



# The Importance of Research & Development Investment for Canada's Mining Industry

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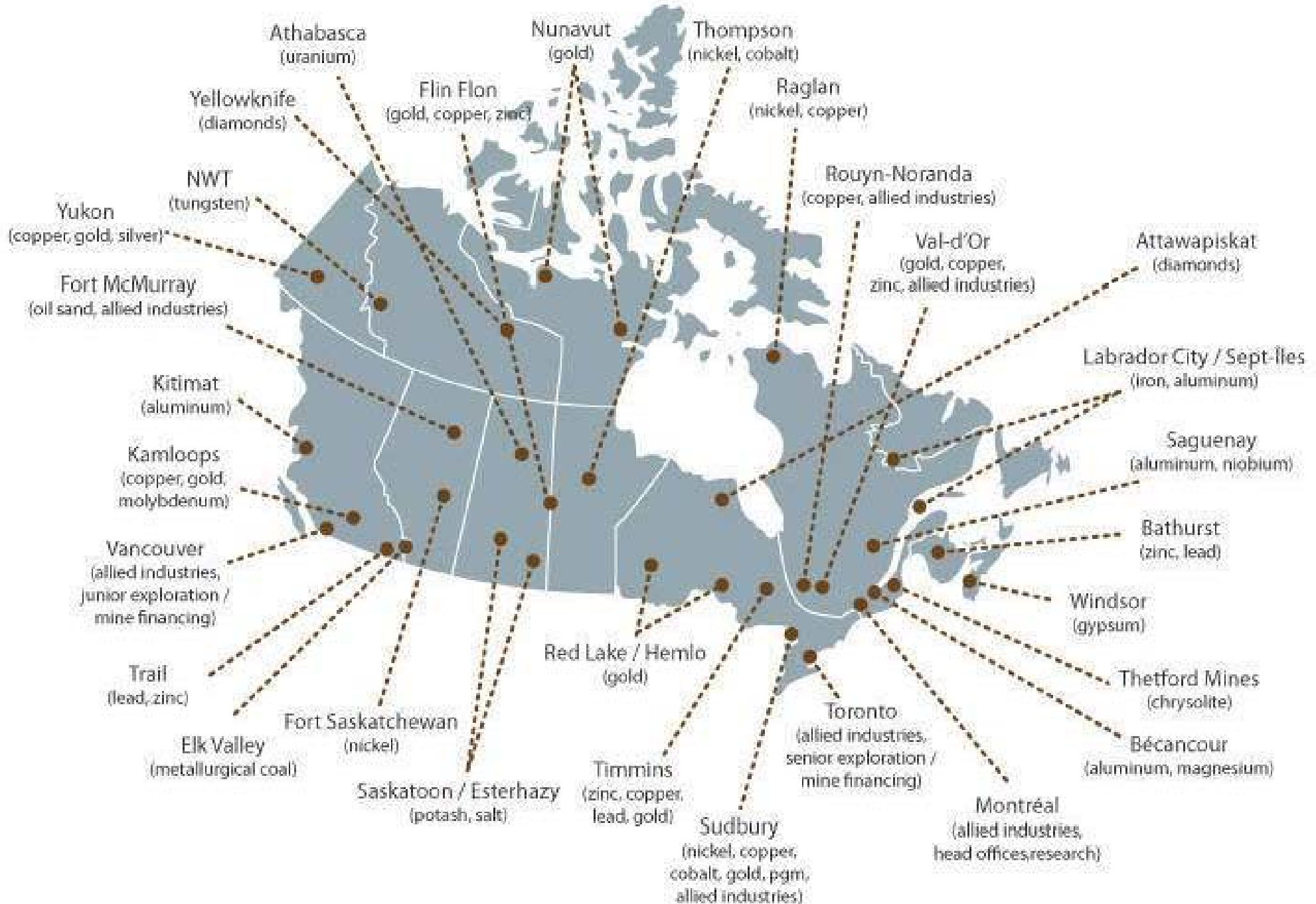


# ABOUT MAC

The national voice of the mining industry in Canada:

- Advocacy - to advance the business of mining
- TSM Initiative – stewardship and social license
- 36 corporate members in iron ore, gold, diamonds, oil sands, met-coal, base metals, uranium
- 50 associate members in engineering, environment, finance
- Members engaged in the full spectrum of the industry: exploration, mining, smelting, semi-fabrication, supply

# CANADA'S MINING INDUSTRY: OPERATING IN ALL REGIONS ACROSS THE COUNTRY





# ENVIRONMENTAL PERFORMANCE

## *Towards Sustainable Mining (TSM)*

- MAC members commitment to Sustainable Development
- A strategy for improving the mining industry's performance by aligning its actions with the priorities and values of Canadians.
- A process for finding common ground with our communities of interest, to build a better mining industry today and in the future.
- TSM is about Stewardship and industry's Social License to operate



# MINING'S CONTRIBUTION TO CANADA

- **Employs** 300,000+ workers; Wages 30-60% above other sectors
- **Operates** 220 producing mines, 33 smelters and refineries
- **Paid** \$8.4B in taxes and royalties to governments in 2010
- **Invests** \$20B in capital projects annually
- Largest private employer of Aboriginal Canadians
- Core supplier to clean-technology sectors

## MINING IN CANADA'S NORTH

- In one decade - produced \$16 B in diamonds ranking Canada 3<sup>rd</sup> globally by value
- Provided 30,000+ person-years of employment
- \$10.2 B capital and operating spending
  - \$8.5 B Northern business; including \$4 B Aboriginal businesses
- Historical contributions to Northern Infrastructure : rail, roads, hydro, shipping, ice roads and community development



# CANADA AS A GLOBAL MINING COMPETITOR

- Attracted 19% of world exploration spending in 2010
- Efficient TSX processes - 1400 mining companies listed, ~50% of mineral projects are outside Canada
- Estimated 1000 Canadian companies in 100 countries
- Minerals account for 21% by value of Canada's goods exports
- Top 5 World Producer in uranium, potash, nickel, platinum, aluminum, diamonds, zinc, met coal
- Large direct investment: 14% of all FDIC and 10% of CDIA



## • CHINA – GLOBAL MARKET DRIVER

- 30 consecutive years of 8-15% annual growth (exception '89-'90)
- 1980s China consumed 5% of world's base metals in vs. ~30% today
- Shift toward feed-intensive diets (potash), nuclear power (uranium), infrastructure and manufacturing (base metals), middle-class (diamonds, gold)
- Results: Mineral price increases in the past decade have been ~3-25 times larger than inflation

## CHINA – LONG TERM



- 2020-2025, China growth will still be in the 6-9% range
- Autos: 10 /100 people in China vs. 76/100 in US
- Personal computers: 4 /100 people in China vs. 75/100 in US
- China - 30% of world's metals demand vs. 3% in India
- **Next 25 years - as many minerals and metals consumed worldwide as in all of history to date**



# CANADA'S OPPORTUNITY

*MAC estimates that approximately \$137 billion in mining-related projects are presently proposed in Canada, including multi-billion dollar investments in:*

- **Nunavut:** gold and iron ore projects – Agnico Eagle, Newmont, Baffinland (ArcelorMittal)
- **NWT:** rare earths, diamonds, gold – De Beers, Avalon, Fortune, others
- **BC:** coal, copper mines - Teck, Capstone, Walter Energy, Imperial, Taseko, others
- **Alberta:** mined oil sands projects – Suncor, Syncrude, Shell, CNRL, others
- **Saskatchewan:** potash, uranium, diamonds – BHP, Cameco, Shore Gold
- **Ontario:** nickel, gold, palladium – Vale, Xstrata, Goldcorp, others
- **Quebec:** diamonds, nickel, gold – Stornoway, Xstrata, Agnico-Eagle, ArcelorMittal
- **Newfoundland and Labrador:** nickel processing plant – Vale; iron ore – Rio Tinto IOC,, Cliffs, New Millennium





# R&D CHALLENGES TO OVERCOME

- Declining ore reserves
- Declining discovery rate
- Increasing costs in exploration, mining, processing & reclamation
- Increasing environmental management costs
- Public demand for more comprehensive EA process
- Remote infrastructure costs
- **Improved Technology is needed to assist industry with these challenges**

# GREEN TECHNOLOGY & MINERALS

**Global investment in clean energy technology expected to reach \$450B per year by 2012**

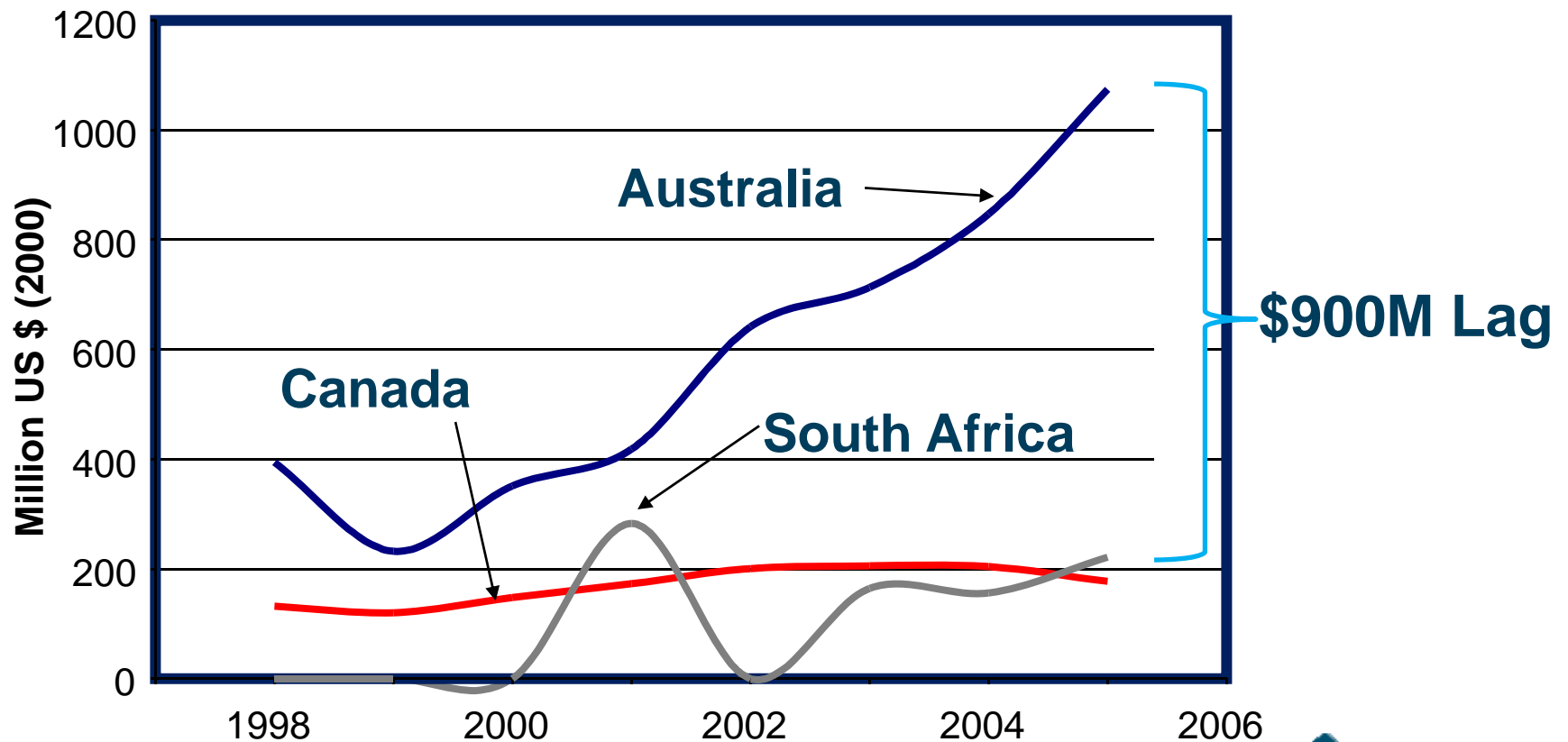
- **Hybrid vehicles** – nickel hydride batteries, cobalt, rare earths
- **Electric vehicles** - vanadium batteries
- **Catalytic converters** - cerium and platinum
- **Solar energy cells** - tellurium and germanium
- **Wind turbines** - aluminum, lightweight composites
- **Nuclear** – uranium, beryllium



## CANADA'S MINING R&D NEEDS A DEDICATED NATIONAL VOICE

- Canadian mining R&D is mainly private, fragmented and uncoordinated
- Canadian mining research has lost ground to international competitors
- **Industry-Government collaboration and support is also needed for Mining R&D**

# Stagnant investment in R&D has resulted in lost ground to Canada's international competitors



Source: OECD, Main Science and Technology Indicators Database (Paris, 2008).

# Australia Minerals R&D Support...



## Minerals Down Under National Flagship Program

- **Vision:**
  - Allow Australian industry to potentially exploit new resources: **Target - in situ value of \$1 trillion by 2030**
  - More than **double** the size of the **mining services and technology sector to \$10 billion by 2015.**
- **Funding:**
  - **2009-10 - \$115 million** (CSIRO, involving 400 research staff across Australia)
  - **2010-11 - \$77.2 million** (\$42 million (CSIRO) + \$32 million (Industry & other sources))

# Australia Minerals R&D Support



## CRCMining (Cooperative Research Centre, 2003)

- Funding Sources:
  - Australian Government - **\$27 million/ 7 years**
  - Industry and University partners - **\$100 million cash and in-kind** support.
- In 2009, received **additional \$12 million, with 5 year extension** under the Cooperative Research Centers program.

# Canadian Mining Industry Private Sector R&D Investment

(The Private Sector is doing its part)

Statistics Canada Catalogue (2010)

- 88-202-X

Category	\$ Millions
Mineral Extraction	47
Primary Metals	211
Fabricated Metal Products	223
Non-Metallic Products	67
<b>Total</b>	<b>\$ 548</b>

- Exceeds motor vehicles; & machinery manufacturing sectors
- Studies indicate private sector R&D focuses primarily on cost reduction and process improvement rather than technology innovation.
- **2009 - Top 7 Private Company R&D Expenditures = \$419 M**

# Top 7 Canadian Mining R&D Investors in 2009

Mining Company	Spending (\$Millions)	Rank
Suncor	\$200	13
Vale	64	33
Syncrude	56	37
Novelis	47	42
Rio Tinto Iron & Titanium	20	75
ArcelorMittal Dofasco	17	85
Teck Resources	15	91

<b>Oil Sands</b>	<b>61%</b>
<b>Base &amp; Precious Metals</b>	<b>19%</b>
<b>Aluminum Products</b>	<b>11%</b>
<b>Iron/Titanium</b>	<b>9%</b>

Source: RESEARCH Infosource Top 100



# RESEARCH PRIORITIES

(Some Examples)

- **Exploration**

- Airborne 3-D geophysical mapping; remote sensing
- Low-impact seismic, deep exploration technologies

- **Mineral Extraction**

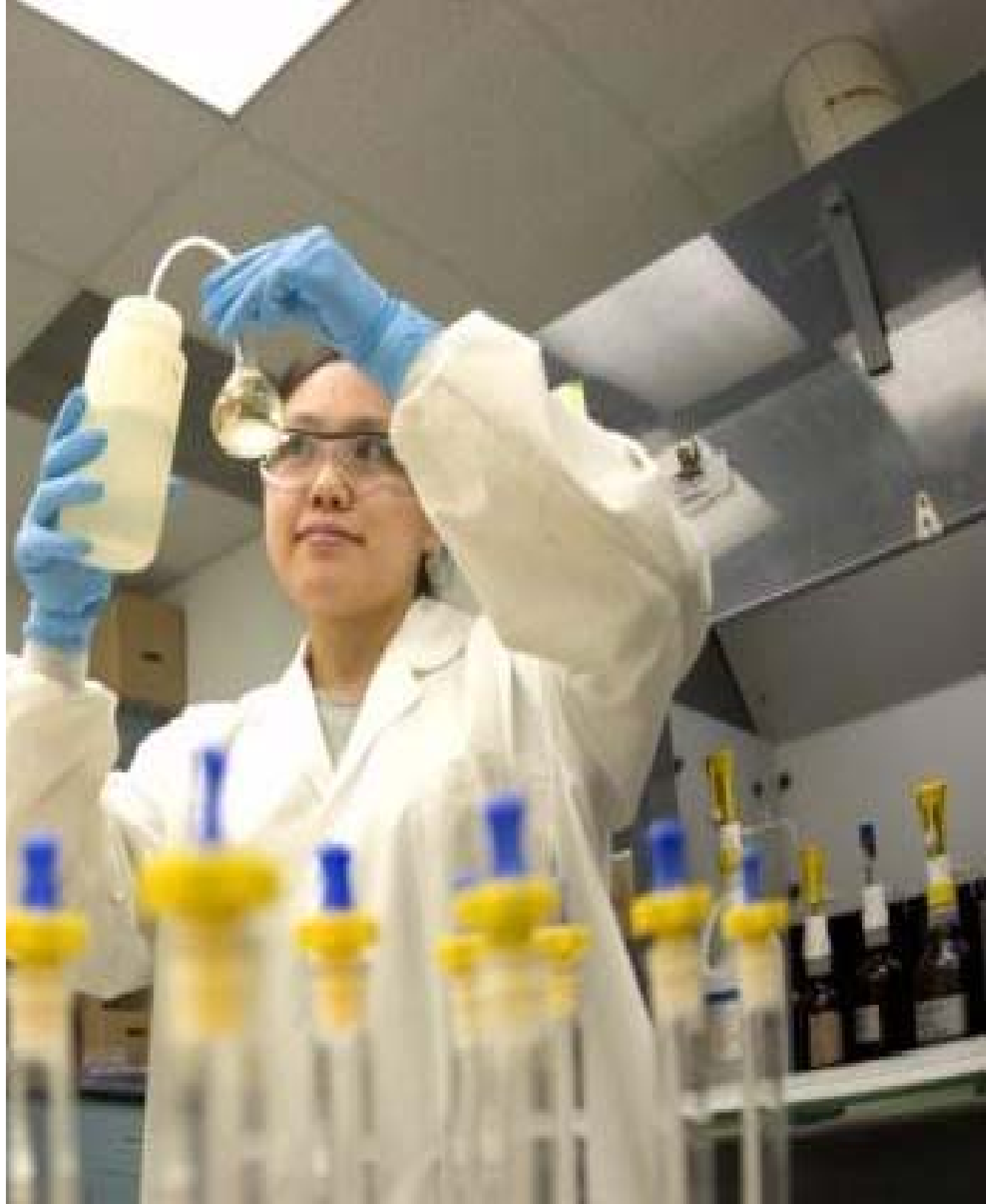
- Lower grade ore recovery
- Improved remote-control; deep mining methods
- Compliance with increasingly stringent standards

- **Processing and Refining**

- Clean air technologies
- Complex ores refining
- Hydromet technology

- **Tailings, Effluent and Water Management**

- Environmental Effects Monitoring; water use
- Innovative, practical solutions to environmental legacies



# POLICY CONSIDERATIONS

- Recognize the strategic and critical important nature of Canada's mining industry:
  - **Key contributor to Canada's Global Competitive Advantage and a major contributor to employment and social development, particularly for Aboriginal and Northern Canadians**
- Recognize the need for public R&D investment in the mining sector
  - **NSERC support for mining is relatively small;**
  - **A 2005 NRCan paper recommended that Canadian governments invest \$40M per year in mining R&D.**
- Consider Tax System incentives for investment in mining
  - ***“Canadian Research & Development Investment Expense Allowance”*** for contributions to mining research programs
- ***Support public-private funding for mining R&D, with CMIC as Canada's national coordinator***



# THANK YOU

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