

# MERC

Mineral Exploration Research Centre  
AT THE HARQUAIL SCHOOL OF EARTH SCIENCES



# INTRODUCTION

Good morning Mr. Chair, and Honourable Members. Thank you for this opportunity to speak to the challenges facing the Canadian Mining Industry. I will focus on Exploration and Research, the former being the process of discovering the new resources required to build Canada's new mines, and the latter the research required for exploration to be successful. Exploration is the scientific R&D component, and first phase of a sustainable mining life cycle of Exploration – Development – Mining – Reclamation, where the environment is the first and foremost concern throughout that life cycle.

To set the stage I will first present some significant facts about the Mining Industry, Exploration, and Research, then I will present some of the most pressing challenges facing the Mining Industry, which impede successful exploration and discoveries, and lastly I will offer recommendations to meet these challenges.

But first, to help you understand my perspective, I will tell a bit about myself. I was born in the North, in Sudbury, Canada's and perhaps the world's foremost mining centre and cluster. I was employed by Major and Junior Canadian mining companies for 10 years where I successfully explored for metals throughout northern Canada and globally. I joined Laurentian University in 1990, and I am Director of Laurentian's Mineral Exploration Research Centre (MERC) and Metal Earth, a new \$104M R&D program funded by the Canada First Research Excellence Fund (CFREF - \$49.26M) that will transform how we explore for metals.

# Facts

A healthy Mining industry is essential to Canada. Exploration is essential for the discovery of new mineral resources. Without new metal resources there will be no new mines, no mining, and no sustainable northern development.

Mineral resources are essential to Canada. They comprise 18.2 % (2014) of Canada's exports and constitute 4% of Canada's GDP. Mining is, and will continue to be, a major economic driver of the Canadian economy, and the only economic driver for the Far North.

The Mining Industry is the largest employer of First Nations people in Canada (about 10% of the workforce). The exploration sector is often the first opportunity for First Nation Communities to make contact with the Mining Industry.

Historically, Exploration Research in Canada has been of the highest quality, but is fragmented, poorly funded, and dispersed throughout the Canadian University system. In Australia, Mineral Exploration Research over the past two decades has benefited from their government focusing research to key university research centres that are well funded and undertake the large, big-science projects required to address key industry challenges. Canada has slipped behind Australia as the world leader in mineral exploration research.

The development of Canada's North and Far North will depend on the sustainable development of new mines discovered through successful exploration.

# Challenges

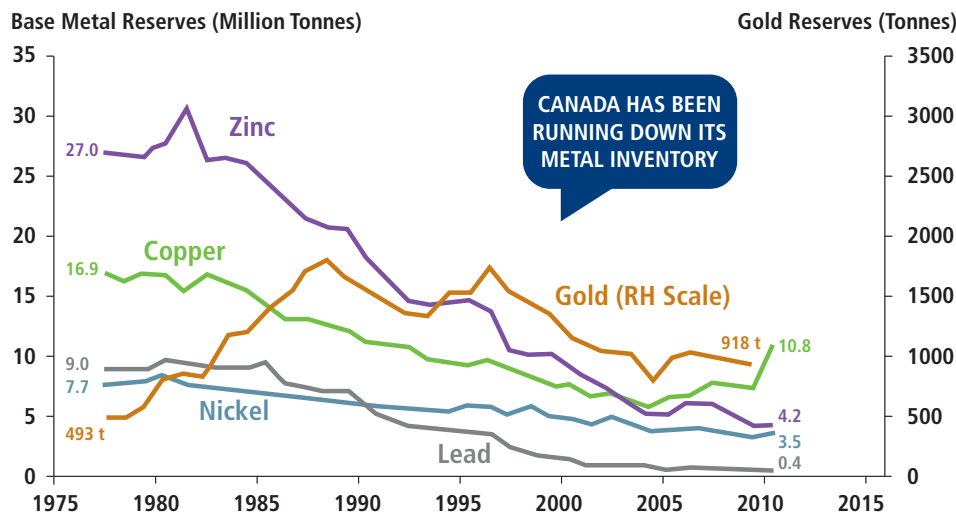


Fig. 1 Canada's Metal Resources. NOTE: Refers to metal contained in Proven and Probable Mineable Ore in Operating Mines and Deposits committed to Production. SOURCE: NRCan

The decline in Canadian (and global) metal resources (Fig. 1) is a threat to global sustainability, and security. Since 1980, the most dramatic decline has been in lead (97%), zinc (82%), nickel (82%) and silver (80%) reserves. Copper (36%) has fallen significantly as well. Almost all the zinc and lead produced are used for electric cars, and rust-proofing (anodizing), they are considered as "green metals", and there have been no major discoveries of either for >20 years! The real challenge is that the need for metals is going to increase exponentially due to increasing global industrialization and the resulting shift in the economic status of billions of people. We need to discover the new resources required for global sustainability, security, and growth.

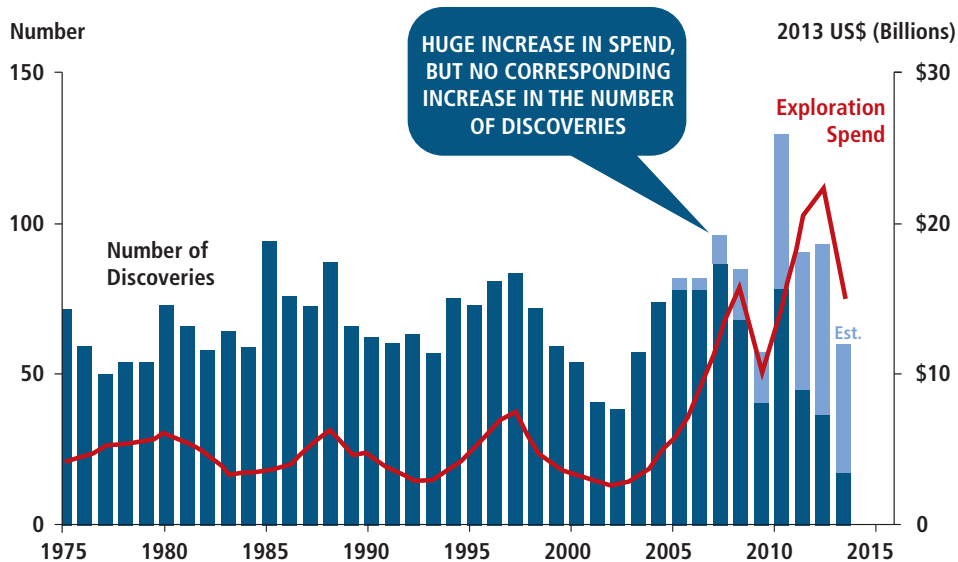


Fig. 2 Canadian Exploration Expenditures and Discoveries. NOTE: Based on Moderate, Major and Giant discoveries. Excludes satellite deposits within existing Camps. Also excludes Bulk Mineral discoveries and expenditures. SOURCE: MinEx Consulting September 2014

Notwithstanding the current recession in the Mining sector, in the period of 2005-2010, there has been an unprecedented drop in the number of significant discoveries despite record exploration expenditures (Fig. 2). Every discovery is important, but World-Class discoveries are essential as 80% of global metal resources are contained in the largest 20% of deposits! Real economic and societal impact only comes from the discovery of World-Class deposits. Metal deposits are rare (metal concentrations of 1000x their average crustal abundance is required), small, and more difficult to find than finding a needle in a haystack (the surface footprint of an average underground mine is < than 3 city blocks; all mining activities in Ontario occupy <0.05% of the provincial landmass). To compound this, new deposits are more difficult to discover because they are increasingly hidden and “deeper”, and the resources in existing brown fields mining districts are finite. However, exploration in remote or “Greenfields” parts of Canada is challenging, and this is reflected in lower success rates. In part, this reflects our lesser understanding of the geology of Canada’s North and Far North and the limited effectiveness of current exploration tools and models in such remote environments. We clearly need new tools and concepts to identify the most metal endowed and prospective areas of our vast North and Far North.

Exploration dollars are leaving Canada. For decades Canada was the preferred destination for global exploration expenditures. From 2003 -2013 exploration expenditures in Canada have dropped by 40% (\$18 Billion in lost investment), compared to 24% for Australia, our closest competitor. Australia is now the preferred destination for global exploration dollars. Fewer exploration dollars means fewer discoveries and fewer mines.

90% of Canada’s known resources are south of 60° north latitude, and >95% of our mines are south of 55°, yet the same geology extends throughout Canada’s Far North. How do we focus exploration in such a vast area as Canada’s North and Far North, and how do we increase discovery rates?

There are 100s of millions of tonnes of “stranded, uneconomic” base and precious metal resources in Canada’s Far North (e.g. Selwyn Basin, Yukon and Hackett River, Nunavut), which would be developed if there were adequate infrastructure and a return to slightly better metal prices.

# Recommendations

To increase discovery rates, increase investment of global exploration dollars in Canada, to discover the mines, and to fully engage First Nations peoples to be leaders in the sustainable development of Canada's North and Far North we need to (list not prioritized):

## FIRST

Upgrade our fundamental geoscience data coverage: the existing one quarter million scale geological mapping of Canada's North and Far North, and the current mapping of the Far North (e.g. GSC -GEMS II) although welcomed, does not have the required resolution and level of detail to support effective exploration. We need higher resolution geological mapping of areas with known resources e.g. Hackett River district, Nunavut (last mapped in 1972), and areas known to have higher metal endowment. This will require increased funding to support geoscience and targeted mapping surveys- geological mapping, geophysics and geochemistry - traditionally conducted by NRCAN, provincial, and territorial geological surveys, or through new mechanisms, such as universities.

## SECOND

Remove roadblocks to global exploration investment in Canada, such as secure land tenure and accessibility by reducing areas withdrawn from exploration, or lands encumbered by First Nation Issues (e.g. Ring of Fire). First Nations need to be recognized as co-owners of Canada's northern mineral resources. For example, in Nunavut the Inuit own many of the known mineral tenures and the mining industry works well with them, and in the USA a Native group is co-owner of the World-Class Red Dog mine. We cannot have First Nations feeling solely as adversarial owners of environmental protection. Co-ownership of mineral tenure would broaden their viewpoint.

## THIRD

Provide industry with the new tools, protocols and models needed to make the next generations of Greenfields exploration discoveries and new mines. This cannot be done by traditional ore deposit research or by individual researchers working alone. To be successful, to innovate, we need to financially support and grow our mineral exploration research centres such as MERC at Laurentian and MDRU at UBC, as they can assemble, grow and sustain the multidisciplinary research teams required to solve fundamental research problems and to innovate. An example is MERC's Metal Earth mega-project, which will change our understanding of the processes responsible for metal transport and economic concentration during Earth's early evolution, and transform how we explore for metals by providing new tools and knowledge to aid exploration.

## FOURTH

We need to increase government funding directly and/or through federal agencies (e.g. NSERC) to leverage more industry dollars to support successful exploration research within university based research centres and by directly supporting applied exploration research driven by industry consortiums such as the Footprints Project of the Canadian Mining Innovation Council (CMIC), which represents a consortium of 27 mining companies, 24 universities. CMIC coordinates research efforts on some of the big challenges of the Canadian Exploration Industry. The big-science, multidisciplinary mineral exploration research programs conducted by university research centres like MERC and MDRU provide the only mechanism to bring the best minds in Canada (and globally) together to provide students (HQP) with the education and training needed to become Canada's next generation of thought leaders in mineral exploration research. Young graduates with the appropriate education and skills are key to the discovery of future mines.

## FIFTH

New funding to develop programs that target Aboriginal youth (high school level) for careers in the mining sector, and to develop and support new mining and mining related programs at both colleges and universities including Indigenous Access programs that provide transitions and pathways into the fields of Geology, Engineering, and Environmental science.

Lastly, Thank You for this opportunity, for your attention, and for your commitment to the Mining Industry, an essential driver of Canada's economy.

Respectfully submitted by  
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