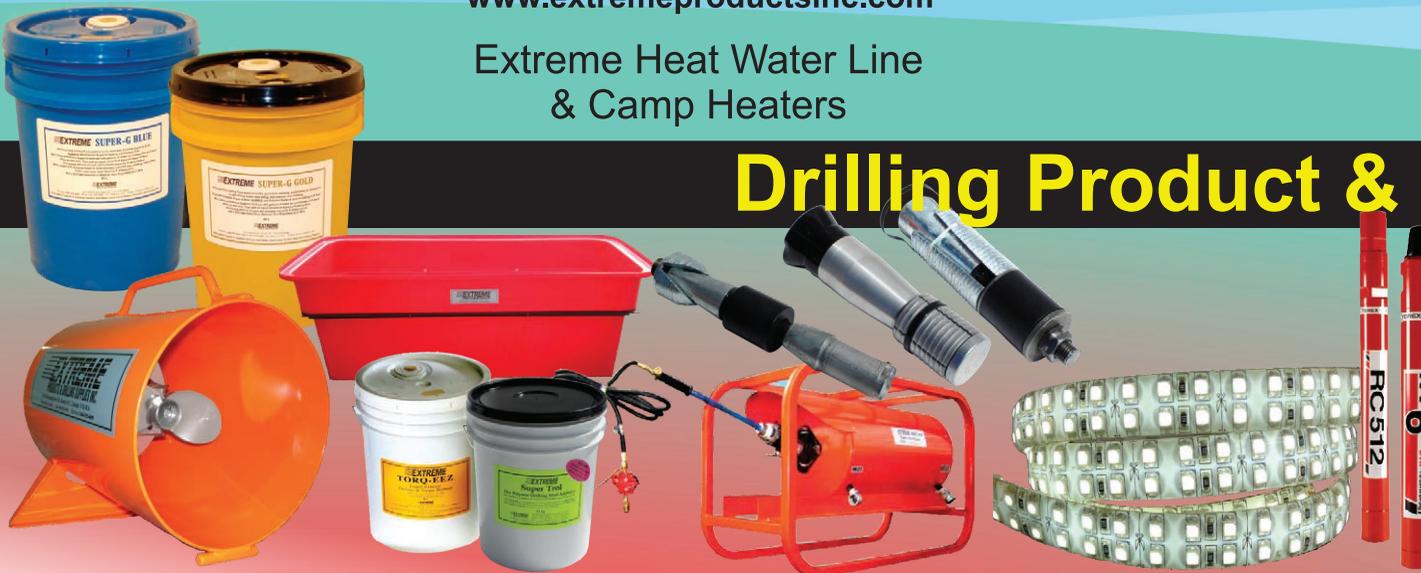
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Exploration this year at Pretium Resources Inc.'s **Bowser Regional** project was primarily focused on the A6 zone, which is approximately 14 km northeast of the Brucejack mine. The company expected to drill about 10,000 m at A6 to delineate volcanogenic massive sulfide mineralization. The company also plans to complete 3,700 m of drilling at the Koopa, Hanging Glacier and East Snowfield zones to test their mineralized extents.

Dolly Varden Silver Corporation planned a 10,000 m drill program at its **Dolly Varden** project to focus on expanding resources from the NI 43-101 report published in 2019 and on Ag targets outside of the current resources at the past-producing Torbit Mine.

In July, Skeena Resources Limited announced its intention to exercise the option to acquire 100 per cent of the **Eskay Creek** project from Barrick Gold Inc. Barrick is expected to own approximately 12.4 per cent of Skeena's shares outstanding, including shares held, and has agreed

to waive its back-in right on the project. Skeena planned 88,000 m of drilling for the Eskay Creek project, 66,000 m for infill and the remainder for exploration. Highlights from initial drilling include 25.03 g/t AuEq across 35.42 m in the 21A zone.

Etruscus Resources Corp. sampled, prospected, mapped and flew a VTEM survey at its **Rock and Roll** property, which contains known resources at the Black Dog deposit. Results were to guide late-season drilling focusing on depth potential and prospective areas close to the Black Dog system.

At the end of February, Coeur Mining Inc. announced a temporary suspension of mining and processing at the **Silvertip** mine. However, the company planned to double its exploration investment this year to potentially further expand the resource and extend the mine life. As of mid-October, more than 38,000 m of diamond drilling was completed, focused primarily on testing further step-out targets. Initial work suggests that manto-style mineralization continues north and south of known resources.

Equity Metals Corporation planned a 3,000 m drill program to test the full extent of mineralization in an alteration halo surrounding polymetallic veins on its **Silver Queen** project. Areas where historic drilling encountered mineralized zones were also to be tested.

Ni-Cu-Co-precious metal projects

As of mid-October, drilling was underway at the **Nickel Mountain** project, where Garibaldi Resources Corp. is attempting to expand the known magmatic Ni-Cu massive sulfide system. Drilling is targeting a 2 km-long east-southeast trending corridor of mineralization. Results to date have extended the strike length of the mineralized system eastward for more than 650 m.

Coal projects

Allegiance Coal Limited continued to forward its **Tenas** project and receiving an environmental assessment certificate by collecting environmental data and completing the required regulatory processes.

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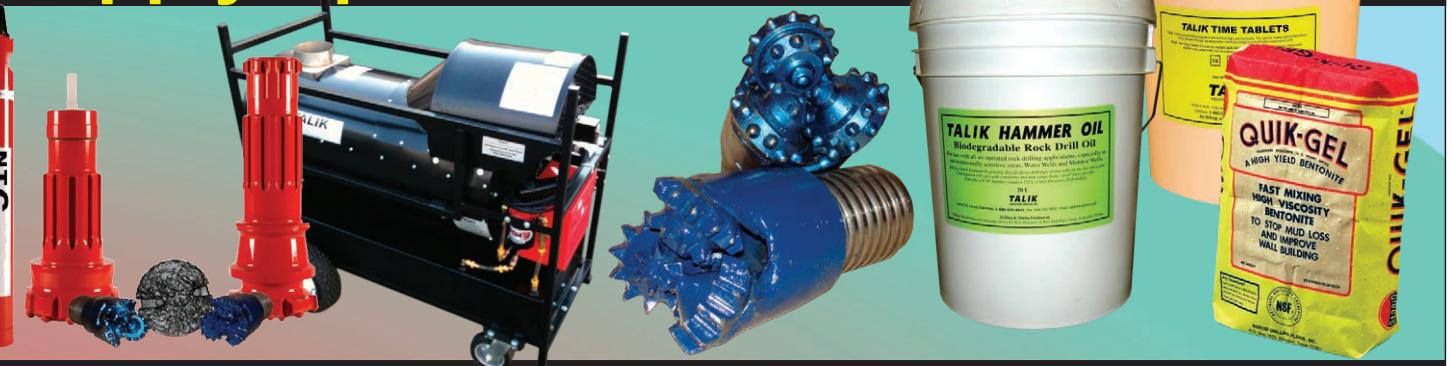
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NORTHEAST AND NORTH CENTRAL REGIONS

Precious metal projects

Artemis Gold Inc. acquired the **Blackwater Gold** project from New Gold Inc. for approximately \$210 million. At a 0.20 g/t AuEq cut-off, the total Measured and Indicated mineral resource is estimated at 597 Mt at 0.65 g/t AuEq, 0.61 g/t Au and 6.4 g/t Ag for a total of 12.4 million AuEq oz. Revised pre-feasibility study results included an unlevered after-tax NPV of \$2.2 billion, an after-tax IRR of 35 per cent and payback on initial capital costs of two years. The project has both provincial and federal environmental assessment approval. BW Gold Ltd. (a wholly owned subsidiary of Artemis) plans to move the project forward with construction starting in the second quarter of 2022.

Benchmark Metals Inc. planned to complete up to 100,000 m of diamond drilling in 2020 at its **Lawyers** project. The project has five discrete zones (Cliff Creek, Duke's Ridge, Phoenix and AGB) targeted for their bulk tonnage potential. Highlight results included 57.91 m of 1.90 g/t Au and 91.96 g/t Ag and 31 m of 2.98 g/t Au and 72.77

g/t Ag. Results are to be used to prepare a global resource estimate and a preliminary economic assessment in early 2021.

Independence Gold Corp. announced that 2,200 m in 11 holes would be drilled in the fall at its **3Ts** project. Drill collar location selection was largely based on an extensive compilation and a 3D geological model of the known epithermal vein system, in addition to magnetic and spectral surveys, completed in 2019.

At its **Golden Lion** project, Evergold Corp. reported broad intersections of epithermal mineralization from more than 2,500 m of drilling at the GL1 "Main" prospect. The company also carried out an IP survey that defined a resistivity and chargeability anomaly encompassing hundreds of m of strike length, broad widths, and untested down-dip potential

NV Gold Corporation carried out detailed mapping, trenching, soil sampling, project-wide geophysics and structural modeling at its optioned **Exodus Gold** project. These data were to be used

to develop diamond drill targets.

In September, Tower Resources Ltd. carried out reverse circulation (RC) drilling on its **Nechako Gold** project to map out a mineralized trend beneath thick till cover. Drilling was designed to follow up on spring diamond drill results that returned 7.1 m grading 2.75 g/t Au and 40 g/t Ag. Results from the RC drilling along with ground magnetic and IP geophysical surveys were to be used to target approximately 2,000 m of diamond drilling.

High Range Exploration Ltd. planned to extract a 10,000 t bulk sample from its **Dominion Creek** gold property. The sample would be shipped to Nicola Mining Inc.'s mill and Nicola will be responsible for negotiating the sale of concentrate to a smelter or third-party purchaser.

Cu-Mo, Cu-Au-Ag, and Mo (porphyry) projects

Amarc Resources Ltd. filed a 43-101 report providing details on the potential of the Company's **JOY** porphyry Cu-Au deposit.

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NORTHEAST AND NORTH CENTRAL REGIONS

QuestEx Gold & Copper Ltd. (formerly Colorado Resources Ltd.) announced IP surveying, soil sampling and mapping for its **Sofia** project. Data will be used for targeting diamond drilling in 2021.

At the **Pil** project, Finlay Minerals Ltd. carried out a property-wide, high-resolution airborne magnetic survey, detailed geological, alteration and structural mapping, and soil and rock geochemistry sampling.

Centerra Gold Inc. carried out exploration on several of its projects. At the **Kemess** project, 3,302 m of diamond drilling was carried out on the Nugget target and IP surveys completed on the Rat Hilda and Orion targets. At the **Kemess East** project, 4,257 m of diamond drilling was completed. At the **Mount Milligan** mine site, 17,500 m of diamond drilling was planned. **Mount Milligan on lease** brownfield work included approximately 15,000 m of diamond drilling and two line-km of IP surveying. **Mount Milligan off lease** greenfield work included approximately 5,100 m of diamond drilling and 10 to 15 line-km of IP surveying.

GGL Resources Corp. carried out 20 line-km of IP and ground magnetic surveys over a known Cu-Au porphyry zone at its **McConnell Copper-Gold** project. The IP survey follows up on an older reconnaissance IP survey. New work is designed to better define the known chargeability target, and to expand geophysical coverage to evaluate the potential for other nearby targets under overburden cover.

IMC International Mining Corp. carried out ground geophysics, alteration mapping, rock, soil and silt sampling at its **Thane** property to guide diamond drilling.

Pacific Empire Minerals Corp. was active at both the **Jean Marie** and **Weedon** projects. Sampling highlights for Jean Marie include rock samples returning 8.79 g/t Au, 86.6 g/t Ag and 1.75 per cent Cu from the newly identified Leap target area, and continuous chip sampling results of 4 m grading 1.37 per cent Cu, 0.08 g/t Au and 67.4 g/t Ag at C zone south. A ground magnetic survey was carried

out over the C zone south target area and a property-wide airborne magnetic survey was commissioned. The company announced that diamond drilling would be carried out in the fall. At the Weedon project, reverse circulation drilling was carried out to sample bedrock under glacial overburden at the T1 target.

Pacific Ridge Exploration Ltd. completed fieldwork at its **Kliyul** and **Redton** projects. At Kliyul, work included 9.1 line-km of IP and ground magnetometer surveys over the Kliyul Main zone, surface and drill core sampling to identify alteration and geochemical trends, and historical core re-logging to identify porphyry-style veining. At Redton, one 434 m diamond drill hole tested a 550 m by 250 m magnetic and IP chargeability anomaly and coincident 500 m x 100 m copper- molybdenum-in soil anomaly.

Serengeti Resources Inc. was active at the **Kwanika**, **East Niv** and **Top Cat** projects. The Kwanika project is owned by Kwanika Copper Corporation, a

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graph TD
    A[DISPUTE between parties] --> B[Negotiation]
    B --> C[Application to Board]
    C --> D[Mediation]
    D --> E[Board Hearing]
    B --> F((RESOLUTION by parties))
    D --> F
    E --> G((BINDING DECISION by Board))
    
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The Board's primary responsibility is to hear and decide disputes related to accessing or using Yukon First Nation settlement land and, in certain circumstances, disputes involving access to or use of non-settlement land. The Board's process starts when the parties are unable to reach an agreement and a party applies to the Board. The Board's jurisdiction is derived from several statutes. The primary authority for the Board is set out in the *Yukon Surface Rights Board Act* (Canada).

Additional responsibilities of the Board are set out in other laws and agreements including the *Quartz Mining Act* (Yukon), *Placer Mining Act* (Yukon), *Oil and Gas Act* (Yukon), *Expropriation Act* (Canada), *Radiocommunications Act* (Canada), and individual Yukon First Nation Final Agreements.

To learn more about the Board and its process visit yukonsurfacerights.ca or contact the Board's office.

joint venture consisting of Serengeti Resources Inc. (66 per cent) and Posco International Corporation (34 per cent). Serengeti, on behalf of Kwanika Copper Corp., conducted exploration diamond drilling at Kwanika. The team expected to include up to 4,300 m of drilling in eight to nine drill holes, testing several exploration targets and resource expansion opportunities. At East Niv, mapping, sampling and IP geophysical surveys were completed. New data identified a 3.5 sq km multiparameter porphyry Cu-Au target. At Top Cat, mapping and sampling were carried out over the Nova zone. In addition, IP surveying was carried out over the Nova and Cat Mountain zones.

Orestone Mining Corp. announced fall plans for diamond drilling at its **Captain** project. Target areas are outlined by strong magnetic anomalies with spatially associated moderate IP chargeability anomalies that are potentially related to mineralized monzonite porphyries and breccias.



Base and precious metal projects

Sun Metals Corp. continued to explore at the **Stardust** project. In late September, the company announced that 11,988 m of drilling had been completed and drilling would continue into early October. Work also included geophysical surveys,

geotechnical work and core logging and sampling. Initial drilling results established continuity between the 421 and Canyon Creek zones along a 900 m corridor of continuous high-grade Cu-Au mineralization. Results included 1.57 per cent Cu, 1.08 g/t Au, and 28.2 g/t Ag or 2.88 per cent CuEq over 44 m.



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NORTHEAST AND NORTH CENTRAL REGIONS

Specialty metal projects

Taseko Mines Limited continued with ongoing technical work, environmental monitoring, and product marketing initiatives for its **Aley** niobium project.

Defense Metals Corp. filed an updated 43-101 technical report, began baseline environmental studies and carried out flotation pilot plant studies for its **Wicheeda** rare earth element project. The updated report includes an Indicated mineral resource of 4.89 Mt averaging 3.02 per cent LREO (Light Rare Earth Oxide), in addition to Inferred mineral resource of 12.1 Mt averaging 2.90 per cent (LREO reported at a cut-off grade of 1.5 per cent LREE [sum of cerium (Ce), lanthanum (La), neodymium (Nd), praseodymium (Pr), and samarium (Sm); in addition to niobium (Nb) percentages as metal].

Ni-C-Co-precious metal projects

FPX Nickel Corp. announced a positive preliminary economic assessment for its

Decar project's Baptiste deposit. Highlights included a mine life of 35 years and after-tax payback of 4.0 years, after-tax net present value (8 per cent) of US\$1.72 billion and an internal rate of return of 18.3 per cent, average Ni production of 99 Mlbs per year, average operating costs of US\$2.74/lb Ni and all-in sustain costs of US\$3.12/lb Ni and average US\$481 million of annual earnings before royalties, taxes and depreciation.

Coal projects

At the **Rocky Creek** project, CTI Plus Resources Ltd. drilled approximately 75 holes, including HQ coring, PQ coring and rotary drilling. Coal seams were sampled and sent for testing. Also, 10 trenches were geologically mapped and sampled. Data will be used for a feasibility study.

Industrial mineral projects

Fertoz Ltd. continued with mine design and engineering studies for its **Wapiti** phosphate project.



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Precious metal projects

Exploration continued in the Greenwood district in 2020. Grizzly Discoveries Inc. began 2,000 m of drilling at the **Ket 28** property to follow up on historic results of 2.77 g/t Au along 11 m and 8.75 g/t Au along 3 m, with a higher-grade zone of 11.90 g/t Au along 2 m. The company's claim holdings extend for about 61,000 ha [CGE4] and include targets such as skarns, polymetallic and epithermal veins and porphyries. At the **Golden Crown** property, Golden Dawn Minerals Inc. sampled and trenched a sulphide-quartz vein system, following up on chip sample results of up to 5.87 g/t Au along 4 m. GGX Gold Corp. continued drilling and trenching at the **Gold Drop** property, which includes a series of parallel high-grade epithermal veins. A total of more than 5,000 m of drilling was planned for the year. Trenching uncovered new veins this year, with visible gold in a new vein west of the C.O.D vein.

North of Grand Forks, KG Exploration (Canada) Inc., drilled 1,200 m from 5 locations

at its **Radpath** project. KG Exploration, the Canadian exploration arm of Kinross Gold Corporation, is exploring the northern extensions of the Toroda and Republic grabens for replacement production at the firm's Kettle River mill in Washington State.

Ximen Mining Corp. began rehabilitating old portals at the past-producing **Kenville** mine, to access historic workings for its planned drill program. A 51 kg composite sample, with a grade of 17.16 g/t Au, was sent for metallurgical testing, with results indicating the ore is amenable to gravity-flotation, with recoveries of up to 99 per cent Au and 95 per cent Ag.

In the East Kootenay, PJX Resources Inc. released results from its drilling at the **Gold Shear** property. The team intersected a vein, 1.2 to 4.5 m wide, with 2.5 m grading 25.07 g/t Au, 2.1 m grading 14.06 g/t Au and 1.2 m of 19.85 g/t Au. Drilling tested the downdip extension to 100 m below surface. Further mapping and prospecting traced the gold zone for more than 2,000 m along strike.

Base and precious metal projects

Mesoproterozoic SEDEX mineralization continued to be a target in the East Kootenay. Eagle Plains Resources Ltd. drilled 2 DDH (977 m) at the **Vulcan** project to test geophysical anomalies.

PJX Resources Inc. continued drilling at the **Vine** property early in the year but halted in March due to uncertainty about Covid-19. The company intersected bedding-parallel massive sulphides consisting of mainly pyrrhotite with minor chalcopyrite, galena and sphalerite in what it considers is a structural corridor. DLP Resources Inc. optioned to earn 75 per cent from PJX Resources at the **DD** property and extended a hole that was drilled in 2018 to a depth of 1,711 m. DLP encountered hydrothermal alteration with sericite, albite, garnet and silica, and a 14.8 m interval with trace sphalerite. The company began a magnetotelluric (MT) survey on its adjacent claims to the north and east, and drilling to the southwest



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on the **Aldridge 1** property. The first hole, drilled to 1,048 m, encountered highly altered (quartz-albite) sedimentary rocks with abundant pyrrhotite and trace sphalerite, and a 20 cm sphalerite-rich and silicified zone. Further drilling is underway on targets from DLP's 2019 MT survey. The company also plans to drill at the **Aldridge 2** and **Hungry Creek** properties later this year.

At the **Bull River** mine, Braveheart Resources Inc. drilled 831 m (5 DDH) of a planned 3,000 m underground drill program but ceased activities in March because of COVID-19. The holes were all drilled from the lowest mine level and tested mineralization down dip of the south vein. Results included 4.24 m (true width) grading 1.39 per cent Cu, 1.33 g/t Au and 9.51 g/t Ag. The site has a 750 tpd mill and stockpiled ore. The company began design work to upgrade the tailings storage facility and obtain permits to process the stockpiled ore and move towards a mine restart.

In the West Kootenay, Taranis Resources Inc. continued exploring the **Thor** property for gold and stratiform base metals, drilling two holes at the Great Northern zone. Taranis also continued sampling and worked on obtaining a bulk sample permit. Affinity Metals Corp. continued drilling the **Regal** property on its Allco claims into the fall, with a drill program of more than

3,000 m. The team is targeting Ag-Pb-Zn mineralization in quartz veins and breccias along a regional northwest-southeast fault and drilling on airborne geophysical targets surrounding old workings in the area.

Klondike Silver Corp. continued underground drilling at the **Silvana** project early in the year, but suspended operations in April, due to COVID-19, after completing

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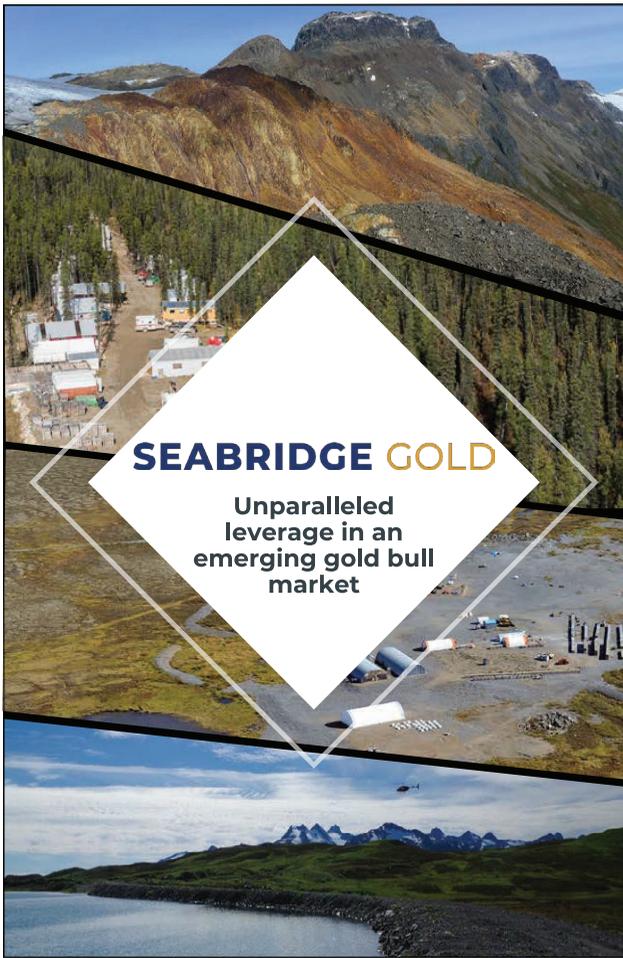


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SOUTHEAST REGION

29 m of a planned 80 m drift to the next drill station. Results from drilling included 0.8 m grading 71.73 g/t Ag, 1.09 per cent Pb and 0.21 per cent Zn.

Rokmaster Resources Corp. optioned the **Revel Ridge** (J&L) property and began underground drilling late in the year to test Au-Ag extensions beyond the historical mine workings and drill sites. The company released a NI43-101 report early in the year and completed preliminary metallurgical test work. The property consists of underground workings and several zones that were historically mined, with previous life of mine average head grades of approximately 6.4 g/t Au, 69.8 g/t Ag, 2.2 per cent Pb and 3.6 per cent Zn.

Industrial mineral projects

Phosphate exploration continued in the southeast. High Brix Manufacturing Inc. completed an additional 1000 t bulk sample at its **Cro** project, for testing as fertilizer.

Coal projects

Teck Coal Ltd. continued exploration drilling in active pits at the **Fording River, Greenhills, Elkview** and **Line Creek** mines and continued exploration in their expansion areas.

Additional coal projects are also in various stages of environmental assessment. Environmental baseline work continued at the **Michel Coal** project (North Coal Limited) and at **Crown Mountain** (Jameson Resources Limited). Both projects also continued design studies on treatment options to comply with water quality guidelines. Jameson also released a bankable feasibility study for Crown Mountain, outlining 1.7 Mty of saleable coal and 57.5 Mt over a mine life of 15 years.

SOUTH CENTRAL AND SOUTHWEST REGIONS

Precious metal projects

After pausing to develop COVID-19 protocols, Osisko Gold Royalties Ltd. began drilling in existing resource and new areas of the **Cariboo Gold** project, following up on earlier results. The company planned about 40,000 m of drilling and, in October, to increase the number of rigs from three to eight and place the project in a new company (Osisko Development Corp.). To date, the highest grade intersection is 6,530 g/t Au along 0.50 m. The company started a bulk sample at Cow Mountain using underground access from the Bonanza Ledge Access Road. The project is in the early engagement phase of a provincial environmental assessment. Osisko updated the project description in 2020 with an increase in proposed average production rate from 4,000 tpd to 4,750 tpd and a mine life of up to 15 years. Before the most recent drilling, Measured and Indicated resources were 19.531 Mt grading 4.7 g/t, with Inferred resources of 19.252 Mt grading 4.0 g/t. The smaller Bonanza Ledge II mine is in development and expected to produce in 2021 with a two-year mine plan.

In an early spring round of drilling at **FG**, Kore Mining Ltd. reported intersections of 32 m of 3.0 g/t Au near surface, 11.0 m



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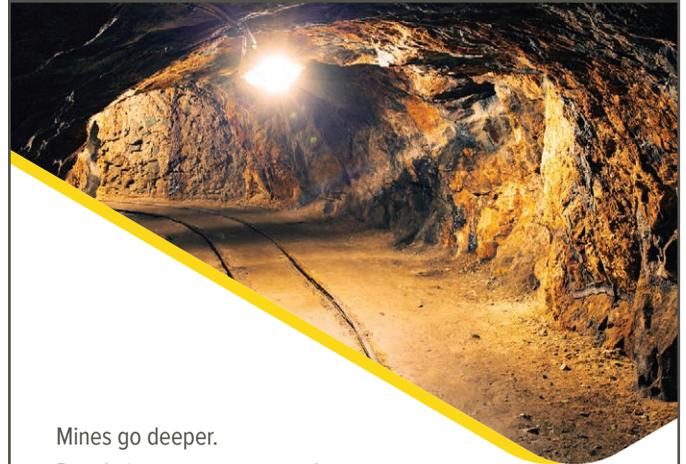
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SOUTH CENTRAL

of 10.0 g/t Au starting at 44 m downhole and a deeper intersection of 52.5 m of 1.1 g/t Au. The company also intersected 10 m of 3.9 g/t Au below the existing resource. Drilling resumed in July for an additional 5,000 m (planned). Kore increased its land holdings in the area to 99,990 ha.

Talisker Resources Ltd.'s 17,000 m drill program at **Bralorne** intersected high-grade gold veins in the Bralorne mine area. Highlights include 102 g/t Au along 0.5 m within 30.98 g/t along 1.7 m. The current drilling is part of a larger project to update the resource estimate. Infrastructure at the site includes a tailing storage facility, a water treatment plant and mining equipment. A 100 tpd mill was disassembled but the building was left in

Vuggy open-space quartz and limonitic volcanic clasts in a trench exposure of the Giant Vein, one of the drill targets at Tempus Resources' Blackdome epithermal gold property



place. Current Measured and Indicated resources are 211,000 tons at 0.341 oz/t Au, with a further 317,000 tons 0.231 oz/t in the Inferred category. Talisker has expanded its land holdings in the Bridge River camp by acquiring neighbouring properties.

Talisker also has a \$3.5 million regional exploration program, the **Spences Bridge Gold** project, that follows up on reconnaissance geochemical sampling in 2019. The company holds tenures on approximately 194,000 ha of a northwest-trending belt of mainly Spences Bridge Group (Cretaceous) volcanic rocks with epithermal precious metals targets.

Spanish Mountain Gold Ltd. started geotechnical drilling and test pits at **Spanish Mountain** in August. Exploration drilling was scheduled for the fall to expand the existing resource at the Main Zone. The company withdrew the project from provincial

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AND SOUTHWEST REGIONS

environmental assessment at the end of 2019 in anticipation of adjustments to the project's scope and new regulations.

Westhaven Gold Corp. planned at least 30,000 m of diamond drilling at **Shovelnose**, with targets outside and within the South Zone area, the main focus since a 2018 discovery of higher-grade epithermal Au mineralization than was previously known on the property. An outcrop discovery, the Franz vein zone, about 2.8 km from the South Zone returned a grab sample of 51.10 g/t Au, 165.00 g/t Ag. Initial drilling at the Franz zone returned 7.78 m grading 14.84 g/t Au and 39.40 g/t Ag.

Freeform Capital Partners Inc. entered into an agreement with Bayshore Minerals Incorporated, which holds the **Elk Gold Project**, with Freeform and Bayshore being renamed the Gold Mountain Mining Corporation. Freeform updated the resource estimate and commissioned a preliminary economic assessment. Measured and Indicated resources of 2,699,000 t at 5.22 g/t Au and 9.23 g/t Ag and Inferred 454,000 t 6.40 g/t Au and 14.17 g/t Ag support a conceptual 10-year 70,000 tpy mine.

In the Zeballos gold camp, Privateer Gold Inc. began a fourth year of drilling at **Surespan Gold**, planning approximately 4,000 m. They also reported a soil geochemical survey. Privateer has consolidated Crown grants and mineral tenures covering several past producers in the historical camp.

Tempus Resources Limited had drilled 5,000 m at **Blackdome** by early October. They planned to move to the **Elizabeth** area for a planned 6,000 m upon receiving a permit. Tempus acquired the two linked properties as the **Blackdome-Elizabeth** gold project in 2019. Blackdome is a past gold producer; Elizabeth is a gold vein prospect 30 km south.

Eagle Plains Resources Ltd. mobilized for a planned 1,500 m, five- to seven-hole drill program at the **Donna** project following a 211 km airborne magnetic and radiometric survey. Targets include near surface intrusion-related Au at a gold-in-soil anomaly and in the Morgan Mine area. Eagle Plains will also test for evidence of deeper porphyry style mineralization.

Omineca Mining and Metals Ltd. has expanded its **Wingdam** placer gold project to include hard rock targets with about 8,000 m of drilling to test suspected nearby bedrock sources of placer gold. They are also dewatering workings and plan to resume underground recovery of placer gold.

Cu-Mo, Cu-Au-Ag, Mo (porphyry) projects

Kodiak Copper Corp. drilled its **MPD** property following positive late 2019 results targeting mineralization below the approximate 200 m depth of historical exploration. Initial 2020 results included 282 m of 0.70 per cent Cu and 0.49 g/t Au (from 263 to 545 m in one hole) encouraging investment by Teck Resources Limited and plans for the program to continue into the fall and winter. The property is a consolidation of the Man-Prime and Dillard properties.

GSP Resource Corp. started drilling at the **Alwin Mine** project. The company reported completing eight shallow holes targeting replacement Ag-Au-Cu mineralization like that mined historically at Alwin, and starting drilling aimed at a deeper porphyry Cu target.



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At the **Woodjam** project, Consolidated Woodjam Copper Corp. drilled to test gold content and grade continuity between holes at the Deerhorn Cu-Au zone, an area with inferred resources.

Pacific Empire Minerals Corp. drilled 1,049 m in 10 reverse circulation holes at **Worldstock**, an early-stage porphyry Cu-Au target. At relatively low cost, the team explored using a drill rig mounted on tracks to test sites along existing roads.

Sego Resources Inc. returned to the **Miner Mountain** porphyry Cu-Au project with drilling and trenching. Notable early results included 30 m of 1.02 g/t Au in trench sampling at the Southern Gold zone, a new target. Additional mapping and trenching may be followed by drilling late in the year. SeGo completed 1,213 m of drilling in their Granby-Cuba area in the summer.

New Gold Inc. continued exploration at **New Afton**, both underground and on the Cherry Creek trend to the west of mining operations. New Gold indicated its intention to begin drilling, potentially at more than 100 sites.

Copper Mountain Mining Corporation tested the depth of mineralization at the New Ingerbelle pit at **Copper Mountain** with two holes. One returned 585 m grading 0.33 per cent Cu, 0.21 g/t Au and 0.45 g/t Ag; the other, 120 m grading 0.69 per cent Cu, 0.37 g/t Au and 1.55 g/t Ag. New Ingerbelle reserves were added to Copper Mountain's mine plan in 2019. The mine now has a 31-year projected life.

At **Mount Polley**, Imperial Metals Corporation conducted an IP survey over the mine site to guide interpretation of a survey conducted to the northwest in 2019. Drilling was planned for fall and winter. Mount Polley suspended mining in 2019 pending higher copper prices. Current reserves would sustain six to seven years of mining at previous rates.

Happy Creek Minerals Ltd. carried out hyperspectral mineral and alteration studies at its **Rateria-West Valley** project. Drilling was planned for the fall.

Part of EnGold Mines Ltd.'s exploration at the **Lac La Hache** property included a hole testing porphyry mineralization at the Ann North prospect several kilometres southeast of the Spout and G1 skarn targets (also drilled). The

deep hole encountered sub economic grades, but potassic alteration consistent with a porphyry model. Farther east, EnGold reported discovering gold in outcrop at their Aurizon West zone.

Copper King Explorations Ltd. drilled at its **Copper King** property, a porphyry Cu-Au prospect near a past (1930s) producer in rocks of the Iron Mask batholith.

Base and precious metal projects

Nyrstar Myra Falls Ltd.'s parent company is majority owned by a private trading company, Trafigura Group Pte. Near-mine exploration at **Myra Falls** has been ongoing for several years and continued in 2020, including more than 10,000 m of underground exploration drilling, VTEM geophysics, and planned surface drilling.

Taseko Mines Limited released an updated feasibility study on its **Yellowhead** (formerly Harper Creek) project. The company plans to restart the terminated environmental assessment of the project. The study included updated Proven and Probable reserves of 817 Mt grading 0.28 per cent Cu, 0.030 g/t Au and 1.3 g/t Ag. Yellowhead is a proposed 90,000 tpd open-pit operation with a 25-year life.

EnGold Mines Ltd.'s drilling at **Lac La Hache** intersected magnetite-chalcopyrite mineralization at the G-1 zone, a 2017 discovery of Cu-magnetite-Au-Ag skarn mineralization about 2 km southeast of the Spout copper deposit, also a Cu-Au-magnetite skarn. Highlight initial results included 22.4 m grading 1.29 per cent Cu, 0.11 g/t Au, 1.76 g/t Ag and 24.71 per cent Fe.

Nicola Mining Inc. reported a resource estimate and metallurgical testing for the South dump and Portal area dump at the **New Craigmont** project (Inferred 18.7 Mt grading 0.13 per cent Cu).

Tungsten projects

Happy Creek Minerals Ltd. is drilling at the **Fox Tungsten** property. The planned eight-hole program will step out from previous intersections, including 5 m of 1.0 per cent WO₃ and 6.3 m 0.43 per cent WO₃. Another hole will test a recent discovery of scheelite several km from the existing Ridley Creek resource area.

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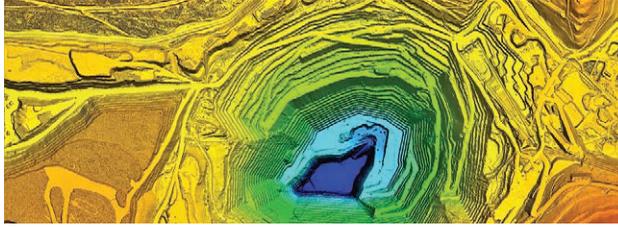


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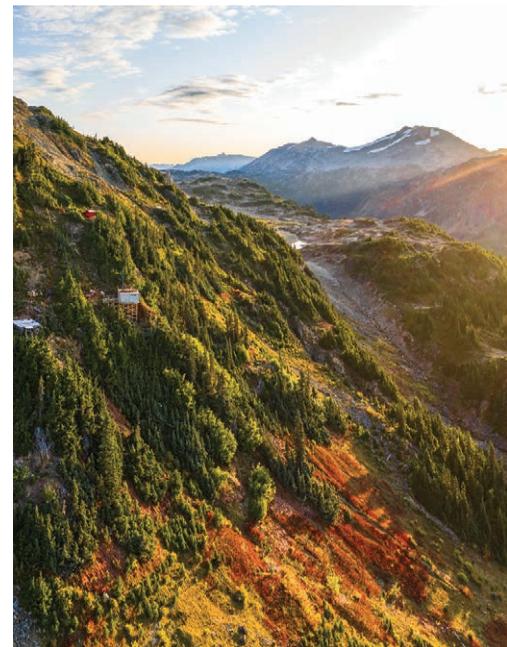
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the BCGS geospatial web service. The wide array of information, services and products provided by BCGS supports effective mineral exploration, sound land use management and responsible governance thus informing decisions that balance the economy, the environment and community interests. The survey is the oldest scientific organization in British Columbia, having celebrated 125 years of public service in 2020.

BCGS plans for the 2020 field season were drastically changed by the pandemic; the "lockdown" starting in March coincided with the normal period of fieldwork planning. Following an initial decision to suspend multi-year mapping

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significant swaths of northwest British Columbia, focusing on areas near Dease Lake, Decar, Polaris, the southern Nicola Arc, southern Quesnellia and Johanson Lake. An extensive program of laboratory analysis, using recently collected and archived samples, continues to build geoscience knowledge across a range of projects and initiatives. Early October saw the successful delivery of an online workshop, "Cordilleran Geoscience: a 2020 Perspective." Planned in collaboration with the Geological Survey of Canada, the Yukon Geological Survey and the Pacific Section of the Geological Association of Canada and comprising 10 presentations, the meeting connected with more than 250 delegates.

Fieldwork undertaken on southern Vancouver Island in August supported an ongoing commitment to innovation and technology development at BCGS. Selected field locations hosted trials of mercury detection technology, which can measure miniscule variations in

atmospheric concentrations to detect buried ore deposits. Similarly, work progresses on developing technology and software that enable the rapid capture of geophysical information using drones.



Mineral potential assessment is now a renewed focus for the survey, with an emphasis on supporting government and stakeholders in land-use planning and policy. BCGS pioneered mineral potential assessment in Canada during the early 1990s, but the more recent development

of innovative analytical techniques and machine learning technology offers the opportunity to update methods and greatly improve results. The development of digital data sources and applications such as MapPlace have been a focus of recent activity and place the survey in a strong position to apply these new analytical techniques. Boosted by the recruitment of Dr. Evan Orovan, an economic geologist specializing in minerals systems, the survey is now developing innovative approaches that will be rolled out to re-assess mineral potential across the province in a multi-year, phased project.

The BCGS houses, maintains and regularly updates databases including MINFILE, COALFILE, Property File, and the Assessment Reports Indexing System (ARIS). MINFILE documents more than 15,000 metallic mineral, industrial mineral



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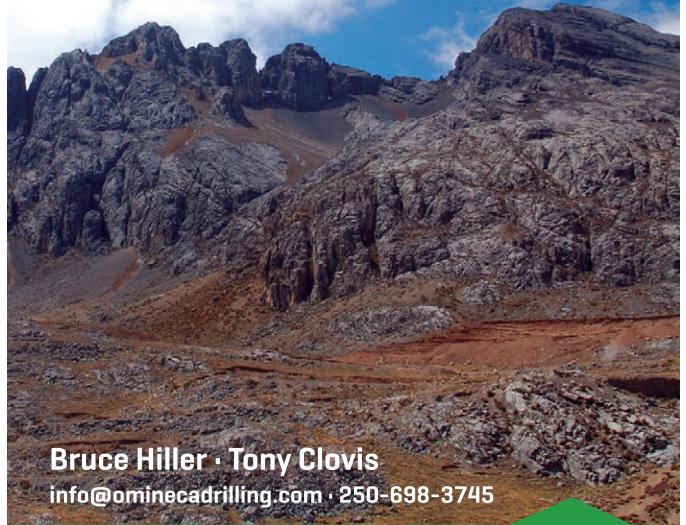


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and coal occurrences. COALFILE includes a collection of 1,030 coal assessment reports. Property File has more than 84,000 reports and maps documenting exploration activity in British Columbia since the late 1800s. ARIS has more than 38,200 mineral exploration assessment reports.

Traditionally, data in assessment reports have been embedded in non-digital electronic files (e.g., .PDF) making them difficult to extract and use. The BCGS has embarked on a program to encourage digital submission of ARIS data using digital data files such as spreadsheets, databases, maps and grids. Explorationists will benefit because digital data can be easily retrieved, integrated and recast for specific needs. Digital submission will also enable the Survey to better maintain province-wide databases and create derivative products that use past results to guide future exploration. The assessment report-sourced surface sediment geochemistry (ARSSG) website now has digital data captured from more than 108,000 samples and includes

more than 4.3 million determinations from 391 assessment reports. In addition to continued work capturing geochemical data, drill-hole data and footprints for geophysical surveys are also being collected from assessment reports.

The BCGS continues to maintain geochemical databases with multi-element analyses from rock, till, stream- and lake-sediment, water and coal ash samples. The databases include more than five million determinations from about 86,000 samples. A compilation of more than 150,000 ice-flow indicators digitally captured from published and unpublished surficial geology, terrain, glacial features and bedrock geology maps is available. In addition, a new geochronological database is scheduled to be launched in late 2020, complementing regular updates to published litho-geochemical and regional geochemistry databases. The BCGS offers province-wide integrated digital coverage of bedrock geology, including all details from compilation of field mapping at scales from

1:50,000 to 1:250,000 and incorporating regular updates from field mapping.

The British Columbia Geological Survey is a government organization representing the province. Similarly, the Geological Survey of Canada is a government organization representing the country. Geoscience BC (GBC) is a not-for-profit, non-government organization funded by provincial government grants. GBC supports mineral and oil and gas investment in British Columbia through the funding and delivery of geoscience projects contracted to third parties. Major projects include significant geophysical and geochemical surveys and grants to universities and consultants for targeted geoscience projects submitted in response to requests for proposals. GBC is governed by a volunteer board of directors and receives technical direction from volunteer technical advisory committees (mineral exploration, oil and gas and geothermal) whose membership is largely drawn from industry. 



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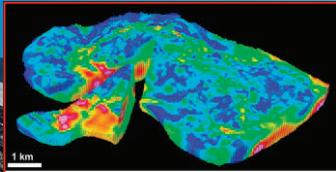
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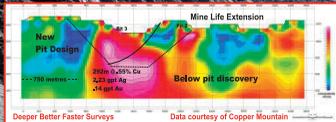
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Putting Safety First

Born out of a tragedy 40 years ago, AME's Health & Safety Committee is helping explorers across Canada have a safe day every day

By **KYLIE WILLIAMS**

The AME Health & Safety Committee celebrated a milestone birthday in 2020: 40 productive and impactful years.

Exploration manager David Barr, a now-familiar name to AME members, created the Health & Safety Committee in late 1980. Barr was motivated to assemble the first safety committee at what was then the B.C. & Yukon Chamber of Mines after he lost a team of explorers in a helicopter crash in the Iskut River area on July 3, 1980.

First, Barr asked the new committee members to distill their years of field safety knowledge into a single handbook for explorers in B.C. and Yukon. AME published the original edition of the *Safety Guidelines for Mineral Exploration in Western Canada* in 1982, dedicated to the crew that died two years earlier. The committee keeps the handbook updated, and AME published the fifth edition in 2013. It was reprinted several times to meet demand.

"The handbook is one of the many tools we, as a committee, use to raise awareness of the risks faced by mineral explorers in B.C.," says Kim Bilquist, program leader, Health and Safety Project Development Group at Teck Resources Limited. "Our motto is 'Have a safe day every day,' and our role is to support and provide tools to AME members to identify hazards and assess the risks to protect the health and safety of workers and the physical environment during our activities."

Bilquist has chaired the Health & Safety Committee since 2018 and has been an active member of the committee since 2012. As of September 2020, the committee had 14 members, all specialists in health and safety, representing junior explorers, major mining companies and drilling companies. Jonathan Buchanan, director, regulatory and technical policy at AME, has been the staff

lead for this committee since 2005.

The committee also distributes and compiles the annual Canadian Mineral Exploration Environment, Health and Safety Survey, in partnership with the Prospectors & Developers Association of Canada (PDAC). Initially a B.C. and Yukon initiative, the survey was extended nationwide in 2005 when the health and safety committees of the two organizations became partners in this research.



Kim Bilquist, program leader, Health and Safety Project Development Group at Teck Resources Limited

"We publish the results of the previous year's survey at Roundup each year," said Bilquist. "At the Environment, Health & Safety Awards Breakfast this year, we released our 14th national survey: 117 organizations responded in 2018, which is a new record for us, up from 88 in 2017."

Nearly 1,000 people have attended the annual in-person safety workshops that the committee has organized and run every spring since 2004. The workshops help prepare workers who may be new to fieldwork, particularly students and managers supervising teams in the field.

In recent years, the committee developed online tools for explorers to

increase safety, including a helicopter slinging training video built in partnership with PDAC and a scalable, interactive risk-management tool used by major companies and junior exploration members alike.

"These tools are custom-designed for junior explorers working in B.C. who may not have the resources or expertise the bigger companies have to step through a risk assessment," says Bilquist.

The Health & Safety committee

also reviews nominations for the David Barr Award, presented annually at the awards gala at Roundup and the Safe Day Every Day awards, jointly presented by AME and PDAC at the Environment, Health & Safety Awards Breakfast. The awards recognize leadership, innovation excellence, performance and long-standing contributions in exploration safety.

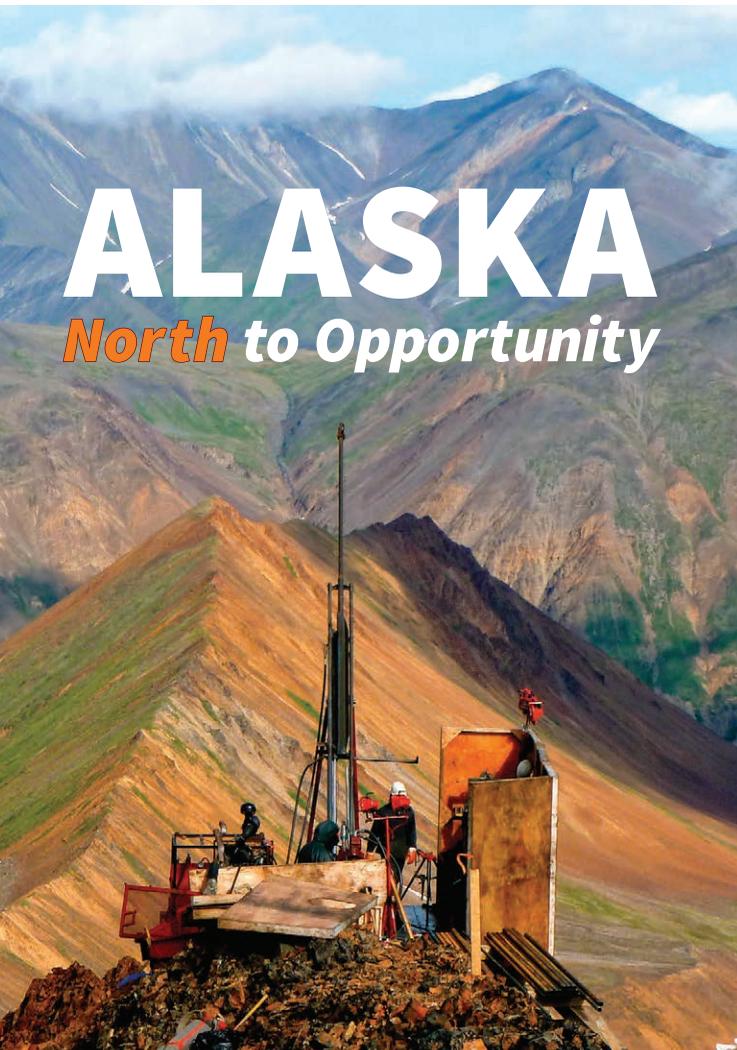
"We receive input from the annual survey and directly from members to identify trends and health and safety challenges our members are experiencing," says Bilquist. "This input focuses our work as a committee. Please reach out: your idea may be the next topic we focus our efforts on." **A**

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Are We Making Progress on Diversity and Inclusion?

Spoiler: Yes, some, but not as quickly as you may think

By **KYLIE WILLIAMS**

Change is hard. Think back to the time, decades ago, when safety was not a top priority for mineral explorers. How did we move forward to today, where every meeting starts with a safety share, and every field day starts with a toolbox meeting?

We critically analyzed the risks and decided the business and personal consequences of maintaining the status quo were not acceptable. Over many years, champions for health and safety worked tirelessly to raise awareness and introduce a new vocabulary around risks, hazards and controls. Senior managers led by example and insisted that health and safety be a priority, ingrained in our culture. The small number of incidents and reported near misses provide a constant reminder of that priority.

Now, we must apply the same effort and energy to improving diversity, equity and inclusion.

Barriers to diversity, equity and inclusion are not limited to women. Other underrepresented groups, including Indigenous people, immigrants, people of colour, people with disabilities and LGBTQ+ people, face similar barriers. This article discusses women specifically because data is more readily available.

Progress? The data says otherwise

On the surface, we appear to have made modest gains, particularly concerning gender diversity. Before the 1960s, there were close to zero women in mineral exploration roles, and today, around 15 per cent. This is progress, but the industry remains over 80 per cent male in almost all categories, particularly in senior roles.

The disconnect between verified data and individual perception of progress is a major stumbling block.

According to McKinsey & Company's 2017 "Women in the Workforce" report, many employees think women are well represented in leadership when they see only a few. Any urgency to change is calmed if we can list a handful of successful women. In exploration and mining, the names Eira Thomas, president and CEO of Lucara Diamond, Michelle Ash, former chief innovation officer at Barrick Gold, Cynthia Carroll, former CEO of Anglo American, and our own Kendra Johnston, president and CEO of AME, are often cited examples.

If a few women have broken through the glass ceiling, it is easy to think that the barriers women face no longer exist. This acceptance of small deviations from the norm lies in stark response to the rapid response a single safety breach receives.

Organic vs. systemic change

Any assumption that mineral exploration and mining companies can maintain the status quo and inclusion and diversity will

naturally increase without additional effort is false, explains Jamile Cruz, engineer and founder of diversity and inclusion consulting company, I&D 101.

"There is nothing organic about the way we manage health and safety today," says Cruz, noting, for example, the prescriptive health and safety signage at every mine, office and exploration project in our industry. These signs do not simply say "use your judgement" but issue specific instructions in response to identified hazards, right down to handrail use and wearing certain personal protective equipment.

Over the past two decades, Cruz transitioned through various roles as an engineer on major mining projects, including Voisey's Bay, into a consultant helping companies build diversity goals into overall business strategy, working with leaders to shape inclusive workplace cultures.

"It became very clear, the higher I got, how lonely I was, first through the gender lens and then, even though Toronto is very diverse, through a race lens," says Cruz. "Gender, ethnic and other aspects of diversity are definitely not reflected at the executive levels in mining companies."

Cruz says that progress on diversity and inclusion will gain momentum when we recognize the difference between organic and systemic change.

Building forward momentum

Cruz uses a change maturity curve to explain our progress. Over the course of any significant structural change, an organization will progress from inactive, through reactive and active, to proactive and to the end goal of dynamic integration.

"The industry as a whole is still moving from inactive to reactive," says Cruz, characterizing inactive as a person embarking on a new exercise and eating regimen who knows they are supposed to be eating fruits and vegetables and exercising, but sits on the sofa, wishing for a healthier lifestyle.

"Now, apply the same approach to inclusion and diversity in mining," says Cruz. "Are we doing the basic steps needed to call ourselves an inclusive industry and to achieve our goals?"

To move forward, says Cruz, we need to make the required changes to our systems so they deliver the outcomes we

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A BOYS CLUB... FOR GIRLS

The Artemis Project helps women-led contractors overcome the “buddy” system

Diversity and inclusion must also expand beyond a company’s walls and into its supply chain. In exploration, these are service providers and suppliers such as helicopter and drill companies, specialist technical consultants, laboratories, heavy equipment operators, seasonal workers and more.

Consultants Elisabeth Ronacher and Jenna McKenzie co-founded Ronacher McKenzie Geoscience in 2014 to supply integrated geoscience technical services to exploration companies. The team has grown to include additional senior exploration specialists but Ronacher and McKenzie noticed that contracts were passing them by.

“Potential clients have admitted to going with “buddies” despite our integrated offering,” says McKenzie, noting that people rarely reach out to new suppliers. This short-sightedness fits into the inactive stage of the change maturity curve.

So, when Ronacher and McKenzie heard about a new network for women entrepreneurs called the Artemis Project, they were at once interested. The Artemis Project, founded by Heather Gamble and Laura Mottola, is a business generator that actively connects female entrepreneurs with large mining companies. The goal is to help established, women-led businesses grow and reach new clients while providing an untapped stream of diverse perspectives and skills to help companies innovate and meet environment, social and governance goals.

“Being an entrepreneur can be lonely,” says diversity consultant Jamile Cruz, a fellow Artemis member, “What Artemis does is put women-led companies and entrepreneurs in front of decision-makers.”

“We don’t want preferential treatment; we just want to be noticed,” adds Ronacher, “We want to be shortlisted so we can be considered for opportunities and then present our technical capabilities.” ■

want. In other words, systemic change.

The single act of recruiting one woman to your board is just the start of the reactive phase. Systemic change requires an orderly approach, investment allocation, definition of clear goals and accountability, and assignment of directed resources.

“We need to be setting key performance indicators like we do with safety and environmental goals,” Cruz says. “We must set goals and measure our performance. Business as usual is not good enough.”

Just as field geologists must immediately locate themselves on the map when in new terrain before planning their next steps, we, as an industry, must take a moment to locate ourselves on the diversity and inclusion maturity curve. Only then can we start applying the same rigours we have applied to health and safety reform to disrupt the diversity and inclusion status quo in our workforce. ▲



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Fact or Fiction

Which tales do your surficial samples tell?

By **DAVID SACCO**, PEGG

Every surficial sample, be it soil, surface sediment or vegetation, tells a story. The challenge in mineral exploration is knowing whether that story belongs in the fiction or non-fiction aisle. As surficial geologists, our job is to help make that determination.

An exploration program that properly considers the nature of the overburden – or surficial geology, to be more explicit – invariably saves money and expedites the path to successful drilling. Overburden is a dynamic tool for mineral exploration, yet many exploration geologists do not know how to use it effectively. Unfortunately, it's still all too common to conduct generic “soil” sampling along a grid without considering the surficial geology. In previously glaciated terrain, these soil grids have a high potential to mislead exploration. Surficial geologists are sometimes completely omitted from mineral exploration projects. But I guess this isn't *that* surprising, considering few geology programs offer courses that even touch on the application of Quaternary science to mineral exploration; many geologists finish school without learning how important and complex the implications of surficial geology can be. Without this surficial context, the line between fiction and non-fiction becomes blurred.

Surficial samples are commonly used as a foundation to direct geophysics and drilling programs. My colleagues and I have spent a lot of time in the field and have seen firsthand how the quality of surficial exploration data can influence the success of a program. It is essential that the surficial exploration data are reliable or the project will be at risk of costly mistakes. We've had the pleasure to meet and learn from a lot of clever geologists. If we've done our jobs correctly, they've also learned from us. Working together, we've witnessed the “aha moment” when the importance of understanding the surficial setting really hit home. Some of these moments lead to exciting stories where an

important tool was added to someone's mineral exploration toolbox, and others were unfortunate tales of deception.

Let's start with a historical fiction about diamond exploration in the Lac de Gras region of the Northwest Territories. The client had been following a poorly defined dispersal of indicator minerals in till. There were subtle patterns apparent in the vintage, washed-out air photos, but it was difficult to determine if or how the dispersal definition was related to these patterns. So, off we went to investigate.

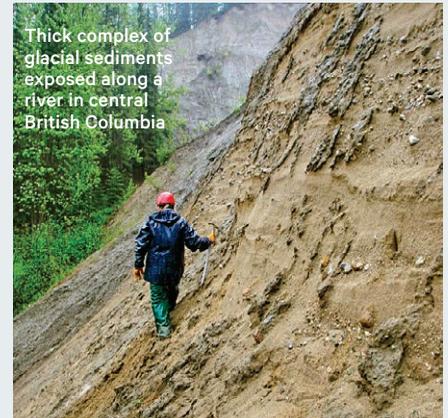
After breaking one of our only two shovels, we cautiously proceeded to characterize gravelly diamicts, conspicuous mounds of poorly sorted sediment and outcrop-scale evidence of fluvial erosion. It became clear that predictable pathways were reworked by meltwater. The area was generally mantled by till, as indicated in the regional mapping, but this existing mapping did not identify the subtle processes that affected the till after deposition. Armed with field-verified calibration points, we re-examined the air photos, delineated the areas affected by meltwater and filtered out the reworked till samples.

The resulting dispersal was better defined and provided a better understanding of the source area. Our clients learned that not all till is “good till” and that it's important to consider subtle differences in sample media that may affect their comparability. We learned that conventional surficial mapping protocols did not provide all the information necessary to inform exploration. Going forward, we would tailor our surficial geology interpretations to include the unique characteristics of each surficial environment that can affect exploration.

Now a mystery story about soil sampling. To be clear, we're referring to sampling near-surface soil horizons with the



David Sacco



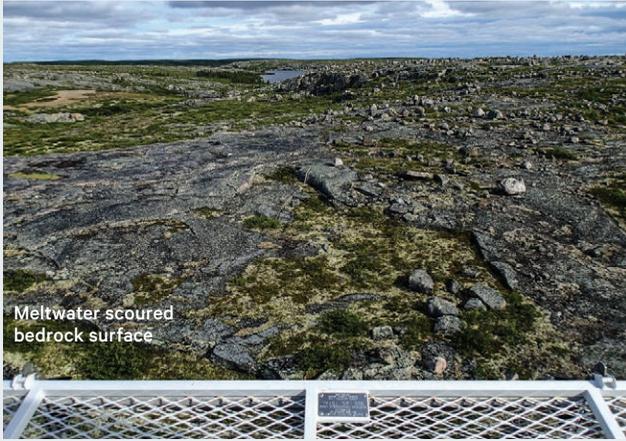
Thick complex of glacial sediments exposed along a river in central British Columbia



Helicopter drop-off on a diamond property in Northwest Territories

expectation that the results are comparable and/or indicate mineralization in *underlying* bedrock. This common default approach to sampling and interpretation is a direct-detection method carried over from regions like Australia or Argentina where soils and soil anomalies have developed over hundreds of thousands of years. Unfortunately, the soils in previously glaciated terrain are typically too young, and the materials too complex, for this method to be effective.

A recent example of this comes from a gold project in northern British Columbia. After a series of unsuccessful drilling campaigns, the client asked us to visit the site and review the soil sampling program results. We investigated several sample sites with the client and discussed the different materials and their varying potential for soil



development. We then talked about the fundamental differences between anomalies that are displaced due to clastic transport and those that occur directly over mineralization. It was the same old story – the soil sampling program simply followed the classic exploration model, which yielded unreliable targets. Our subsequent work provided a foundation to distinguish samples that underwent clastic dispersal from those with direct-detection potential. It also filtered out samples for which a source could never be accurately identified. A re-evaluation of the data using this surficial context revealed several of the previous targets as false anomalies.

Lastly, a parable about surficial geology and exploration. An established company with talented geologists was running a remote till sampling program following up several anomalous reconnaissance surface sediment samples. While crews were out filling hundreds of sample bags, our team headed toward the three anomalous sites that spurred the follow-up survey and our project involvement. En route to the survey area, we could see that glacial meltwater had significantly altered the landscape. The first anomalous site was a lag deposit within a large meltwater corridor. The second anomalous site was a paleoshoreline from a glacial lake that had long-since drained, and the third was an esker fragment.

This complex terrain was full of materials that had similar characteristics to till, and the geology students hired to conduct the reconnaissance sampling did not have the experience to differentiate these materials. In the end, the expensive program was based on misleading data and culminated in no exploration targets. A preliminary investigation of the surficial geology could have identified that the reconnaissance samples only appeared anomalous because they were assumed to be till.

It seems obvious in this neatly laid out op-ed that overburden may not be the *burdensome* villain its common name suggests, and that it is deserving of more consideration in mineral exploration. But the implications of surficial geology for mineral exploration simply aren't taught in sufficient detail as part of the standard geology curriculum for this consideration to be part of the normal procedure. In two of the three experiences we presented, unravelling this complexity saved our client time and money by leading the exploration program in a more successful direction. The third story is an unfortunate reminder that, without the proper context, the story of your surficial exploration data may belong in the fiction aisle. ■

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Explorer to the Core

Chronicling the varied career of AME past president and life member Don Mustard

By **KYLIE WILLIAMS**

Exploration geologist Donald Kennedy Mustard P.Eng. landed in Vancouver on June 6, 1965, with his wife, three young children and “the clothes we stood up in.” But he had a job, and within a week, he was out in the field. Over the following 50 years, Mustard left an indelible mark on mineral exploration in British Columbia and shaped policy and geoscience research across Canada.

Having celebrated his 96th birthday in September 2020, Mustard maintains a keen interest in exploration geology. Although he officially retired over 25 years ago, he served on several junior exploration companies’ boards well into his 90s.

Scottish-born Mustard left school at 17 and volunteered for military service during World War II. After officer training at Royal Military Academy Sandhurst, he joined the Royal Armoured Corps and saw action in Burma. Postings in India and Egypt followed before returning to Scotland to finish his schooling.

Mustard enrolled in science at the University of Aberdeen. He selected a “fill-in course called geology that I really enjoyed,” he recalls. In 1952, Anglo American plc scooped up his entire graduating class and sent all nine newly minted geologists to South Africa.

Mustard’s first job was supervising five producing gold mines in South Africa’s East Witwatersrand Basin. His first day on the job was also his first time underground.

“I went down a 10,000-foot shaft with five African miners, and I didn’t have any idea what to do,” he says. Squaring off against a dusty rock face with a faulting problem to solve, he simply started drawing what he saw.

Mustard found his feet and discovered additional gold in river channels under

the main reef that extended mine life by five years. The next year, he moved to a large reconnaissance mapping program, where he and a colleague discovered what became one of the world’s largest vanadium deposits. Anglo American promoted him, and he moved to East Africa to evaluate prospects there.

One prospect was a goldfield in central Tanganyika (now Tanzania). The moment Mustard met the Italian operator’s daughter, he fell in love. Don and Iolanda (Mimi) were soon married, and as part of their honeymoon, he took his new wife to a mining conference in Johannesburg!

Later, Mustard resigned from Anglo American and managed his wife’s family’s goldfield in Tanganyika. Massive political unrest in the mid-1960s forced him and his family to flee. An Italian company hired him to travel to New York to discuss a phosphate mine he had visited in Tanzania. During a fateful conversation with the chief geologist of Amax Inc., Mustard negotiated his way to Vancouver, B.C.

As senior geologist with Amax, Mustard was introduced to the Canadian Cordillera while exploring for molybdenum near Pemberton. “The bottom of the property was at 3,000 feet and the top was at 8,000 feet,” he recalls. “I went from doing horizontal geology on the plateaus of Africa to vertical geology in British Columbia!”

Mustard soon switched to copper exploration, managing teams doing generative work on B.C.’s porphyry copper deposits. “In the 1960s Vancouver was one of the world’s great centres of mineral exploration,” he remembers. In 1972, BP plc approached him to form a minerals division. BP provided generous funds, a free hand to build a team of the finest people and instructions to look for “whatever you want.”

He worked in this “dream” role at BP from 1972 until 1986.

The election of the New Democratic Party in 1972 propelled Mustard to join the B.C. & Yukon Chamber of Mines, as AME was then known. The incoming NDP introduced super royalties, a tax regime he says “turned most of B.C. ore into waste” and cancelled five proposed mines and a railway to Dease Lake.

Mustard served as vice-president of “the Chamber” between 1976 and 1978, and as president from 1979 to 1981. The Chamber became an influential voice on national policy matters, and he travelled to Ottawa twice a year to meet with ministers. Soon after, he joined the Natural Sciences and Engineering Research Council grants committee as the sole industry representative amongst “mostly senior university people” to distribute \$60 million in research funding annually.

Mustard’s most significant impact on Canadian geoscience came when he joined the Canadian Committee on the Dynamics and Evolution of the Lithosphere, which chose to fund the nationwide, multidisciplinary LITHOPROBE megaproject. LITHOPROBE studied the crust of the Canadian land mass and offshore margins to examine how the continent formed.

“The first [seismic] line was in southern B.C., and we could actually see the subduction zone for the first time,” he says. This incredible research explored the driving forces behind the deposits we seek today. It was “a magnificent piece of science that hasn’t been matched anywhere,” he says.

Mustard also served on the Canadian Geoscience Council (now the Canadian Federation of Earth Sciences) board for six years and as its president in 1990-1991.

In 1995, AME awarded Mustard the Gold Pan Award for his exceptional meritorious service to the mineral exploration community and, in 2008, he received the Distinguished Service Award from the Prospectors and Developers Association of Canada for “his distinguished contributions to Canada’s minerals industry and this country’s geoscience community.”

Mustard sees a key role for mineral explorers, whom he describes as “the best people in the world,” post-pandemic: “Canada will require substantial funds to recover and rebuild, and one of the major sources will be Canada’s world-class mining industry.” **A**

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