

A DEFINING MOMENT IN OUR TIME

A hiker with a backpack stands on a rocky mountain peak, looking out over a vast landscape. The sky is blue with scattered white clouds. The foreground shows dark, jagged rock formations with patches of snow.

PROSPECTORS &
DEVELOPERS
ASSOCIATION
OF CANADA

2020
ANNUAL
REPORT

2020 ANNUAL REPORT

The Prospectors & Developers Association of Canada (PDAC) is the leading voice of the mineral exploration and development community. With over 7,200 members around the world, PDAC's work centres on supporting a competitive, responsible mineral sector. PDAC is known worldwide for its annual PDAC Convention—the premier international event for the industry—that has attracted over 25,000 people from 135 countries in recent years. Please visit www.pdac.ca

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MESSAGE FROM THE PRESIDENT



Canada's national, provincial, and territorial associations that represent the mineral exploration and development community.

Such advocacy efforts led to the creation of draft legislation to extend timelines by 12 months for spending the capital that junior mineral exploration companies and other issuers raised in 2019 and 2020 via flow-through shares, thus allowing them to safely plan when to best continue operations and avoid penalties that would normally come from not meeting original flow-through share timelines.

To further engage with members, PDAC launched a new platform—PDAC Connect—for members to network, seek advice and share insights for the advancement of the mineral sector. The online platform now provides access to resources, success stories, and advice from members from across the sector that have experienced similar projects and challenges.

And although the pandemic resulted in the cancelation of our Student-Industry Mineral Exploration Workshop (S-IMEW), which annually brings together geoscience students from across the country, our Student & Early Career program continued to support the next generation of talent through access to scholarships, bursaries and internships, in addition to our professional development offerings and growing mentorship program that connects students with industry leaders and paves the way for the next wave of talent to find opportunities in the sector.

This past year was also a period to reflect upon how we as a national association can lead by example and take progressive action to create positive change. During Women's History Month we showcased a series of profiles on female leaders in the industry, and shortly after finalized a new comprehensive policy on Equity, Diversity and Inclusion (EDI) that reflects our continual commitment to expand equity, diversity and inclusion in every facet of the organization's operations and mandate. The policy, currently in the launch phase, features 10 guidelines and actions to be implemented at all levels within the organization by the Board of Directors, Executive Director, committees and governing bodies. This new EDI policy is a reflection of PDAC's commitment to foster safe and prosperous working environments for any and all individuals.

The impact of the pandemic will be felt across the industry for years to come, but if there is a silver lining from the experience it is that we must pool our resources and knowledge together during challenging times and continue—as best as possible—to take care of each other, to improve in small yet impactful ways, and never yield to monumental challenges.

Our industry has faced and overcome such periods many times, and each time we have emerged stronger and more unified. Let's ensure we continue that trend.

Felix Lee
President, PDAC

There are moments in time that shape the course of human history and define us as individuals and a civilization. This past year was one of those monumental moments.

The COVID-19 pandemic—that exploded and spread across the world in a few short months—altered our lives in ways we could have never imagined. And as we followed the pandemic's expansive and devastating impact, it brought about a wave of change that forced us to adapt in ways we never imagined before.

As the magnitude of its profound impact on the sector came into focus, PDAC turned its attention towards providing concrete resources for our membership, and the industry at large, that would assist them in their day-to-day operations and secure some semblance of normalcy and stability.

One of the first actions we undertook was to create a COVID-19 dedicated portal on our website that featured a comprehensive list of support programs offered by provincial agencies and associations, as well as the Government of Canada. The portal also served as an outlet for members to provide feedback and insights on specific advocacy efforts PDAC should undertake as we convened and led weekly teleconferences with the Canadian Mineral Industry Federation—a group comprised of

YEAR IN

With the COVID-19 pandemic impacting every region and economy in the world throughout 2020, here is a look back at some of the major news stories, developments and political decisions that shaped Canada's mineral exploration and development sector in 2020, and how PDAC strove to serve and enhance the interests of our members.

REVIEW

CANADA, US COLLABORATE ON CRITICAL MINERALS

At the start of 2020 the Canada-US Joint Action Plan on Critical Minerals Collaboration is finalized. The action plan serves to promote joint initiatives to advance interests in securing supply chains for the critical minerals needed for manufacturing sectors, including aerospace and defence, and clean technology.

CANADA TUMBLES IN FRASER INSTITUTE'S ANNUAL SURVEY

For the first time in a decade no Canadian jurisdiction ranked in the Top 10 for "investment attractiveness" in the annual *Fraser Institute's Annual Survey of Mining Companies* released in February.

The survey of mining executives ranked 76 jurisdictions around the world based on their geologic attractiveness (minerals and metals) and government policies that encourage or deter exploration and investment. Saskatchewan remained Canada's most attractive jurisdiction for investment (ranking 11th on this year's survey index, down from 3rd the previous year), followed by Ontario (16th up from 20th), Québec (18th down from 4th), and British Columbia (19th down from 18th).

Overall investment attractiveness for Canadian provinces and territories (out of 76)

- 11 Saskatchewan
- 16 Ontario
- 18 Québec
- 19 British Columbia
- 23 Yukon
- 26 Nunavut
- 28 Newfoundland and Labrador
- 30 Alberta
- 34 Manitoba
- 35 Northwest Territories
- 52 Nova Scotia
- 60 New Brunswick

THE TOP 10 ISSUES TRANSFORMING THE FUTURE OF MINING

Deloitte releases its latest *Tracking the Trends* report for 2020 that features insights, strategies and ideas for mining companies to enhance their position and business outlook. The Top 10 items are:

- Getting partnerships and joint ventures right
- The social investor
- Seize opportunity amid uncertainty
- Dynamically managing risk
- The path to decarbonization
- On the road toward intelligent mining
- Modernizing core technologies
- The intersection of talent and community
- Leadership in an Industry 4.0 world
- Tax tribulations.

PDAC ANNUAL OTTAWA RECEPTION

PDAC welcomes 28 Parliamentarians and other guests in February to raise awareness about the mineral exploration and development sector, and to highlight the PDAC Convention. Parliamentary Secretary to the Minister of Natural Resources and MP for Sudbury Paul Lefebvre delivers remarks, and the event is sponsored by Yvonne Jones, Parliamentary Secretary to the Minister of Northern Affairs and MP for Labrador.



Canada backs zero-emission vehicles

While attending the PDAC 2020 Convention in March, Canadian Prime Minister Justin Trudeau announces that the government intends to extend the business tax deduction for zero-emission vehicles and equipment to cover mineral exploration and mining operations, including off-road vehicles. The incentive will provide a 100 per cent write-off of the purchase cost of eligible zero-emission vehicles and automotive equipment in the year they are put in use.

This new incentive aims to encourage businesses, in sectors such as mining, transportation and agriculture, to take advantage of opportunities to upgrade to newer, cleaner technologies.

“We are supporting businesses that are making investments today to help protect our environment for future generations. By making it more affordable for Canadian businesses to make the switch to zero-emission technologies, we can help accelerate our transition to a low-carbon, clean-growth economy and create good middle-class jobs,” said the Prime Minister.

ONTARIO TO BUILD NORTHERN ROAD LINK

The Government of Ontario, Marten Falls First Nation and Webequie First Nation sign an agreement at PDAC 2020 to advance the planning and development of a proposed Northern Road Link in the Ring of Fire region of Ontario.

The plan for the project is to link the proposed Marten Falls Community Access Road at the south with the proposed Webequie Supply Road at the north. The all-season road would improve connectivity and create jobs, increase access to health and social services, along with advancing infrastructure such as high-speed internet and reliable cellular service.

Ontario Minister of Energy, Northern Development and Mines Greg Rickford said during the announcement that: “Our government is proud to partner with Marten Falls and Webequie First Nations to support the development of reliable, all-season road infrastructure and move forward with our shared goal of bringing economic prosperity to the region.”

Located about 500km northeast of Thunder Bay, the Ring of Fire covers an area of around 5,000km² and holds extensive chromite, nickel, copper and palladium deposits.

Geoscientists Canada launches new website

Geoscientists Canada launches a new website called Geoscience in Canada (geoscienceincanada.ca) in March. The free online tool is a comprehensive resource for information on professional geoscientist licensure in Canada. The website is available to all prospective professional geoscientist applicants, regardless of the jurisdiction they may eventually apply.

The resource is designed to inform internationally and domestically trained geoscientists about practicing geoscience and professional geoscience licensure requirements in Canada. The website also includes a variety of resources, such as a licensure readiness self-assessment tool that provides prospective applicants with the ability to anonymously self-assess their geoscience education and work experience as compared to the Canadian geoscience requirements for licensure.

NORWAY ADOPTS CANADA'S INITIATIVE FOR SUSTAINABLE MINING

The national mining association of Norway—Norsk Bergindustri (Norwegian Mineral Industry)—announces that it will adopt the Towards Sustainable Mining (TSM) initiative, a corporate social responsibility program developed by the Mining Association of Canada (MAC), to improve environmental and social practices in the mining sector.

Norsk Bergindustri joins seven other mining associations around the world in adopting TSM, and is the third in Europe and second in Scandinavia after FinnMin. With MAC’s support, Norsk Bergindustri will tailor TSM’s performance areas to reflect the unique aspects of its domestic mining sector and commits to TSM implementation over the next five years.



NEW REPORT ENHANCES LABOUR MARKET INFORMATION

The Mining Industry Human Resources Council (MiHR) and PDAC launch the *2020 Canadian Mineral Exploration HR Outlook* in April. The report examines several overarching themes that cut across exploration employers, contractors, workers, educators, students and affiliates. The report showcases several key findings, including:

- Representation of mid-career workers in exploration is lower than in the mining industry.
- There is a higher representation of women and immigrants than in mining.
- Young people are unaware about exploration careers, which limits the future labour pool.
- Stronger industry/education collaboration is needed to better align learning outcomes with employer skills requirements.



PDAC releases *2020 Innovation in Exploration*

PDAC releases its *2020 Innovation in Exploration* report in June that aims to highlight the effects of innovation on mineral exploration in Canada by identifying advances that have improved costs, efficiencies, rates of discovery, and/or reduced environmental impacts. The report includes detailed cases studies that each tell a story about innovation and represent people and organizations of various size and areas on work in Canada.



STATE OF MINERAL FINANCE

PDAC releases its report, *Mineral Finance 2020: Canada Holding Ground*, that analyzes key factors that impact the business environment of the mineral industry, including: metal prices; financing and exploration activity trends; an update on Canada’s fiscal and regulatory landscape; and the relevant advocacy work being conducted by PDAC.

PDAC COMMITS TO STAND AGAINST RACISM AND DISCRIMINATION

As an organization, member and representative of Canada’s mineral exploration and development industry, PDAC issues a **statement to unequivocally condemn racism, inequity, discrimination and hatred in all forms**. The Association underscores that the industry has always had the potential to make social and economic improvements within communities where it operates, and why equity, diversity and inclusion are strategic priorities for PDAC and remain at the core of our mandate and values.

U.S. LAUNCHES TOOL TO STAKE CLAIM TO RARE EARTH MINERALS

The U.S. State Department officially launches an online tool called the Energy Resource Governance Initiative Toolkit to help America stake claim to many of the world’s rare earth minerals.

The tool highlights the country’s increasing concern about securing a stable and viable supply of critical minerals used in such products as solar panels, car batteries and wind turbines. Some of the resources come from emerging markets deemed too risky by U.S. investors who require best-in-class standards.

GOVERNMENT SUPPORTS SECTOR WITH GEOSCIENCE INVESTMENT

Canada’s Minister of Natural Resources, the Honourable Seamus O’Regan, announces in July that the **government will invest \$98 million over five years** to renew two flagship geoscience programs led by the Geological Survey of Canada: the Geo-mapping for Energy and Minerals program and Targeted Geoscience Initiative. PDAC recommended that both programs be renewed to support public geoscience work in Canada.

The Geo-mapping for Energy and Minerals program provides geoscientific knowledge of the immense untapped resources in Canada’s North, and informs mineral resource opportunities in the context of a changing climate. The Targeted Geoscience Initiative provides next-generation geological knowledge and innovative techniques to target deeply buried mineral deposits.

FEDS PROPOSE EXTENSION OF FLOW-THROUGH SHARE TIMELINES

As a result of PDAC advocacy, the **Federal Department of Finance proposes changes to Canada’s flow-through regime** to allow issuers an additional 12 months under both the general rule and the look-back rule.

This change will provide companies with operations that are impacted by COVID-19 additional time to incur eligible expenses, allowing them to safely plan when to best continue operations and to avoid costs from not meeting original flow-through share timelines. This initiative will protect the good, well-paying jobs that many Canadians depend on, including those in rural, remote, northern and Indigenous communities.

PDAC CONNECT GOES LIVE!

PDAC launches a new platform—**PDAC Connect**—for members in May to network and seek advice, as well as share issues, questions and solutions for the growth and advancement of the mineral industry. The online platform also provides access to resources, success stories, and advice from members across the sector that have experienced similar projects and challenges.





PDAC's recommendations for budget 2021

To enhance Canada’s mineral exploration and development sector, **PDAC provides eight recommendations for Federal Budget 2021** in August to increase Canada’s mineral industry competitiveness. As an industry that employs over 719,000 Canadians in rural, remote, northern and Indigenous communities, and contributes 5% to Canada’s GDP, government action is critical to help the mineral sector continue to be a key driver of Canada’s economy. Here are PDAC’s recommendations:

1. That the government increase the Mineral Exploration Tax Credit (METC) from 15% to 30% in each province, and to 40% in each territory, until 2024, in conjunction with the five-year METC renewal in 2019, with a mechanism to extend it further.
2. That the government consider adding a “Force Majeure” clause into legislation that would provide a regulatory mechanism to suspend or defer the timelines associated with flow-through shares (FTS) in the case that an event such as the current COVID-19 pandemic reoccurs.
3. That the government equitably distribute the \$98 million committed to the Targeted Geoscience Initiative (TGI) and Geo-mapping for Energy and Minerals (GEM) program over the next five years.
4. That in recognition of the recently announced investment towards geoscience initiatives, the government commit additional funding to identify, geologically map, and model critical mineral prospective regions in Canada.
5. That the government create a federal funding mechanism to help provincial and territorial governments undertake comprehensive mineral resource assessments, based on geoscientific studies, in order to understand and incorporate the value of mineral potential into land management decisions.
6. That the government establish an inter-departmental government-industry taskforce to investigate policy options and make recommendations to accelerate exploration and development of mineral resources critical or Canada’s transition to a low-carbon economy.
7. That the government establish a broader mandate for the Economic and Finance Subcommittee Inter-Governmental Working Group (IGWG) to identify priority areas for regulatory modernization of the FTS regime, and commit to such a modernization initiative.
8. That the government commit to significant investments in housing, water, and access to high-speed internet, and others that contribute to improved health and educational outcomes and enhances engagement between government, the mineral industry and Indigenous communities under pandemic and post-pandemic conditions.

CANADIAN MINERALS AND METALS PLAN (CMMP) UPDATE

Building off the preliminary Canadian Minerals and Metals Action Plan (CMMP) launched at the PDAC 2020 Convention, Natural Resources Canada (NRCan) updates developments to their **Pan-Canadian Initiatives** in September, including new collaborations with industry and governments. Notably, the Federal Government has made strong progress to advance Canada’s role in critical minerals. PDAC continues to engage with NRCan on CMMP and its related initiatives.

PDAC CELEBRATES WOMEN IN THE INDUSTRY

During Women’s History Month in October, PDAC releases a **series of profiles on women in the sector** who have made outstanding contributions to the Association and to the mineral exploration and development community.

ADVOCACY WEEK ON PARLIAMENT HILL

PDAC undertakes its first virtual Advocacy Week on the Hill in October to share insights and discuss the current state of mineral exploration and development, where it is headed, and how the government can help position it to drive Canada’s economic recovery. Over four days, the PDAC team met with 21 parliamentarians and staff representing all four political parties, focusing their discussions on PDAC’s 2021 Federal Budget recommendations.

EVALUATION OF TARGETED GEOSCIENCE INITIATIVE PHASE 5 (TGI-5)

Environment and Natural Resources Canada (NRCan) makes its **Evaluation of Targeted Geoscience Initiative Phase 5 (TGI-5) report available online**. The report presents findings and recommendations from the five-year program, and includes an overview of planning, design and implementation for the recently announced iteration of TGI.

PDAC HOST FIRST LIVE “ASK ME ANYTHING” WEBINAR

Through the Association’s **PDAC Connect** platform, the Association hosts its first AMA (Ask Me Anything) session in December with members in the sustainability development community. The live, 45-minute Q&A is hosted by Sabrina Dias, Founder and CEO of SOOP Strategies, and features an open discussion on sustainability, ESG risks, COVID-19 and its challenges, and the impact of sustainability on mining.

CANADA LAUNCHES MINING ENERGY BENCHMARKING PLATFORM

Natural Resources Canada (NRCan) and MiTRAQ unveil the Mining Energy Benchmarking Platform that promotes energy efficiency and supports a transition to the low-carbon future for Canada’s mining sector. The platform enables analysis of power generation and consumption at mine sites and provides data-driven insight into energy use productivity. Miners can anonymously compare their sites’ energy efficiency to the aggregated data supplied by peers, and the platform includes customizable indicators that are built specifically for open-pit and underground mines producing 46 different minerals and using power sources ranging from diesel to renewables. NRCan will subsidize licenses so mining companies can access the Energy Benchmarking Program until June 2021.

CRA RECOGNIZES A ONE-YEAR EXTENSION FOR FLOW-THROUGH SPENDING

Following PDAC’s continued efforts, the Federal Government officially **publishes draft legislative proposals** in December to extend timelines for spending capital raised via flow-through shares. While the legislation remains in process, the CRA has confirmed the assumption that issuers/auditors are likely to treat the proposed amendment in the year-end report with the one-year extension enacted.

PDAC 2020 CONVENTION



Photos: www.pdac.ca

For the 88th year the world's premier industry event showcased the latest technologies, trends and personalities shaping the mineral exploration and development community. Some 23,000 attendees participated in an array of programs, presentations and discussions at PDAC 2020—from capital markets, Indigenous participation and sustainability, to corporate presentations, advances in geoscience, and student and early career development.

"The PDAC Convention is a unique opportunity for industry professionals to prepare, plan and position themselves and their companies for the year ahead," said PDAC President Felix Lee. "The event is also widely recognized by all levels of government that use the platform as a means to deliver important announcements that will impact the sector for years to come."

Several notable initiatives revealed at PDAC 2020 included:

- As part of Canada Day, Prime Minister Justin Trudeau announced that the federal government will promote the adoption of on-road to off-road electric vehicles, including vehicles used in mining applications.
- Minister of Natural Resources, Seamus O'Regan announced the next phase of the Canadian Minerals and Metals Plan (CMMP).
- Ontario Premier Doug Ford and Ontario Minister of Energy, Northern Development and Mines Greg Rickford announced that Ontario will develop road access in northern Ontario to service First Nations communities and potentially develop the Ring of Fire project.



PDAC 2020 HIGHLIGHTS

- **Brazilian Mining Day** provided a comprehensive economic and infrastructure overview which, combined with cases of success of major and junior companies in diversified geological environments, would foster Brazil as a top destination for exploration and mining investments.
- Back for a second consecutive year, **Canada Day** featured sessions on critical minerals, investment, trends and innovation, along with announcements on how Canada can retain its position as a leading mining nation.
- **Peru Day** included presentations that addressed the key issues facing mining in Peru, its huge and available polymetallic resources, legal framework based on international standards, neutral tax regime for international investors, and how Peru remains one of the most attractive jurisdictions in the world for mining investment.
- PDAC, in partnership with the World Economic Forum, hosted the **International Mines Ministers Summit (IMMS)** for the fifth year, bringing together ministers responsible for mining from a diverse range of countries. This year's summit focused on the mineral industry of the future.
- At the **Mineral Outlook Luncheon**, Catherine Raw, Chief Operating Officer, North America at Barrick Gold Corporation, discussed the recent spate of M&A in the gold mining sector, how it differs from that of the past, what it means for the mining industry as a whole, and the potential implications this has on investment and growth in the future.



EXHIBITS

Attendees met with over 1,000 exhibitors and learned about leading products, services and mining jurisdictions. A must-see collection of interactive and experiential booths was featured:

- A LEGO survey in action from **Abitibi Geophysics**
- Core display by **Brixton Metals** from their flagship Thorn copper-gold porphyry project in British Columbia
- A drone demonstration from **Drone Delivery Canada**
- A new disruptive universal laser-based drill core digitization service from **ELEMISSION Inc.**
- Machine learning to unlock deep value in exploration and investment data from **Goldspot Discoveries Inc.**
- Advice on buying and selling trends from bullion and collectible experts from **Kitco Metals (Precious Metals Division)**
- Projects from **Midland Exploration Inc.** that focused on their gold, base metals, PGE and REE mine discoveries in Québec
- The Silver Sand project, a silver rich area of Cerro Rico in Bolivia, from **New Pacific Metals Corp.**
- The **Royal Canadian Mint's** 10 kilogram, 99.999% pure gold Maple Leaf coin—the second largest gold coin ever produced by the Royal Canadian Mint
- Insights and solutions on environmental hardships or natural disaster vulnerabilities from the **Society of Exploration Geophysicists (SEG) and Geoscientists Without Borders® (GWB)**



PROGRAMS

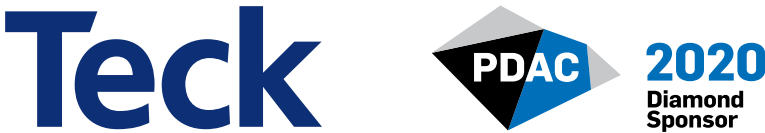
- **Building An Investor Toolkit: Practical Tips Seminar NEW**
This seminar featured a series of professionals who offered practical tips on how to start investing in the mineral sector to increase the odds of making money on investments. How to put the first dollar to work, types of investment platforms, relevant terminology, and impactful news flow were put into context to help build out the investor toolkit.
 - **Capital Markets Program**
The Capital Markets Program provided attendees with discussions and expert analysis on the latest economic developments affecting the mineral sector. In total, eight sessions were featured that focused on key topics such as securities regulation, financing trends and the Capital Markets Regulatory Authority.
 - **Corporate Presentation Forum for Investors**
A staple of the convention offerings, the forum showcased discussions and insights from exploration and development companies on their current activities and investment potential.
 - **Cutting Edge NEW**
Located in the Investors Exchange, this new stage offered various presentations on unique and innovative ideas that exposed attendees to forward-thinking ideas that they may not have previously considered.
- **Exploration Insights**
Selected from a call for abstracts, these technical, policy and academic presentations offered insights into current and topical subjects impacting the mineral exploration and development sector.
 - **Indigenous Program**
A highlight of the PDAC Convention, the Indigenous Program once again brought together the mineral sector with Indigenous communities and companies to exchange ideas, share information and network. The program continues to evolve into an important platform for fostering cooperative, respectful and mutually-beneficial relationships between Indigenous communities and industry.
 - **Keynote Program**
Exploration success has been declining since the start of the 21st century. Yet key tier one deposits have been discovered and put into production. Mark Bristow, Joe Ovsenek and Robert Friedland outlined how this was possible, what were the keys to success, and what are the keys for discovery in the future.



- **Letter Writer Presentations for Investors**
The Letter Writer Presentations for Investors once again featured industry commentators who presented their market research and ideas on how to select good investments in the resource sector.
 - **PDAC One-On-One Meeting Program**
PDAC partnered with Precious Metals Summit Conferences, LLC to offer professionally organized one-on-one meetings that brought qualified investors together with senior management teams from various companies.
 - **Presentation and Reception Rooms**
Presentation and Reception Rooms provided a venue to interact with representatives from countries and companies who provided up-to-date information on their mining jurisdictions, products and services.
 - **Short Courses**
A record 14 Short Courses were offered for mineral exploration professionals and students to update their knowledge of mineral exploration science, technology management, and other related issues.
- **Student & Early Career Program**
The Student & Early Career Program continued to offer young professionals an opportunity to connect with industry leaders and peers from all over the world. Students had access to an array of sessions and events, including the Student-Industry Networking Luncheon, Student & Early Career Centre, PDAC-CIM Toronto Branch Guided Tours, Flash Mentoring with industry professionals, and the Prospect Generation Challenge hosted by Next Gen Geo—a “Dragons’ Den” style event where students pitch ideas for projects that include cash prizes.
 - **Sustainability Program**
Celebrating its 11th anniversary, the Sustainability Program featured presentations and panel discussions highlighting key aspects of sustainable development, social and environmental performance. Sessions examined diversity and inclusion in the workplace, as well as in the community setting.
 - **Technical Program**
As a long-standing component of the convention, attendees took part in close to 20 programs that explored everything from next and best practices to timely insights from experts during these dynamic series of presentations.

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PDAC AWARDS

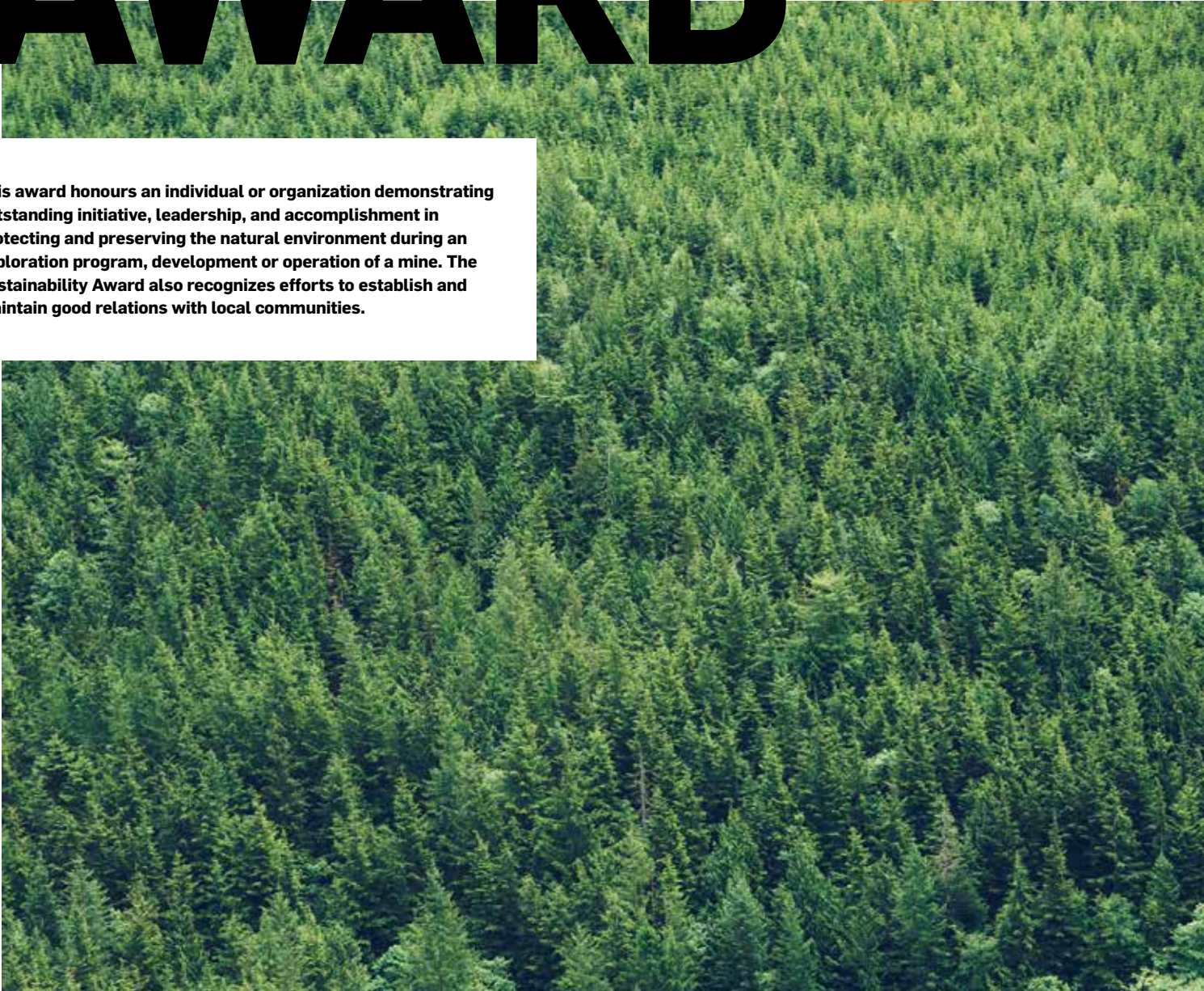
PDAC was pleased to announce the **2020 Award Recipients in six categories** for their outstanding contributions to the mineral exploration and mining sector.

Recipients received their awards and were celebrated at the PDAC 2020 Convention during the Awards Gala & After Party.



SUSTAINABILITY AWARD

This award honours an individual or organization demonstrating outstanding initiative, leadership, and accomplishment in protecting and preserving the natural environment during an exploration program, development or operation of a mine. The Sustainability Award also recognizes efforts to establish and maintain good relations with local communities.



**Agnico Eagle Mines Limited's Nunavut
Community Relations, Education & People
Development Team**

For developing a strong Inuit workforce and supporting the Kivalliq region of Nunavut with training, education and community-led projects that benefit everyone

**Agnico Eagle Mines is setting an example for the
Canadian mining industry at its operations in Nunavut.**

The company's Community Relations, Education and People Development team has invested extraordinary energy and resources to developing its Inuit workforce and providing support for local communities.

Agnico Eagle's goal is to reach 100% Inuit employment at its Nunavut gold mines, including Meadowbank, Meliadine and Amaruq. In order to get there, the company offers training, education and skills development. Since Meadowbank opened in 2010, the company has provided 36,000 training hours to Inuit employees, including work readiness programs, summer employment for students, and individual career development. Employees who lack literacy or numeracy skills or the confidence to take on senior roles, are given support to fill those gaps. To reach the younger generation, Agnico Eagle has established initiatives in schools designed to inspire students to further their education, including a trades awareness week, mine site visits, and career information days. Community liaison officers in seven communities tie it all together by providing job information, maintaining personal contact with employees, and identifying ways to support families and participating in community events.

Agnico Eagle's 60-year tradition of putting family and community first are a good fit with Inuit beliefs. Annual family days in each community provide employees and their

relatives a chance to mingle and have fun together. A role model program recognizes exemplary Inuit employees that might inspire others to achieve personal and work success. A pool of donated funds ranging from \$10,000 to \$25,000 annually supports community-specific projects such as a summer camp for children, removing and transporting hazardous material from landfill sites, and repairing baseball fields. Community members, including elders tasked with preserving traditional culture, are encouraged to visit the mine sites to get a sense of what Agnico Eagle is trying to achieve and offer suggestions for improvement.

Finally, Agnico Eagle provides financial support for Nunavut-based organizations that provide literacy and skills training. The Nunavut Literacy Council, for example, is embedding literacy development in non-formal cultural activities such as sewing. In Arviat, community members have access to a program that teaches the basics of diamond drilling and welding. In addition, a mine training society for the whole Kivalliq region is helping to relieve the skills shortage in Nunavut by providing Inuit with the knowledge to pursue valuable credentials such as trade and cooking certificates and driver's licenses.

Agnico Eagle plans to operate in Nunavut for several decades. Through targeted investments in skills and community, the company strives not only to build successful mines, but to be an employer of choice and good neighbour.

AWARD
RECIPIENT

BILL DENNIS AWARD

This award, named for a former president of the association, honours individuals who have accomplished one or both of the following: made a significant mineral discovery; made an important contribution to the prospecting and/or exploration industry.

AWARD RECIPIENT

Prospector Rudy Wahl has made not one, but several significant discoveries in Ontario. A self-taught master of ore deposit models and exploration techniques, he has inspired others to pursue prospecting as a career and generously shared his knowledge of the craft.

Prospecting has long been the lifeblood of mineral exploration, yet the skill often goes unrecognized because discoveries tend to be vended to public companies at the earliest stages of exploration. Known as one of the most productive prospectors in Ontario, Rudy has optioned more than 30 of his properties to companies eager to invest in further exploration. His discoveries represent a diverse range of commodities and deposit types, including gold, uranium, rare earth elements, diamonds and niobium.

Born in Minden, Germany, Rudy spent eight years in the German army where he supervised the repair of military vehicles and tanks. He immigrated to Canada in 1988 and found work as a mechanical shop supervisor at the Dickenson gold mine in Ontario's Red Lake camp. He went on to become the mechanical leader at Barrick Gold's Williams mine near Hemlo and was promoted to a position managing continuous improvement at the operation in 2005.

In his free time, Rudy would take to the bush prospecting, mostly in the relatively unexplored Terrace Bay-Marathon-White River area. By 2008, he was ready to adopt the precarious life of a full time prospector. Through hard work and unlimited enthusiasm, he beat the odds to achieve success. In 2012, the Northwestern Ontario Prospectors Association (NWOPA) presented him with its Lifetime Achievement Award. Three years later, he received NWOPA's Bernie Schneiders Discovery of the Year Award for his discovery of niobium-phosphate mineralization in the Prairie Lake carbonatite complex northwest of Marathon. In August 2019, Plato Gold Corp. acquired a 100% interest in the discovery, now called the Good Hope niobium project.

Rudy has contributed his time to the sector by organizing conferences, mentoring students, leading field trips, and fostering relationships with Indigenous groups. For his exceptional accomplishments, he received an Honorary Doctorate Degree in Science from Lakehead University in Thunder Bay in 2017. A year later, he was elected to NWOPA's Board of Directors, and in 2019 was elected Vice President.



Rudy Wahl

For his enduring perseverance as a prospector and for the discovery of several precious metal, diamond and rare earth occurrences in northwestern Ontario

SKOOKUM

JIM AWARD

Recipients of this award have demonstrated exceptional achievement and/or service in a Canadian Indigenous-run service business for the Canadian mining industry or a Canadian Indigenous exploration or mining company, or have made a significant individual contribution to the mining industry.

A W A R D R E C I P I E N T



Hans Matthews

For his contribution to Canada's mineral exploration and mining sector by building bridges between Indigenous communities and the industry through the Canadian Aboriginal Minerals Association

Hans Matthews is an experienced geologist and member of the Wahnapiitae First Nation in Ontario.

As a founder and the president of the Canadian Aboriginal Minerals Association (CAMA), he has played a key role in the evolution of Indigenous communities as equal partners in the mining industry.

Hans received his B.Sc. in geological and earth sciences from Brock University in 1982. He started his career as a project geologist for several mining companies, including in the Red Lake camp for Interquest Resources, and continued in exploration for a syndicate led by Barrick Gold. In 1991, he made the leap to government, becoming project manager of the Aboriginal Workforce Participation Initiative for Indian and Northern Affairs Canada. He later worked for consulting firm PwC to facilitate agreements between mining companies and Indigenous Peoples for projects in Australia, Canada and South Africa.

All of this diverse, international and national experience prepared Hans to become one of the founding members of CAMA in 1992. As the organization's president, he helped CAMA bring together industry and Indigenous leaders, government representatives and youth in a neutral setting to discuss resource management, youth engagement, and health and environmental protection. The organization has been pivotal in developing partnerships that provide training, employment, business opportunities, and equity to Indigenous Peoples across Canada.

While continuing to lead CAMA, Hans has taken on several other roles to advance Indigenous interests in the resource sector. He negotiated the participation agreement between the Nickel Rim South mine in Sudbury and the Wahnapiitae First Nation, and was elected band councillor in 2012. He served as a Board member of the National Energy Board and continues to serve on the Board of the Northern Centre for Advanced Technologies (NORCAT) in Sudbury. Hans has also taken on the crucial role of reviewing resource projects for their impact on communities, health and the environment as a member of the Board of Environment and Climate Change Canada.

His leadership skills extend to the realm of community health care. For more than a decade, he has been chair of the Shkagamik-Kwe Health Centre in Sudbury, where thousands of Indigenous patients receive holistic care combining traditional medicines and teachings with Western medical science.

DISTINGUISHED SERVICE AWARD

This award recognizes an individual who has achieved one or more of the following: made a substantial contribution to mineral exploration and mining development over a number of years; given considerable time and effort to the PDAC; made outstanding contributions to the mineral industry in the field of finance, geology, geophysics, geochemistry research, or a related activity.

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Lynda Bloom

For her leadership in the junior mining sector, her thousands of volunteer hours dedicated to PDAC, and her exploration geochemistry expertise

Lynda Bloom fulfills not just one, but all of the conditions for the Distinguished Service Award.

She has contributed to the mineral exploration sector as an officer and director of junior mining companies, a consultant, and a lobbyist. She has devoted extraordinary time and effort to PDAC as a director and committee chair, as a leader of the Student-Industry-Mineral Exploration Workshop (S-IMEW), and as a frequent contributor to the convention's Technical Program. She is considered one of the world's experts in geochemical sampling, assaying and quality control.

Lynda graduated from Carleton University with a B.Sc. in chemistry and geology in 1977 and completed her M.Sc. at Queen's University in 1981. She worked as an exploration geochemist and commercial laboratory manager for four years before becoming president of Analytical Solutions Ltd (ASL). She has worked internationally as a forensic geochemist providing services for projects ranging from stream sediment surveys to laboratory audits ever since.

Lynda served as a director of PDAC from 2004 to 2013. She co-chaired the Student Affairs Committee and spearheaded the S-IMEW—a legacy that has continued annually since 2007. In 2009, she became chair of the Communications Committee to develop a communications and marketing strategy for the organization. Her efforts succeeded in raising PDAC's profile among colleges and universities, encouraging students to consider careers in the industry, and improving the organization's approach to public affairs.

Lynda continues to serve as president of ASL and in several volunteer roles. Under her leadership, the Toronto Geological Discussion Group has grown 10-fold to over 300 members since she became a director in 2010. She is a member of the Canada Centre for Mineral and Energy Technology (CANMET's) advisory committee, and helped to develop the Women in Mining Canada Trailblazer award. As a torchbearer herself, she is an inspiring role model and tireless mentor for women following in her footsteps.

In 2013, Lynda received the Queen's Diamond Jubilee Medal for her volunteer work on behalf of the mining industry. And in 2016 BMO Capital Markets named her one of the Top 100 Global Inspirational Women in Mining.

VIOLA R. MACMILLAN AWARD

This award, named in honour of PDAC's longest serving president, is given to an individual or organization demonstrating leadership in management and financing for the exploration and development of mineral resources.

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Touquoy/Moose River Mine Development Team

For developing the Touquoy open pit mine and consolidating other gold deposits near Moose River in Nova Scotia after the gold potential of the area had been unrecognized for decades



Wally Bucknell



Steven Dean



Ronald Hawkes



Bruce Hudgins



John Wightman

Damas Touquoy, a prospector from France,

discovered gold in the Moose River area of Nova Scotia in 1876 by identifying both high-grade gold in quartz veins, typical of Meguma deposits, and disseminated gold in the host argillites.

The disseminated gold, and the Meguma Terrane generally, had been largely overlooked until the mid-1980s when work by Bruce Hudgins for Westminer recognized the potential. Bruce and John Wightman acquired the Touquoy/Moose River property in the mid-1990s and continued the delineation of the gold deposit by drilling.

In 2002, Ronald Hawkes, a former exploration geologist and manager for Noranda in Australia who had developed and operated five gold deposits in Australia for Plutonic Resources, was looking for gold exploration opportunities in Canada. He examined Bruce and John's drill core from Moose River at a Nova Scotia Open House and recognized similarities with Western Australia's bulk tonnage gold deposits. Ronald formed a company, which subsequently became Atlantic Gold, and optioned the property. CEO Wally Bucknell took the project to the feasibility stage from 2003 to 2014, but delays in environmental assessment permitting, acquisition of surface titles, and lack of available financing almost killed the project.

But then a white knight arrived on the scene in 2014 in the form of Steven Dean, a former president of Teck Corporation, who was looking for a gold development opportunity for his cash-rich company, Spur Resources. He met with Ronald and Wally and was convinced of the potential of the Touquoy property and intrigued by the possibility of consolidating the four known deposits in the Moose River camp, including Touquoy, and exploring the area in between. Spur and Atlantic Gold merged in 2014, retaining the latter's name, and within three years Atlantic Gold had completed a positive feasibility study, raised the necessary financing, completed construction, and put the Touquoy deposit into production as an open pit gold mine on time and on budget. The mine reached commercial production in March 2018.

In July 2019, St Barbara Limited purchased Atlantic Gold for \$722 million. The Australian gold miner expects to produce 95,000-105,000 ounces of gold in fiscal 2020, at a cost of less than A\$955 per ounce. The company considers the other projects in the Moose River fold, including Beaver Dam, Fifteen Mile Stream, and Cochrane Hill, as candidates for future development.

Until the Touquoy/Moose River exploration/development team recognized the potential of the disseminated mineralization surrounding the high grade quartz veins, the exploration industry had generally avoided the Meguma Terrane. The success of Atlantic Gold, through the efforts of Bruce, John, Ronald, Wally and Steven, has revitalized gold exploration in the area. The increased interest has also rekindled exploration in other parts of the province resulting in discoveries of epithermal gold mineralization in previously unrecognized areas.

THAYER LINDSLEY AWARD

This award recognizes an individual or a team of explorationists credited with a recent significant mineral discovery anywhere in the world.

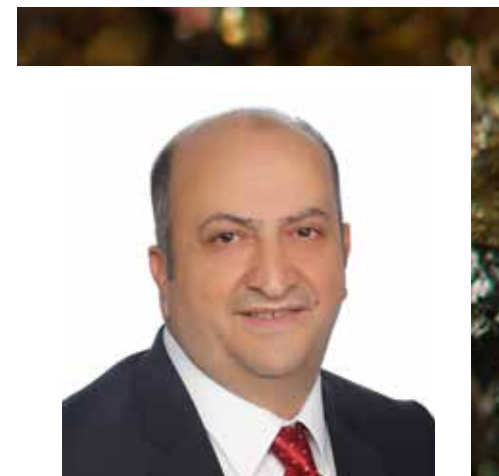
As is often the case with mineral discoveries,

others had recognized the gold-copper potential of the Hod Maden property in northeastern Turkey before Lidya Madencilik arrived on the scene but were unable to advance exploration. It wasn't until Firuz Alizade, a prolific minefinder, took an interest in the project that drilling proceeded, leading to the discovery of a hundred metre width of high-grade copper and gold in 2015. Now a feasibility study is underway, with first production from Hod Maden expected at the end of 2022.

After finishing high school in Iran and England, Firuz earned a B.Sc. followed by a M.Sc. in Geological Engineering from the Middle East Technical University in Ankara, Turkey in 1988. He began working for Cominco Resources' Turkey subsidiary and was promoted to project geologist in 1989. A series of exploration successes followed—first the Tac and Corak gold deposits, then the Gerattepe VMS mine. Firuz joined Denver-based Anatolia Minerals Development (Alacer) as chief geologist in 1998, managing exploration around the Copler gold deposit in eastern Turkey and other projects throughout the country. He went on to become the vice-president of Turkish operations for Alacer.

In 2014, Firuz joined Polimetall Madencilik, a subsidiary of Lidya Mining, as general manager and head of global exploration where he spearheaded the discovery of the Gediktepe polymetallic deposit in western Turkey. The same year his team secured an option to earn a 70% interest in the Hod Maden projects in the Eastern Pontides belt from Mariana Resources. After obtaining the permits Mariana had been unable to secure, Lidya started drilling. On February 5, 2015, the partners announced a 103-metre intersection of massive sulphide mineralization grading 9.0 grams per tonne gold and 2.2% copper, including 33.4 metres grading 18.3 grams per tonne gold and 3.3% copper.

Under Firuz's leadership, the Hod Maden project progressed from discovery to pre-feasibility in 40 months. In 2016, Sandstorm Gold Royalties purchased Mariana's 30% share of the project, plus a 2% NSR royalty. As of 2018, proven and probable reserves stand at 9.1 million tonnes grading 8.9 grams per tonne gold and 1.4% copper (2.6 million ounces of gold and 129,000 tonnes of copper). A pre-feasibility study envisions an underground mine with an 11-year life processing 900,000 tonnes per year. Capital costs are estimated at US\$272 million and all-in sustaining costs at US\$374 per ounce for an extraordinary 50% internal rate of return.



Firuz Alizade and the Lidya-Hod Maden Exploration Team

For the 2015 discovery of the Hod Maden gold-copper deposit in eastern Turkey

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MARY-CLAIRE WARD

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This year's recipient of the Mary-Claire Ward Geoscience Award is Kendra Zammit of Laurentian University.

Kendra received the award for her MSc. research that seeks to constrain the Neoproterozoic evolution of progressive deformation and orogenic gold mineralizing events in the western Wabigoon subprovince of Canada's Superior Province.

Her research integrates legacy data, new field observations, microstructural analyses, and U-Pb geochronology to revise the structural and metallogenic evolutionary history of the region. Results will document the influence of structural evolution of greenstone belts on their differential gold endowment, and will assist future orogenic gold exploration in the western Superior Province.

Kendra received her award at the PDAC 2020 Convention. The award, comprising \$5,000 and a certificate, is given annually and honours the memory of Mary-Claire Ward who died in 2004. Mary-Claire was the chair of the PDAC's Geoscience committee, Chairman of Watts Griffis McOuat Ltd., and a Past President of the Geological Association of Canada. She was a passionate advocate for the geosciences in Canada.

The intent of the award is to encourage and support a graduate student in Canada whose thesis contributes to our knowledge about the geological history of Canada. Mapping must be a significant component of the winning thesis.

The award is administered by the Prospectors & Developers Association of Canada (PDAC), the Geological Association of Canada (GAC), the National Geological Surveys Committee, the Canadian Geological Foundation, and Watts, Griffis and McOuat Ltd.



Kendra Zammit
MSc., Laurentian University

JOAN BATH

CSA Global, an ERM Group company, and the Prospectors & Developers Association of Canada (PDAC) are pleased to sponsor two \$3,000 bursaries—the Joan Bath and Peter Howe Bursary for Advancement in the Mineral Industry—that aim to assist geoscientists and engineers in a field related to mining with their further education in Canada.



The first Bursary is in honour of **Joan Bath**, an inspirational mining engineer from the CSA Global's headquarters in Perth, Western Australia, who has embodied excellence and achievement in the mining industry over several decades.

Josephine's research lies at the intersection of rock mechanics and emerging machine learning algorithms where she is developing data driven methods to predict rock mass behaviour in underground mining excavations.

Machine learning algorithms have been found to be highly useful in ore prospecting, and for autonomous mine vehicles. The challenge in applying these algorithms to rock engineering is combining the various input data formats, developing algorithms to be interpretable, and validating the predictions using conventional methods. Josephine's research objective is to produce a framework for applying machine learning to geomechanical datasets so that there is a blueprint for how these may be applied in mining practice. She is working with a collection of operating mines, instrumentation manufacturers, and mine consultants to improve the prediction of rock mass stability hazards, and to improve the efficiency of the rock support rehabilitation scheduling.



Josephine Morgenroth
PhD Candidate, York University

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The second Bursary is named in honour of **Peter Howe** who founded A.C.A. Howe International in Toronto and went on to establish offices in the United Kingdom, Australia, South Africa, and Indonesia. A.C.A. Howe went on to become a leader in global exploration consulting and was responsible for several discoveries around the world, including the Bernic Lake Tantalum mine in Canada, Jabiluka Uranium Mine in Australia, and Mount Muro in Indonesia.

Talia's MSc. research project focuses on gaining insights into ore-forming processes of seafloor massive sulphide (SMS) deposits on the modern seafloor, specifically at an actively-forming deposit (VOLPA) in the most tectonically- and volcanically-active place on Earth—the northern Tonga subduction zone with an industry partner SM2. This study involves an integrated program of geological and structural mapping at regional to local scales to determine the tectonic and volcanic controls on ore formation.

This is integrated with petrological and geochemical studies of ore assemblages and fresh volcanic rocks, including major- and trace-element geochemistry, S-isotope systematics, and $^{226}\text{Ra}/\text{Ba}$ dating of hydrothermal barite, in order to understand the geodynamic, volcanic and hydrothermal history of the site. The results of this study will add to a growing work on the SMS deposits on the seafloor and specifically along the Tonga-Kermadec arc, providing new insights into the relationship between geodynamics, volcanism, and hydrothermal venting. This work has direct implications for the emerging seafloor mining industry and may advance our understanding of VMS formation in ancient terranes where the geodynamic setting is difficult to constrain.



Talia Moun
MSc. Candidate, University of Toronto

COVID-19: PERSEVERANCE DURING A HISTORICALLY CHALLENGING TIME

As the global pandemic created exceptional challenges for businesses and individuals across Canada and around the world in 2020, PDAC focused its attention on advocating for programs to help the mineral exploration and development sector navigate these difficult times.

SUPPORTING INDUSTRY THROUGH COVID-19

In the early stages of Canada's pandemic lockdown, PDAC recognized the need to create a one-window approach to provide members and the general public with the information and tools required to understand the unique challenges being faced by the industry in all corners of the country.

A [COVID-19 dedicated page on PDAC's website](#) was created to guide individuals and companies to the information and resources relevant to them. It includes various support programs offered by the Government of Canada, an outline of the work undertaken by PDAC on behalf of its membership, and relief alternatives and resources offered by provincial and territorial associations.

This webpage also serves as a platform to solicit feedback from members on where advocacy efforts should be focused, and how PDAC can continue to play a vital role in ensuring a vibrant and thriving mineral exploration and development sector.

FEDERAL GOVERNMENT ADVOCACY

In an effort to ensure that support programs offered by the Government of Canada met the needs of the mineral exploration and development sector, PDAC undertook an expansive advocacy campaign focused on areas identified by members as being potentially problematic. These included:

- Recommendations to defer timelines associated with Canada's flow-through share regime;
- Expansion of the Canadian Emergency Wage Subsidy program and Canadian Emergency Business Account to include pre-revenue businesses;
- Temporary expansion of eligibility under Canadian Exploration Expenses (CEE);
- Regular communication with key Ministers and Parliamentary Secretaries, including Natural Resources Canada, Energy, Northern Development and Mines, and Small Business, Export Promotion and International Trade; and
- Participation in daily conference calls with the Department of Innovation, Science and Economic Development to identify gaps in existing programming and ensure the mineral sector is included in the continued development of these programs.

Additionally, PDAC assumed a leading role in convening recurring teleconferences with the Canadian Mineral Industry Federation—a group comprised of Canada's national, provincial and territorial associations representing the mineral exploration and development community. This forum allowed for continual knowledge sharing, and provided a platform to identify areas where further advocacy is required. It resulted in letters, co-signed by members of the group, being sent to the Minister of Finance with key recommendations on how the Canadian government can best support the sector.

Such advocacy efforts led to the creation of draft legislation in December 2020 to extend timelines by 12 months for spending the capital that junior mineral exploration companies and other issuers raised in 2019 and 2020 via flow-through shares. "As the impact of COVID-19 continues to cause significant global disruptions, the Canadian mineral exploration sector has seen many junior companies and small businesses facing pandemic-imposed challenges such as voluntary shutdowns or difficulty accessing the field due to travel restrictions," said PDAC President Felix Lee.

"This legislation will ensure mineral exploration companies with operations impacted by COVID-19 would be allowed additional time to incur eligible expenses, allowing them to safely plan when to best continue operations, and avoid penalties that would normally come from not meeting original flow-through share timelines."

As the COVID-19 pandemic continues to progress in impact the industry in a myriad of ways, PDAC will continue to adapt its advocacy approach to ensure government programs are designed with mineral exploration and development in mind. The significance of our industry and its economic contributions should not be overlooked. It can, and will, play a key role in bolstering Canada's economic recovery plan.

HOW THE SECTOR HELPED

PDAC listened to members and heard time and again how companies within the mineral sector stepped up to help communities in this time of need. Through social media and online engagement with members, PDAC promoted various channels that businesses can use to donate to and support their local communities. To date, companies have donated over \$150 million of personal protective equipment, monetary contributions, and other goods and services globally. This number is expected to climb as time goes on, and PDAC would like to thank all of those who have taken the opportunity to support ongoing efforts to combat COVID-19.

While the pandemic created unprecedented challenges, PDAC is confident that Canada's robust mineral exploration and development sector will once again show why it is considered the world's best, and we will continue advocating to ensure the industry is recognized as a critical component of Canada's economy and an essential part of modern life.

MAPPING INNOVATION IN MINERAL EXPLORATION

Mineral exploration is unquestionably part of modern society and is underpinned by fundamental science and evidence-based processes. The mineral resources needed for a low-carbon future are more likely to be deeper or hidden in areas of exotic cover. In order to be successful in this environment industry is innovating, creating new tools, approaches and techniques.

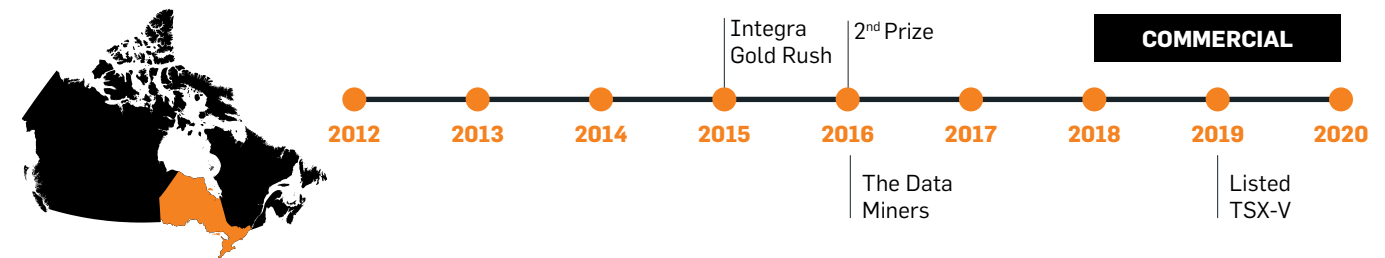
To gauge the current innovation landscape in mineral exploration across Canada, PDAC embarked on a review of companies and organizations that created and implemented successful projects or products. Over 30 hours of interviews were conducted to investigate specific innovations and shed insight on the current state of innovation in mineral exploration. Our [full report](#) includes eleven case studies ranging from 'big think' collaborative research efforts, to process-related advances in field data collection, diamond drilling and core logging, and the use of Machine Learning (ML) and Artificial Intelligence (AI) in data integration and analytics.

What our report uncovers is that there are common turns and experiences on the path to successful innovation, but that there is no defined route from A to B. Innovation thrives in a landscape that provides access to quality university research and people, public geoscience provided by governments, geological surveys and other organizations, research consortia-networks, and industry partners.

Small, more agile companies and consultants operate effectively within this innovation landscape, furthering initiatives by major companies to achieve exploration success and improve operational efficiencies. They are supported by funding from various sources, and often through government grants that may help reduce risk and bring in outside knowledge. Ultimately, carrying an innovation through to commercialization requires a champion and, perhaps most importantly, a larger corporation to be an early adopter.

Modern discovery requires a complex and inter-related series of processes that continually feed into each other. 'Boots on the ground' mapping and sampling is still fundamental to exploration, requiring technical geological expertise. What has changed is that there is a fast-growing variety of new tools and approaches that allow large and diverse data sets to be collected and analysed with increased precision. Canadian companies are leading in shaping this modernized approach to mineral exploration, building on technical expertise and strengths that will benefit us all.

FROM DATA MINERS TO TSX-V



KEY PARTICIPANT

GoldSpot Discoveries Corp.

DRIVERS

Target Generation
Data Integration

KEY FACTORS

Outside Expertise
Funding
Prize

THE PROBLEM

The 'Data Miners' were big news in 2016, coming in second to SGS in the Integra Gold Challenge. The team, however, were a group of students based in Québec and British Columbia, with no formal industry connections. Was it possible to capitalize on the talent and abilities of the young team, while also helping to solve the problem of finding mineral resources?

THE INNOVATION

The demonstrated abilities of a student team were combined with the expertise of experienced junior mining business professionals, building a company with a broad approach to creating value. The publicly-listed junior exploration company applies advanced data analytics and machine learning to process geoscience data, identify mineral targets and solve exploration problems.

THE STORY

The original team formed as an alliance spanning the country, a collaboration between students at the Institut National de la Recherche Scientifique (INRS) and the University of British Columbia (UBC). They built a group with diverse backgrounds in order to develop a machine learning solution for the Integra Challenge in 2016.

Initially the team worked as individuals on facets of the data which matched their expertise. Key to success was Vincent Dubé Bourgeois, now COO of GoldSpot, who melded the work and ultimately packaged it for presentation. The independent and youthful nature of a group, with a quality product, attracted the attention of Denis Laviolette and Cejay Kim. The pair of mining business professionals initiated discussions which led to the formation of GoldSpot Discoveries. A corporate structure and initial private investment were followed by a handful of early jobs that produced clients who not only liked the results, but also invested in the company.

Right from the start, a very flat organizational structure was created, aiming to create a culture where everyone wants to be involved and to contribute. Hiring is done based on finding the right people for the culture of the company, but not inserting them directly into an organizational chart. New staff can grow into the positions that fit them best and allows them to add the most value to the group.



Projects include a variety of commodities and range from 2D regional greenfields targeting and mine camp exploration, to brownfields mine extension, to collaboration with multi-stakeholder research efforts such as Metal Earth at Laurentian University in Sudbury. In addition, internal R&D is continuous and includes close to 40 initiatives. The CEO plays a critical role in keeping the teams' focus and work on track.

The company operates on a flexible basis, from cash for services to investing directly in companies, up to a cap of 9.9% and building their own stock and royalty portfolio. GoldSpot strives to develop collaborative, ongoing relationships and to provide individual and modular solutions to problems.

Data sets are hugely variable, as is the quality of the storage, ranging from mouse eaten and water damaged paper to perfectly formatted and cleaned Excel spreadsheets. Projects may require natural language processing, deep learning photo processors or adaptations of machine learning algorithms. GoldSpot uses its geoscience expertise to do exploratory data analysis, to identify which patterns are useful and which can be cast aside, allowing the group to chisel away to the nugget of the problem. This part of the work can be as much as 75% of the project.

CHALLENGES

Building relationships with clients is important as is developing the right framework for each deal. Some partners or clients may be disinclined to work with a company that also funds its own projects and takes and equity stake in others. By nature, being listed as a junior mining company also requires promotion, which is difficult to balance with demonstrating strong technical capabilities.

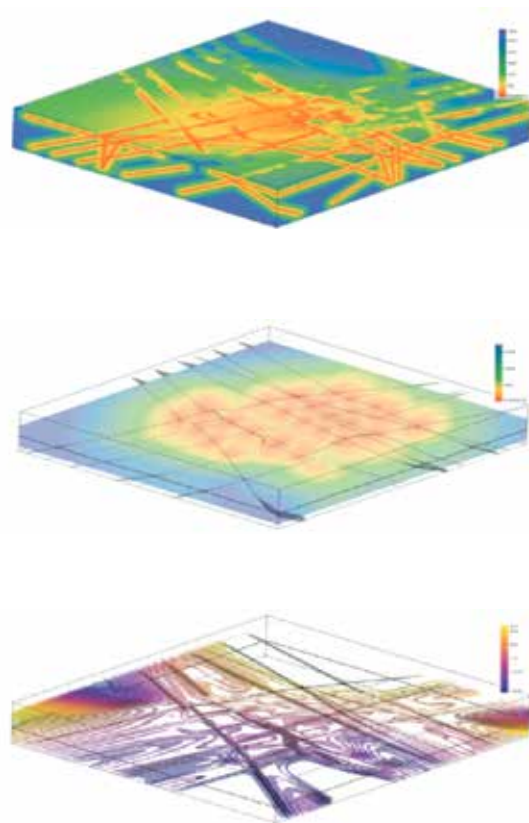
EARLY ADOPTER

While still private, the first consulting assignment was for Sprott Mining Inc., where GoldSpot was deployed on the prolific Jerritt Canyon camp in Nevada.

FUNDING AND SUPPORT

The Integra Challenge was the kick-starter for the eventual formation of GoldSpot Discoveries. Early private investment by Eric Sprott and Hothschild Mining led to Triple Flag, taking the lead order in GoldSpot's \$7.5 million go-public financing. U.S. Global Investors bought in and Frank Holmes serves as GoldSpot's Chairman.

Schematic workflow



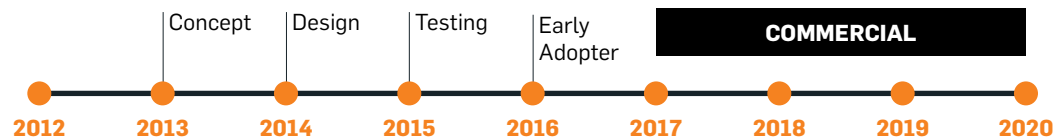
BENEFIT

GoldSpot Discoveries is adapting data analytics, machine learning and AI to create value and target mineralization. The company provides flexible solutions for data-oriented problems, taking advantage of large datasets.

BOTTOM LINE

GoldSpot Discoveries is one of the new exploration companies that is using data analytics, machine learning and AI to create value and target mineralization.

WHY WASTE WATER?



KEY PARTICIPANT

HY-TECH Drilling Ltd

DRIVERS

Environment
Regulations

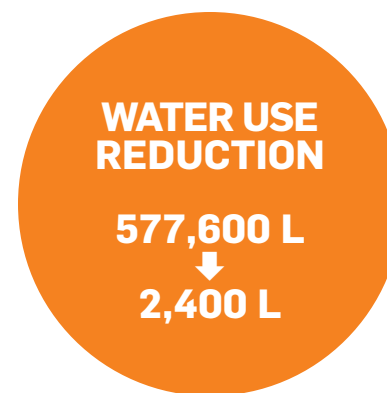
KEY FACTORS

Outside Expertise

THE PROBLEM

Diamond drills consume large amounts of water with on average 577,600 litres used for every 1,000 m drilled. Water is pushed down the hole to cool the bit and move the cuttings back up to the surface. The process facilitates the drilling and recovers a clean core for analysis.

Standard practice is to drill using a continuous new water supply and allow the used water to percolate back into the ground. The cuttings and unconsolidated material from the drill process are typically buried in a large sump dug at the drill site. This approach is becoming unacceptable internationally. Both regulators and communities want to see better practices implemented.



THE INNOVATION

HY-TECH Drilling Ltd. saw the need to design a method of reducing the water use in diamond drilling for mineral exploration. They envisioned a portable, easy to manage and care for system that attaches to a drill and recycles the water, creating a closed-loop. The system functions simply as a 'plug-in' to the drill. Cuttings are removed with a second very high-speed rotating assembly that pushes the solids out and the water is recirculated down the hole, resulting in 90% recovery rates.

THE STORY

In their workshop in Smithers, B.C., HY-TECH Drilling has its own full-time R&D unit of two people—an engineer and an experienced driller who understands the practical applications.

An independent drilling company, HY-TECH manufactures and operates their own drill unit that is lightweight and portable and ideal for challenging locations. Design and innovation are integral to the company and proprietary technology has been developed over many years, including various patented components. Feedback and ideas from the drillers in the field is vital to the process. The first step was to look outside the minerals business for solutions.

The team investigated existing technologies for water treatment such as clarifiers, shaker screens and centrifuges. The benefits to centrifuges became apparent. They realized that this process was already being used in the oil and gas sector, so they went looking for existing solutions. They were able to work from systems already in use and find alternative components of the right scale for diamond drilling. The system was then designed around the centrifuge to create a low interaction 'plug and play' solution.



It is extremely beneficial to have a dedicated team in place to evaluate the endless number of ideas that come from our field crews, equipment operators and experienced personnel located in our branch facilities.

Brian Butterworth, HY-TECH Drilling

CHALLENGES

HY-TECH tested units used in the oil/gas drilling systems. Clearly, these were developed for holes that are a magnitude larger than those found in mineral exploration mineral exploration. Bringing the oil and gas equipment into Smithers required two tractor trailer loads; a daunting task. The next step was to find a small centrifuge or rotating assembly and then adapt that to plug and play into their drill equipment, working with the pumps and the rest of the drill equipment. The solution had to be helicopter portable, be intuitive and have a low interaction level from the crew.

Now with a functioning system with 13 units in operation, HY-TECH are working on version 4. The next challenge is to deal more effectively with the very fine clay fraction in the water. A particle size of 2-10 microns limits the processing capacity. Self-cleaning improvements are the next priority, again reducing the interaction level.



EARLY ADOPTER

One early adopter was Pretivm—they were working with a more advanced project and looking to reduce water consumption and needed to clean the water going to their operations plant. Other clients were working in an area with public viewing and realized that a clean and tidy operation would be positive for both them and the public view.

FUNDING AND SUPPORT

Grants from Industrial Assistance Research Program (IRAP) were key to a positive outcome, providing critical funds to create an encompassing diamond drilling specific solution. Government regulators were also supportive, realizing the benefit of water recycling and recognizing the environmental value.

BENEFIT

Companies carrying out mineral exploration can substantially reduce water use. This approach is responsible and environmentally beneficial and can also be helpful in community relations and acquiring government permits. Operating in a more responsible way has big benefits for both clients and HY-TECH, creating better outcomes on the ground and with community relations.

BOTTOM LINE

HY-TECH Drilling has developed a competitive advantage and are able to supply clients globally with an effective water management tool. Currently 13 centrifuge units are in use, creating value for them, their clients and the local areas in which they work.



PUSHING THE NEEDLE FORWARD ON EQUITY, DIVERSITY AND INCLUSION IN THE MINERALS SECTOR

Over the past decade, PDAC has steadily become a leading voice within the mineral exploration and development community in promoting and building resources that champion an equitable, diverse and inclusive workforce.

Celebrating the talents, skills and contributions of all individuals—regardless of ethnicity, race, gender, disability, sexual orientation, or religious beliefs—is a core value of the Association’s current strategic plan, and a driving force in our program areas and advocacy work.

“Creating positive change is a cornerstone of our DNA as an association that we will continue to implement in every facet of our work as the leading voice of Canada’s mineral exploration and development sector,” said PDAC President Felix Lee. “We still have areas to improve upon, and would be naïve if we simply sat back and expected it to happen—words must equate to action.”

In the past few years, concrete action has taken place in several key areas. In June 2019, PDAC developed a new resource for *e3 Plus*: *A Framework for Responsible Exploration*, PDAC’s

cornerstone corporate social responsibility (CSR) initiative, that focused specifically on gender, diversity and inclusion.

The purpose of creating this new resource was to provide guidance for exploration and mining companies on how to: 1) foster a more diverse and inclusive workplace; and 2) exercise more inclusive engagement with communities in order to ensure mining-related activities benefit everyone—regardless of gender. The guidance sheds light on the barriers to both diverse and inclusive workplaces, as well as inclusive engagement in communities, and provides opportunities for change drawing on case studies and other tools for inspiration.

In creating this new resource, PDAC assembled a multi-stakeholder advisory group comprised of 25 to 30 industry leaders, all of whom have sector and/or community engagement experience, that continues to serve as a platform for knowledge-sharing on topics of importance to advancing the dialogue around equity, diversity and inclusion in the minerals sector.

PDAC has also fostered dialogue around the significance of equity, diversity and inclusion at our annual convention where topics and discussions on how to create positive change in the workplace and community setting have been a central component of the Sustainability Program, and in certain networking events such as the Mining for Diversity Reception. And in the broader convention programming areas we have seen an increase of almost 20% of our speakers and presenters in recent years coming from diverse backgrounds—a figure that will rise in future conventions.

In addition, our momentum for positive change in the workplace was reflected in our public stand against racism in the wake of events unfolding across the United States and around the world, and in our Women’s History Month campaign that profiled women in the industry and showcased their personal experiences, the challenges they faced, and their achievements and insights on future progress.

During Women’s History Month, PDAC finalized a new comprehensive Policy on Equity, Diversity and Inclusion (EDI) that reflects our continual commitment to expand equity, diversity and inclusion in every facet of the organization’s operations and mandate. The policy, currently in the launch phase, features 10 guidelines and actions to be implemented at all levels within the organization by the Board of Directors, Executive Director, committees and governing bodies, including:

1. Developing and delivering education and training materials directed at eliminating unconscious bias.
2. Identifying relevant factors to be considered in the employee, consultant and contractor selection process.
3. Promoting an inclusive community within the membership of PDAC in which diversity is valued and all members feel heard, included, and respected.
4. Fostering a diverse environment for staff and volunteers where all individuals are accepted without bias, and access to opportunities is based on performance, skill and merit.
5. Recruiting, appointing and promoting staff and volunteers on the basis of an individual’s competence, qualification, experience and performance, regardless of ethnicity, gender, race, age, national origin, disability, sexual orientation and religious beliefs.
6. Fostering cooperative working environments characterized by inclusive practices and behaviours for the benefit of all participants, which are free from bullying, harassment and discrimination.
7. Improving opportunities for participation and leadership for all staff and volunteers, and especially for those groups who have been underrepresented in the mineral exploration sector in Canada, including women, visible minorities and Indigenous Peoples.
8. Establishing procedures for monitoring, measuring, encouraging and assessing equity, diversity and inclusion within the Association.
9. Working with other industry partners, to promote equity, diversity and inclusion within the Canadian mineral exploration sector.
10. Reporting on the results and progress.

“This new EDI policy is a reflection of the Association’s expansive commitment to foster safe and prosperous working environments for any and all individuals,” said Felix Lee. “As discussions and developments surrounding EDI evolve, so will PDAC’s commitment to adopt and implement such practices to ensure that our members, along with our volunteers and staff, have fair and unbiased opportunities to succeed in the sector in the years and decades ahead.”



2020 PDAC MEMBERSHIP STATISTICS

INDIVIDUAL
MEMBERS
(excluding students)

5,247

Canada
3,357

64%

NT	29
NU	9
YT	40
BC	744
AB	117
SK	68
MB	47
ON	1,846
QC	318
PE	1
NB	35
NS	59
NL	44

USA
575

11%

International
1,315

25%

Latin America / Caribbean	490
Europe	319
Australia	188
Africa	199
Asia	119

PDAC MEMBERSHIP TREND

Individual members	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Core	2,185	2,432	2,524	2,540	2,355	2,068	1,805	1,636	1,619	1,603	1,553
Regular	2,408	3,283	3,891	3,827	3,124	2,794	2,450	2,713	2,981	2,767	2,564
Senior	501	644	768	832	808	792	733	688	728	733	689
Student	933	1,048	1,543	1,662	1,407	1,228	1,114	1,092	1,074	897	859
Life	273	288	290	293	289	283	294	396	406	425	441
Total	6,300	7,695	9,016	9,154	7,983	7,165	6,396	6,525	6,808	6,425	6,106
Variance (%)	18%	22%	17%	2%	-13%	-10%	-11%	2%	4%	-6%	-5%

1,096 CORPORATE
MEMBERS

73%	Canada	794
	NT	3
	NU	4
	YT	3
	BC	281
	AB	34
	SK	14
	MB	9
	ON	335
	QC	87
	PE	-
	NB	6
	NS	9
	NL	9

9% USA 101

18%	INT	201
	Europe	75
	Australia	51
	Latin America / Caribbean	28
	Asia	28
	Africa	19

859 STUDENT
MEMBERS

90%	Canada	771
	NT	2
	NU	1
	YT	1
	BC	39
	AB	27
	SK	21
	MB	29
	ON	525
	QC	65
	PE	-
	NB	10
	NS	23
	NL	28

5% USA 46

5%	INT	42
	Europe	22
	Latin America / Caribbean	10
	Australia	1
	Africa	6
	Asia	3

Corporate members	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Class A	19	26	24	25	23	20	16	18	19	19	19
Class B	5	10	8	9	5	9	8	6	7	7	9
Class C	16	20	23	22	9	10	9	9	10	8	10
Class D	19	22	24	21	26	18	15	14	13	13	13
Class E	18	17	15	18	12	12	11	14	16	15	13
Junior Exploration	545	577	651	583	449	384	303	355	423	422	407
Non-Mining	402	430	525	556	537	507	514	492	525	607	625
Total	1,024	1,102	1,270	1,234	1,061	960	876	908	1,013	1,091	1,096
Variance (%)	3%	8%	15%	-3%	-14%	-10%	-9%	4%	12%	8%	0.5%



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*as of December 31, 2020

EDITORIAL

Produced by PDAC's Communications Department
Cameron Ainsworth-Vincze Editor-in-Chief
Hambly & Woolley Inc. Design

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