

# CANADA'S REPUTATION ON THE WORLD STAGE IN MINING: DRAWING THE BEST AND BRIGHTEST FROM AROUND THE WORLD

Canada is known worldwide for its wealth of natural resources and exceptional mining industry. In 2022, the country's minerals and metals sector directly contributed \$109 billion to the national GDP, representing 6% of the total, with indirect effects increasing this to \$149 billion. Professional geoscientists are key to this success, driving exploration, discovery, and sustainable development. For geoscience students and early career professionals, the mining industry presents an exciting opportunity to make a real impact.



Three geologists overlooking Voiseys Bay, NL, an important nickel mine in Labrador. credit: Joshua Duggan, CC BY-SA 2.0 <<https://creativecommons.org/licenses/by-sa/2.0>>, via Wikimedia Commons

## THE VITAL CONTRIBUTIONS OF PROFESSIONAL GEOSCIENTISTS

Professional geoscientists play a crucial role in Canada's mining achievements. They unlock the potential of geological environments hosting more than 60 minerals and metals. From exploration to development, their expertise in discovering new deposits and evaluating mineral resources underpins the industry's ability to renew mineral inventories and manage projects sustainably. Geoscientists working in mines continue the exploration through the complicated task of finding and following ore zones and maintaining tonnage and grade requirements – this enables mines to continue operating economically to their fullest potential.

Their work is critical for ensuring the transparency and reliability of technical and scientific data—key factors for investor confidence. Beyond this, geoscientists contribute to environmental assessments, regulatory compliance, and the industry's adaptation to emerging challenges, such as the growing demand for critical minerals for green technologies.

Deborah McCombe, P.Geo., FGC., senior geoscientist and former Chief Mining Consultant for the Ontario Securities Commission offers her perspective: *"A career in geoscience is more than fieldwork – it's about solving some of the world's most pressing challenges."* Further, she opines: *"Those entering the field today will be shaping the future of global sustainability."*





Geoscientist in forest (Saskatchewan) credit: CLS Research Office from Saskatoon, Canada, CC BY-SA 2.0  
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As we know, the exploration and mining industry is capital intensive, and involves a risky and lengthy process. So, how has Canada earned its excellent reputation on the world stage in mining? And how do we attract young people to become the professional geoscientists who have such a significant role in public protection and preparing and disclosing material scientific and technical information, increasing investor confidence, and enabling a steady flow of financing?

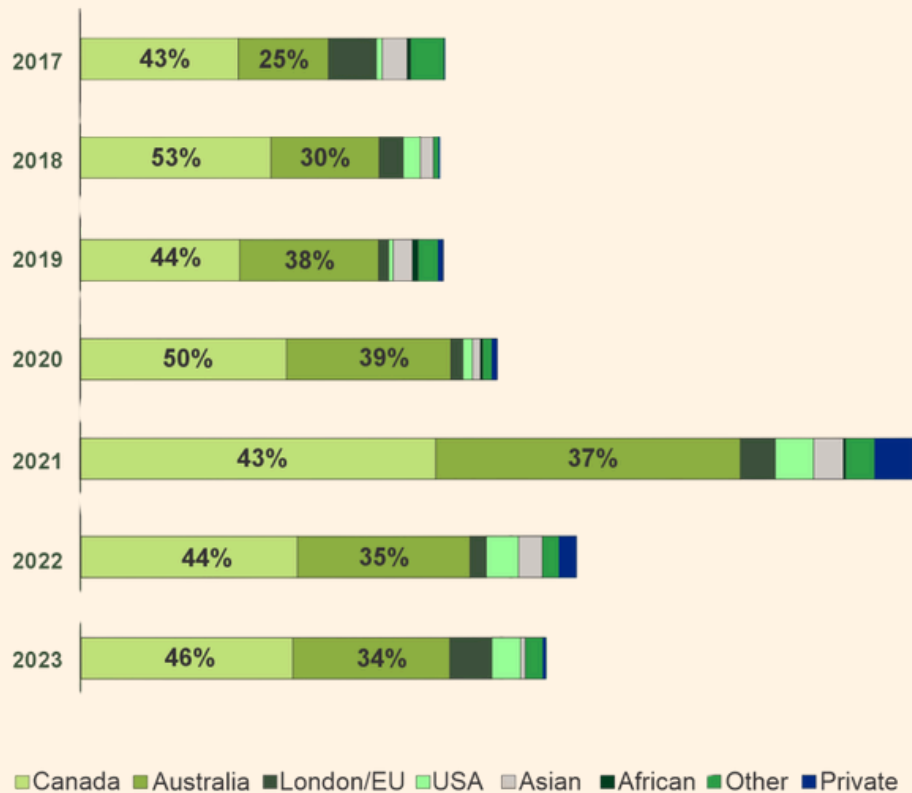


PGO's Committees, including the Professional Practice Committee and Geology Subcommittee, develop practice documents for mining geoscientists to support their role in public protection.

## CANADA: THE GLOBAL LEADER IN MINING FINANCING

Canada has a reputation as the preeminent country for mine financing, thanks to the Toronto Stock Exchange (TSX) and TSX Venture Exchange (TSXV). Together, they host more mining companies than any other market globally. Between 2019 and 2023, mining companies on these exchanges have raised \$45 billion through over 6,700 transactions. This represents 48% of the number of public mining financings completed and 36% of the mining equity capital raised globally (See Figure 1 and Figure 2). This establishes Canada as the world's go-to hub for mine financing.

## World Mining Capital Formation

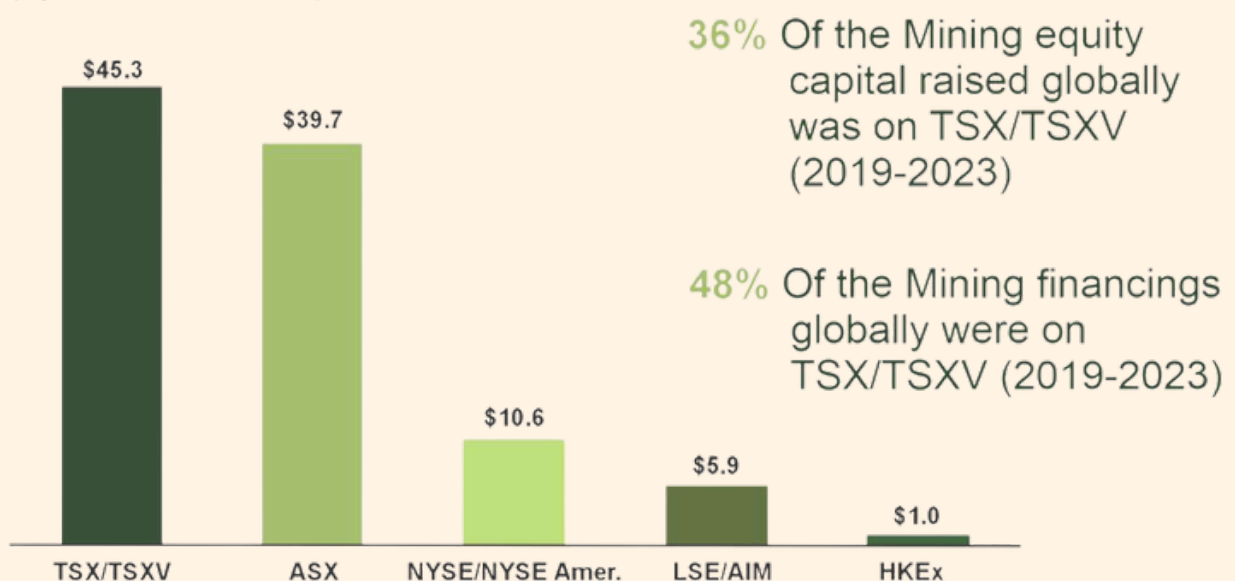


CSA Data + S&P Global Market Intelligence.

BCSC Short Course (April 8, 2024) – slide 11 (NOTE: data includes the CSE as well as the TSX/TSXV). This slide is based on the “2024 Guide to Listing” – TSX and TSXV (pages 30 to 31). <https://www.tsx.com/ebooks/en/2024-guide-to-listing/>)

## The world's Mining companies look to TSX

Global Mining equity capital raised  
(5-year total = \$102.5 billion)

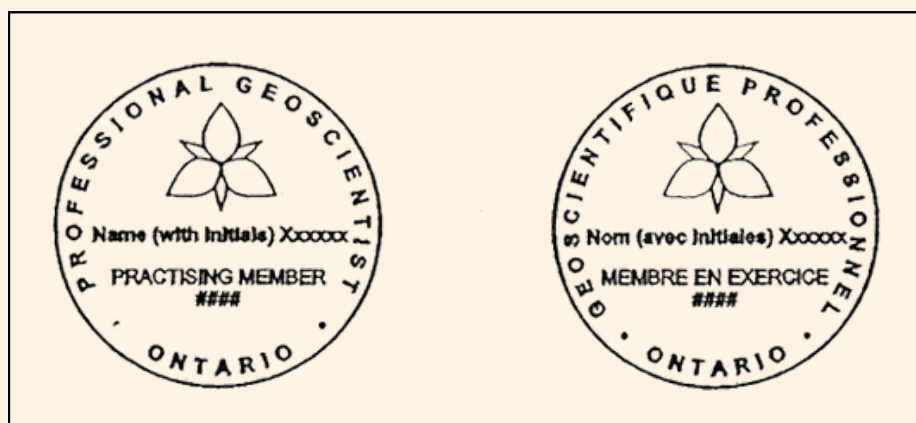


Source: TSX/TSXV Market Intelligence Group and S&P Global Market Intelligence. As at December 31, 2023.

Transparent disclosure of material information is a cornerstone of this success. Professional geoscientists and engineers are responsible for the accuracy and reliability of this data, making Canada's financial ecosystem for mining investments both robust and trustworthy.

In 2001, National Instrument 43-101 (NI 43-101) – Standards of Disclosure for Mineral Projects, a Canadian mining securities law, came into effect. It was designed to balance a robust mining industry with investor protection. Initially, the industry was hesitant, perceiving it as an additional layer of regulation. However, NI 43-101 has become a globally recognized and esteemed standard within the international mine finance industry.

### Example





## LEADERSHIP IN CANADIAN AND GLOBAL MINING STANDARDS

In 2001, the Canadian Securities Administrators (CSA) were drafting disclosure rules. However, the mining industry was tasked with defining key standards. These included the definitions of Mineral Resources and Reserves, industry practice guidelines for exploration, Mineral Resources and Mineral Reserves (MRMR) estimation, and, more recently, Environmental, Social, and Governance (ESG) guidelines referenced in the NI 43-101 Companion Policy. Currently, the Canadian Institute of Mining, Metallurgy & Petroleum (CIM) MRMR Committee, composed of professional geoscientists and engineers, develops and defines these standards and guidelines. The scope of CIM guidelines has expanded beyond traditional metals to include resources like lithium brines and other critical battery metals, reflecting growing demand for electric vehicle production.

Canadian geoscientists also play a leading role in the Committee for Mineral Reserves International Reporting Standards (CRIRSCO) which sets global benchmarks for reporting mineral resources, mineral reserves, and exploration results. Canada is a founding member of CRIRSCO and Canadian geoscientists have twice chaired CRIRSCO. Canadian geoscientists continue to lead efforts in defining standards that foster materiality, transparency, competency and trust across the international mining industry. CRIRSCO is a Strategic Partner of the International Council on Mining and Metals (ICMM). These contributions reinforce Canada's reputation as a global leader in mining standards.



Committee for Mineral Reserves International Reporting Standards (CRIRSCO) Annual General Meeting in Vancouver, BC October 2024

## ATTRACTING PROFESSIONALS TO THE MINING INDUSTRY

Despite their critical role, as demonstrated by their contribution to the GDP, enrollment in Canadian earth science and mining engineering programs has declined. According to the Council of Chairs of Canadian Earth Science Departments (CCCESD), Canadian undergraduate enrollments in geology, geophysics, and geological engineering dropped from approximately 4,200 in 2014 to around 2,400 in 2021.

To support the next generation, organizations like PGO offer mentorship programs, student outreach initiatives and short courses that provide crucial industry insights. Andrea Waldie, a leader in geoscience governance at PGO and Geoscientists Canada explains: *"Whether you are passionate about exploration, environmental protection, or regulatory policy, a geoscience career can take you from the depths of underground mines to international conferences setting global industry standards."*



Delivery of Geoscientists Canada's Short Course for Students on Professional Career and Public Reporting. In 2024, PGO rolled out Geoscientists Canada's new Short Course on Public Reporting and designed for practicing Professionals.

Also, in 2016, in its ongoing efforts to ensure fair, transparent, objective, and impartial professional regulation, and also recognizing the potential workforce gap, PGO updated its registration regulation to maintain rigorous professional licensure standards while removing or adjusting requirements that may have inadvertently acted as barriers for internationally-trained geoscientists. The initiative protects the public by applying appropriate criteria to register qualified individuals from other countries who can contribute to the geoscience profession in Ontario, thereby helping to address the indicated shortfall in domestic graduates and supporting the industry's future needs.

## INCIDENTAL PRACTICE IN ONTARIO

Geoscience transcends jurisdictional boundaries, making professional mobility essential. Ontario's Professional Geoscientists Act, 2000, promotes mobility and the transferability of membership across Canada. PGO has always taken a leadership role in attempting to establish the seamless ability for registered professionals to carry out their activities across Canada. In recent years, it has lobbied to establish a framework for Incidental Practice that would be reciprocal between all Canadian provinces and territories. Although this proved difficult to institute, Ontario has taken a leadership position of allowing professional geoscientists in good standing from all other Canadian jurisdictions to carry out Incidental Practice within Ontario, with the hope that in the future other provinces would reciprocate with a similar policy.

The Incidental Practice (<https://www.pgo.ca/registration/membership-types/temporary/registered>) provision supports mobility while requiring compliance with Ontario's regulatory standards, including adherence to the PGO Code of Ethics and maintaining professional liability insurance. It benefits industries like mining, environmental consulting, and hydrogeology by enabling qualified professionals to meet project demands without unnecessary administrative hurdles.

By balancing mobility with rigorous professional regulation, the PGO fosters economic growth while protecting public and environmental interests.



## CONCLUSION

Canada's mining industry owes much of its success to the expertise of professional geoscientists. From contributing to setting global standards to fostering investor confidence through transparent reporting, their contributions are invaluable. With initiatives like NI 43-101, leadership from PGO, and a commitment to workforce development, Canada continues to shine as a beacon of excellence in the global mining sector. By supporting and empowering its professional geoscientists, Canada ensures a sustainable and prosperous future for the industry.

For students and young professionals considering geoscience, now is the perfect time to get involved. Attend industry events, network with experienced professionals, and explore internship and research opportunities. The future of mining and geoscience is bright, and with the right skills and knowledge, you can be part of Canada's continued leadership on the world stage.

## REFERENCES

Minerals and the economy - <https://natural-resources.canada.ca/minerals-mining/mining-data-statistics-and-analysis/minerals-and-the-economy/20529>

Global geoscience enrolment - <https://geoscientist.online/sections/unearthed/global-geoscience-enrolment/>

Guidelines to Registration – Professional Geoscientists Ontario (PGO) - [https://www.pgo.ca/files/Guideline\\_Package.pdf](https://www.pgo.ca/files/Guideline_Package.pdf)

CCCESD/CDDGC enrolment report for 2022 - <https://cccesd.acadias.ca/rep2022.html>

British Columbia Securities Commission (BCSC) Short Course (April 8, 2024) – slide 11

TSX 2024 Guide to Listing – TSX and TSXV (pages 30 to 31)

## BIOGRAPHIES

### Lead author – Deborah McCombe

Deborah McCombe, P. Geo., FGC, is a Principal Geologist at SLR Consulting (Canada) Ltd. and has over 35 years' experience in exploration project management, feasibility studies, resource and reserve estimation, and due diligence studies worldwide. Prior to joining SLR, Mrs. McCombe was President of Roscoe Postle Associates and then Chief Mining Consultant for the Ontario Securities Commission (OSC) where she was involved in developing and implementing National Instrument 43-101: Standards of Disclosure for Mineral Projects. Deborah is a graduate of Western University. She is a Past President of Professional Geoscientists of Ontario, a Fellow of Geoscientists Canada and was the 2013 recipient of the Canadian Professional Geoscientist Award as well as Distinguished Service awards from CIM and PDAC.

### Contributing author – Andrea Waldie

Andrea Waldie P. Geo., FGC, is Principal at Waldie GeoGovernance and consults on matters of geoscience professionalism, having recently retired as CEO of Geoscientists Canada, the national umbrella organization of the professional geoscience practice regulators in Canada. She enjoys speaking and collaborating nationally and internationally on matters that support excellence in geoscience professionalism. Andrea served as the Executive Director and Registrar of Professional Geoscientists Ontario from 2007 through 2012 and continues to serve on a variety of committees. She is a director on the board of the APGO Education Foundation and the International Geological Congress (IGC 2028) Foundation and is the treasurer of the Global Geoscience Professionalism Group. Andrea holds an HBS in Earth Science from the University of Waterloo, was awarded the PGO Award of Merit (2023), is a registered professional geoscientist in Ontario and a Fellow of Geoscientists Canada.

### Contributing author – Scott McLean

Scott McLean, P. Geo., FGC, is the President and CEO of Transition Metals Corp, CEO of SPC Metals Corp, and serves as a director on various company boards. With over 35 years of experience, Mr. McLean has a track record of discovering orebodies. His career achievements are exemplified by the co-discovery of the Nickel Rim South Mine for which he received the PDAC Bill Denis, "Prospector of the Year" award in 2004. In 2013, Scott together with the Transition Metals team and its partner Impala Platinum, were awarded the Bernie Schneiders Discovery of the Year award for its work at Sunday Lake. In 2014, Scott was appointed as a Fellow of Geoscientist Canada for his contribution to the Profession. As Past President of PGO, Mr. McLean has the additional distinction of being the only twice-serving President in PGO's history.