The Pan-Canadian Mining Research and Innovation Strategy:

Strengthening the Competitiveness of a Responsible Canadian Mining Industry Through Excellence in Research, Innovation and Commercialization

A Report to Federal, Provincial and Territorial Mines Ministers
From the Canadian Mining Innovation Council

September 2008

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The Pan-Canadian Mining Research and Innovation Strategy

VISION

Canada is a global leader in the mining industry through leading-edge research and innovation.

MISSION

To enhance the competitiveness of a responsible Canadian mining industry through excellence in research, innovation and commercialization.

FIVE STRATEGIC GOALS

To drive breakthrough research solutions to address critical needs in targeted areas	To enhance sustainable research performance and receptor capacity through HQP	To optimize research efficiency and achieve innovation potential through collaboration	To create a mining research and innovation culture effectively linking research capability to industry needs	To enroll new audiences and key decision-makers to support mining research and innovation

ACHIEVING GOALS AND RESULTS IN FIVE ACTION AREAS

Targeted Research and Innovation

- Breakthrough research solutions achieved and commercialized in targeted areas (including environmental technologies)
- International leadership in targeted research areas attracting international students, researchers and funders
- Well-funded and sustainable research programs with long-term projects and goals

Collaboration

- Greater coordination and collaboration in seeking access to higher levels of research funding
- Enhanced research output through coordinated and collaborative research effort
- Moving collaborative research beyond regional boundaries to theme-based endeavours and increased awareness of who does what and where

Innovation Systems and Culture

- Strong national research networks connecting regional nodes of mining research excellence and with international linkages to potential researchers and funders and markets
- Increased uptake of research results by industry, a seamless flow of people and ideas within the mining research and innovation system, and increased industry participation in research networks
- Increased attention to multi-disciplinary approaches to mining research and innovation

Highly Qualified People

- Attracting, developing and retaining a steady flow of HQP (students, faculty and practitioners) in mining research and innovation, and increasing student completion rates
- Strengthening the research capacity of Canadian mining schools and their linkages to industry and other mining innovation system stakeholders
- Increased industry involvement in HQP training and increased opportunities for students in co-operative educational settings
- Increasing the profile of mining research within educational institutions

Brand, Visibility and Reputation

- Strengthening the public's knowledge base on mining through disseminating accurate, relevant and timely results of mining research and innovation
- Unsolicited third-party endorsements of the Canadian mining industry brand and research agenda
- Making CMIC an internationally open and renowned organization with a growing membership dedicated to strengthening the competitiveness of a responsible Canadian mining industry

Implementation through collaborative partnerships, a bias for action, and measuring progress

1.0 INTRODUCTION

This document describes the Pan-Canadian Mining Research and Innovation Strategy and the next steps to ensure its effective implementation and achieve the Canadian mining community's vision of Canada as a global leader in the mining industry[1] through leading-edge research and innovation.

Federal, provincial and territorial Mines Ministers met in September 2007 and endorsed the establishment of the Canadian Mining Innovation Council (CMIC). They asked that CMIC develop a Pan-Canadian Mining Research and Innovation Strategy to be presented at the 2008 Energy and Mines Ministers' Conference.

CMIC was launched in the fall of 2007 with a Transition Board of Directors drawn from industry, academia, and government (see Appendix II), and a secretariat supported by Natural Resources Canada and the Canadian Institute for Mining, Metallurgy and Petroleum (CIM). CMIC's overarching objectives are to:

- increase mining research, innovation and commercialization efforts in order to strengthen Canada's pre-eminent role as a global leader in mineral exploration, mining, and knowledge-based services and technologies; and

- increase the supply of highly qualified graduates from mining and earth sciences faculties to meet the significant demand today and into the future of industry, governments, and academia.

CMIC's first order of business was to develop the Pan-Canadian Mining Research and Innovation Strategy. In early 2008, the Council sought the Canadian mining community's views on the economic, social, and environmental drivers that will shape the future of mining research and innovation in Canada and the significant areas of challenge and opportunity. These were provided through seven regional workshops held in early 2008 involving over 150 leaders from the private, public, and academic sectors. CMIC then commissioned: four expert papers covering the full mining cycle (exploration, extraction, processing, and cross-cutting environmental issues); a report on mining strategies in foreign jurisdictions; and a report on the strategies and initiatives being undertaken by Canadian federal, provincial and territorial governments to support the Canadian exploration and mining sector.

CMIC drew on the results of this work to set out a clear vision and mission for a Pan-Canadian Mining Research and Innovation Strategy, identify five priority areas for action and expected results, and develop action plans for delivering results in both the near term and over the next five years.

[1] The mining industry includes exploration, extraction, processing, mine remediation and closure, and supplier industries.

2.0 A CANADIAN MINING COMMUNITY MOBILIZED BY A COMMON VISION AND MISSION

The CMIC Transition Board has set out the following vision and mission for the Pan-Canadian Mining Research and Innovation Strategy:

Vision

Canada is a global leader in the mining industry through leading-edge research and innovation.

Mission

To enhance the competitiveness of a responsible Canadian mining industry through excellence in research, innovation and commercialization.

This vision and mission, which respectively serve to guide and frame the Pan-Canadian Mining Research and Innovation Strategy, are founded on: what the CMIC Transition Board heard from the Canadian mining community at seven regional workshops held in early 2008 (in Vancouver, Edmonton, Saskatoon, Toronto, Val-d'Or, Montréal, and Halifax); expert research papers; a scan of the mining research strategies in foreign jurisdictions; and the considered judgment of the Transition Board members themselves.

2.1 Views from the Canadian mining community

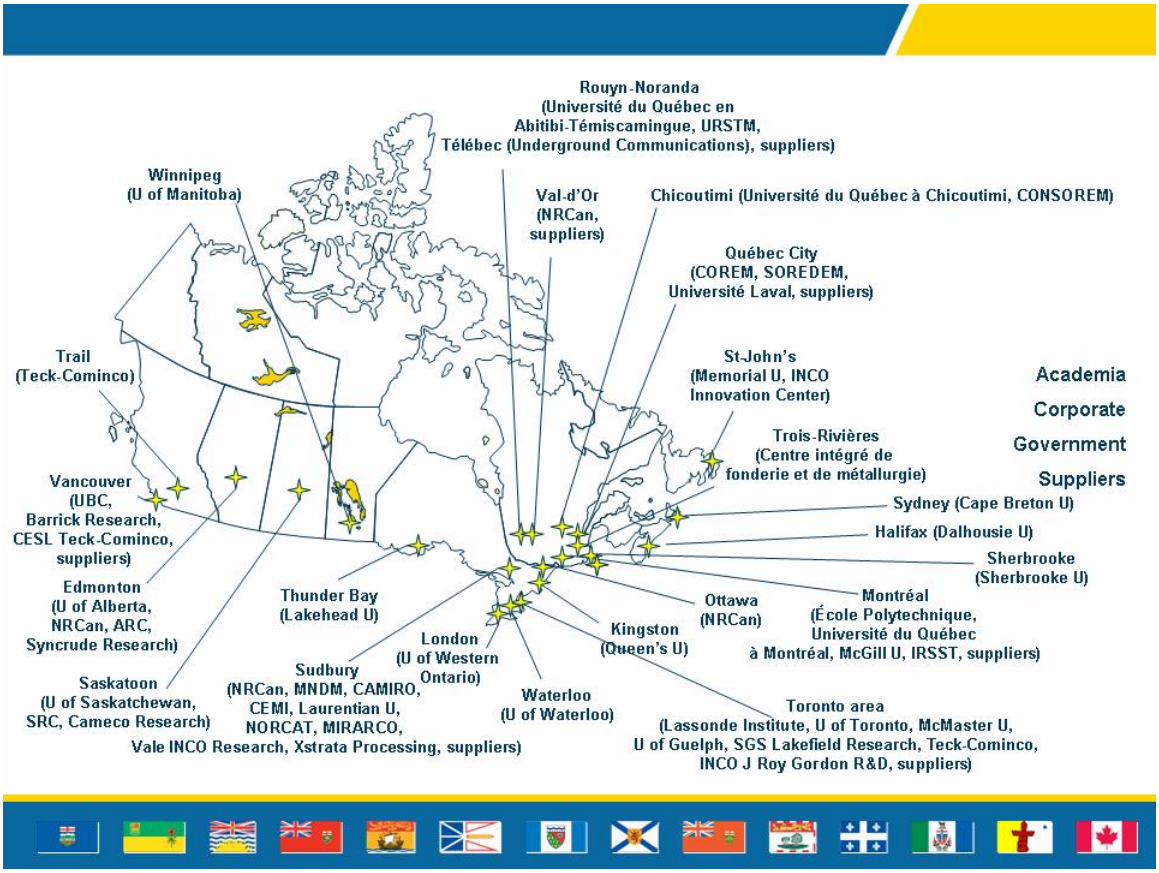
The workshop discussions revealed diversity in local and regional mining exploration, extraction, and processing circumstances because of geography and geology, differences in the scope and scale of mining exploration and mine operations, and different federal, provincial and territorial policy and regulatory frameworks. But significant areas of commonality also emerged. Time and again participants highlighted the need to:

- focus and prioritize research effort and resources;
- address current and looming skills shortages (especially in the area of highly qualified people);
- leverage research effort through greater collaboration;
- rebuild mining research excellence across Canada through reinvigorating Canada's mining innovation system and culture; and
- ensure the Canadian mining sector's brand and reputation for excellence and sustainability are continuously strengthened and communicated.

Workshop participants identified a number of other considerations that the strategy should take into account, including:

- CMIC itself should have a bias for action to effect change in Canadian mining research and innovation;
- the appetite for the mining research community to work in a more multi-disciplinary manner and in collaboration with complementary industries and non-traditional partners;
- the importance of research and innovation activities resulting in transformative changes through longer-term fundamental research initiatives;
- the need to recognize and respect different public policy and regulatory frameworks for mining across Canadian jurisdictions, while also identifying areas for greater federal-provincial-territorial collaboration; and
- leveraging diverse centres of mining research excellence found across the country through strengthening linkages between them (see Figure 1 below).

Figure 1. A Strong Base for Strengthening and Connecting Canada's Mining Research and Innovation System

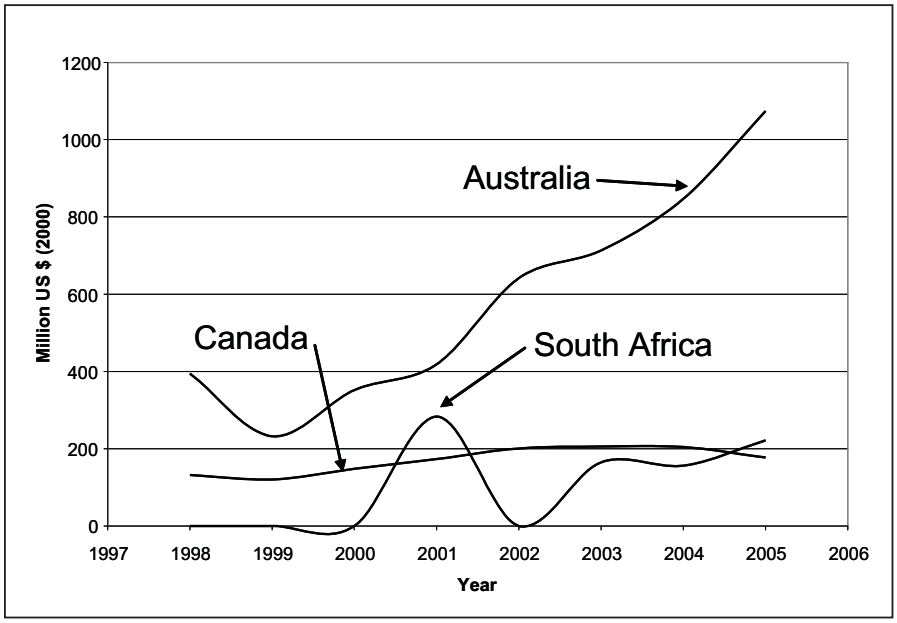


Source: Natural Resources Canada (Minerals and Metals Sector, 2008).

2.2 Benchmarking ourselves against global best-in-class

CMIC commissioned an international scan of mining research and innovation strategies in foreign jurisdictions. The scan revealed that significant efforts are being made to achieve greater scale and scope in mining research and innovation activities in such diverse foreign jurisdictions as the United States, Australia, India, Chile, and South Africa. Often the national strategies centre on improving collaboration between the various mining research institutions, industry, and governments. Australia is a leading jurisdiction in taking this direction and it is notable that it is also the location for significant new private-sector investments in mining R&D (Figure 2 below).

Figure 2. Business Intramural Expenditures on Research and Development Mining and Quarrying in Australia, Canada and South Africa (constant 2000 US$ millions)



Source: OECD, Main Science and Technology Indicators Database (Paris, 2008).
Note: The OECD data set used to construct this graph includes: R&D expenditures related to exploration and extraction in the mining and oil and gas sectors, and specifically includes the mining of coal and lignite; extraction of peat; extraction of crude petroleum and natural gas (including oil sands); service activities incidental to oil and gas extraction, excluding surveying; mining of uranium and thorium ores; and mining of metal ores and other mining and quarrying. The data refer to domestic R&D expenditures by resident companies. R&D expenditures of resident companies abroad are not included. For methodological and definitional reasons, the OECD data set is not directly comparable with R&D expenditures reported by national statistical agencies, including Statistics Canada. Based on Statistics Canada data, Canadian business expenditures on R&D in the minerals and metals sector (all four stages, but excluding oil and gas extraction) grew in nominal terms from $396 million in 2001 to $504 million in 2005. See *Facts and Figures, a Report on the State of the Mining Industry in Canada* (The Mining Association of Canada, 2007) available at www.mining.ca.

2.3 Expert assessments across the mining life cycle

The four expert papers commissioned by CMIC underline that Canada has a pre-eminent role as the global leader in mineral exploration, mining, and knowledge-based services and technologies, including environmental services and technologies. However, they also highlight challenges within each part of the mining life cycle (exploration, extraction, processing), and cross-cutting environmental areas involving energy, water, tailings and effluent management.

Extracts From the CMIC Expert Papers

Exploration

"Successful performance in exploration requires recognition and support of applied geoscience as a knowledge-based industry where success is measured by development and training of skills and transfer of ideas related to observation of rocks, compilation of maps and generation of models. Capacity exists in the service industry to develop innovative technologies in chemistry and geophysics. Universities need to develop teaching and research in exploration geochemistry and geophysics. Analytical infrastructure exists in universities to contribute significantly. Without a plan and support, both business SMEs and universities will lose out to aggressive international competition overseas."

Extraction

"Substantial Canadian mineral resources are found in deep mines and 75% of mining operations use underground mining methods. These methods, which have less impact on the environment than open-pit mines, are, however, technically more complex to exploit. Furthermore, much of the mineral potential is located at great depths where complex geomechanical conditions make their safe extraction more challenging. As well, the increasingly developed northern mineral potential requires technologies specifically designed to minimize impacts on the region's fragile environment. These characteristics of the Canadian mineral potential, combined with the changing socio-economic context such as the current and forecasted shortage of highly qualified personnel, require the mining sector to innovate and to improve the mining methods currently in use to preserve an active and economically efficient mining industry."

Processing

"As the global population increases, the result will be a sharp increase in the demand for minerals and metals. As the world's rich ore deposits quickly deplete, there will be an acute need to develop the poorer-quality ore deposits. Such ores are hard to treat and will require finer grinding. As a consequence, the energy requirements of the mining industries will increase exponentially while the generation of mine-related waste will also increase. The only way to remain competitive will be to develop processing technologies that require less energy, less water, lower capital cost, lower dust and gas emissions, and less toxic effluent generation."

Environment

"One of the greatest areas of public interest in the mining industry is the environmental impact of mining activities. Concerns about acidic drainage, heavy metals contamination, releases of tailings or other wastes into natural waters, and the general issue of environmental footprint have led to a widespread negative public image of mining. This image persists even though modern regulations and mining practices in Canada have done much to reduce the sorts of problems that have occurred due to past mining activities. The issue is exacerbated by the fact that problems at orphaned and abandoned sites . . . continue to occur . . . more research is needed to address persistent environmental challenges."

3.0 STRATEGIC GOALS, EXPECTED RESULTS, AND ACTION PLANS

The contents of the Pan-Canadian Mining Research and Innovation Strategy – its goals, expected results, and action plan – match the strategy's ambitious vision and mission.

In developing the goals, results, and action plans, CMIC's Transition Board recognizes that Canada has a pre-eminent role as the global leader in mineral exploration, mining, and knowledge-based services and technologies. But it also finds that Canada's mining and mineral processing sector faces key challenges related to R&D, innovation, and commercialization. There is a need for technological solutions to advance sustainable mining, meet environmental standards and regulations, reduce costs, increase the value added, and protect the health and safety of workers. There is a lack of efficient and cost-effective access to R&D capacity in Canada and globally. There are shortages of necessary engineers and scientists that are not being matched by increasing enrolment in most university mining departments. Furthermore, Canada is not fully capturing the commercial benefits of R&D for domestic and international markets.

Mining research in Canada too often occurs in silos. Researchers and research institutions do not always recognize and capture the benefits of collaborative effort. There have been a number of discrete initiatives over the years at both the regional and national level to encourage research collaboration. Yet today there remains fragmentation in research effort and competition, rather than collaboration in seeking research funding. Moreover, there are weaknesses in linking industry needs with public-private R&D capability. Unless companies are well connected to, and knowledgeable about, Canadian research efforts and capabilities, they will look offshore for leading-edge solutions.

In summary, Canada needs not only a long-term vision and mission for mining research and innovation to maintain its global leadership role in mining, but also a focused set of strategic goals and a clear plan of action to generate results, supported by improved coordination and collaboration between research users, funders, and performers. In this context, the Transition Board identified five thematic areas where action is essential for realizing the vision:

- Targeted areas for research and innovation
- Highly qualified people
- Collaboration
- Innovation systems and culture
- Brand, visibility and reputation

Within each of these areas, as set out below, CMIC has established goals and expected results that must be achieved. It has also developed five-year action plans within each area (including actions to be taken in year one) to achieve the strategy's vision, goals, and expected results.

3.1 Targeted areas for research and innovation

STRATEGIC GOAL

To drive fundamental research breakthrough solutions to address critical needs through focus, organization, and collaboration.

This strategic goal is underpinned by the Council's judgment that the Canadian mining industry requires a long-term and targeted research and innovation agenda that provides a clear focus for people and attracts the required resources to make Canada a global leader in developing solutions to real-world mining issues. This goal responds to such challenges and considerations as:

- *Stakeholders work within a fragmented mining innovation system that lacks overarching collaborative mechanisms to bring together potential partners and establish research priorities.*
- *The short-term nature of many research projects brings about incremental change, but does not result in the major breakthroughs that will mark the Canadian mining industry as the most innovative and competitive in the world.*
- *Public sector funding programs often operate within a five-year timeframe and, as a result, there is very little sustained funding and few research initiatives that span a time horizon beyond five years.*

EXPECTED RESULTS

- Breakthrough research solutions achieved and commercialized in targeted areas of the environment (including energy, water, and tailings and effluent management), exploration, deep mining, and process efficiency.
- International leadership in targeted research areas attracting international students, researchers, and funders.
- Well-funded and sustainable research programs with long-term projects and goals.

DRAFT PROPOSED ACTION PLAN

1. **Define initial research sub-priorities within each of the four research themes of environment (energy, water, tailings and effluent management), exploration, deep mining, and process efficiency.**
2. **Launch in year one at least two well-funded collaborative research projects with national scale and strategic focus, and undertake preparatory work for other high-impact projects.**
3. **Establish a management process and structure of national scale and reach for bringing on stream additional high-impact collaborative research projects that involve the establishment of research consortia (including industry, funders, and researchers).**

3.2 Highly qualified people

STRATEGIC GOAL

To enhance a sustainable research performance and receptor capacity in Canada through HQP.

This strategic goal is underpinned by the Council's judgment that highly qualified people (HQP) with the skills and knowledge to support a sustainable mining sector are a national strategic asset for Canada and a competitive asset for internationally competitive Canadian mining companies.

A critical group of HQP consists of those graduating from Technologist, Bachelor's, Masters, and Ph.D. programs. These graduates will hold key roles in research, development and implementation of new mining technologies, systems and leading practices for the "next generation mine." However, a significant proportion of such individuals working in academia and research centres, industry, or government settings will be retiring over the next two decades. As a consequence, both specialist know-how and leadership will be lost unless there is sufficient renewal to enable research, transfer of knowledge, and development of future leaders.

EXPECTED RESULTS

- Attracting, developing, and retaining a steady flow of HQP (students, faculty and practitioners) in mining research and innovation, and increasing student completion rates.
- Strengthening the research capacity of Canadian mining schools and their linkages to industry and other mining innovation system stakeholders.
- Increased industry involvement in HQP training and increased opportunities for students in co-operative educational settings.
- Increasing the profile of mining research within educational institutions.

DRAFT PROPOSED ACTION PLAN

1. **Initiate the rebuilding of Canadian educational and research capacity related to the mining industry in universities and colleges:**
    - **Coordinate and prioritize areas for improved industry engagement with academic and government facilities, including financial support, part-time teaching and research involvement, and academic sabbaticals in industry; and**

- **Seek funding for new faculty research chairs (including a Global Excellence Chair), equipment, and facilities linked to targeted research areas at selected Canadian geosciences, mining engineering, mineral processing and related schools/departments.**

2. **FOR UNDERGRADUATE STUDENTS: Expand the number and variety of industry participants (mining and their supplier companies) in co-op programs (including through drawing on expertise found in such organizations as the Canadian Association for Cooperative Education), expand summer employment opportunities in mining, and strengthen student transitioning arrangements between colleges and universities.**

3. **FOR GRADUATE STUDENTS: Seek new funding from existing federal/provincial/ territorial government programs for expanding the number of research internships and topping up research stipends.**

4. **Collaborate with the Mining Industry Human Resources Council (MiHR) to: map Canada's mining HQP stocks and flows today and into the future; establish networks of best practice in HQP attraction, retention and development; identify initiatives to develop an interdisciplinary mining research and education strategy; and support the development of a number of MiHR initiatives in such areas as K-12 curriculum development and the development of post-secondary education mining mentoring programs.**

3.3 Collaboration

STRATEGIC GOAL

To establish a culture of collaboration, optimize research efficiency, and enhance innovation potential.

This strategic goal is underpinned by the Council's judgment that there is much room and opportunity to improve collaboration among the mining industry, research organizations, universities and other stakeholders to strengthen the research and innovation performance of the Canadian mining sector. For example, the stakeholders can better maximize the limited pool of funding available for mining-related research through more effectively working together in developing research proposals with scale and focus. More generally, greater collaboration in strategic areas can increase the flow and diffusion of knowledge through providing the conditions for open innovation systems, including through:

- *sharing of resources and perspectives between government, industry, research organizations, academics and associations;*
- *larger access and influence with original equipment manufacturers and international stakeholders; and*
- *global recognition of Canada's mining R&D networks.*

EXPECTED RESULTS

- Greater coordination and collaboration in seeking access to higher levels of research funding.
- Enhanced research output through coordinated and collaborative research effort.
- Moving collaborative research beyond regional boundaries to theme-based endeavours and increased awareness of "who does what and where."

DRAFT PROPOSED ACTION PLAN

1. **NETWORKING: Develop a comprehensive and widely accessible national database on existing mining research and innovation networks, and identify opportunities for research network growth and development through a sustained information and advocacy campaign conducted in partnership with such organizations as the CIM.**

2. **FUNDING: Establish a national focal point/mechanism for assisting the mining sector to access federal, provincial, and private-sector research funding programs.**

3.4 Innovation systems and culture

STRATEGIC GOAL

Create a collaborative environment (process, networks, and leadership) that connects enhanced research capability (people, infrastructure, equipment, and facilities) to the demand pull of industry customers for applied and breakthrough research and innovation.

This strategic goal is underpinned by the Council's judgment that the research capability and capacity must be rebuilt in light of demographics, a loss of expertise, and the limited research capacity of the junior sector that by necessity focuses on short-term results. Many research initiatives tend to focus on short-term, incremental improvements creating an urgent need for long-term, fundamental research that results in disruptive innovation.

From a process perspective, engagement between industry and researchers is limited to a few major companies, and the mining industry in general seems slow to appreciate and implement new innovations. In parallel to the concerns associated with highly qualified people, it is desirable to increase the number of leaders in the mining industry (and also within the higher levels of university administrations) who recognize the value of placing a higher priority on mining-related research and innovation. Perhaps most fundamentally, there is no Pan-Canadian focal point (or process) for communicating the benefits and opportunities of strengthening existing networks of research and innovation in the Canadian mining sector or establishing new networks.

EXPECTED RESULTS

- Strong national research networks connecting regional nodes of mining research excellence and with international linkages to potential researchers, funders, and markets.

- Increased uptake of research results by industry, a seamless flow of people and ideas within the mining research and innovation system, and increased industry participation in research networks.

- Increased attention to multi-disciplinary approaches to mining research and innovation.

DRAFT PROPOSED ACTION PLAN

1. **INFORMATION: Unlock the value of mining research information through developing a database of Canadian mining researchers, research interests, and projects, and ensuring the mining community has full access to knowledge on "who is doing what and where" (building on and expanding such existing web sites as MineCan)**; **and develop a web-based facility for matching industry requirements with Canadian research capacities.**

2. **COMMUNICATIONS AND OUTREACH: Proactively strengthen Canada's mining research and innovation culture through workshops on mining research and innovation, and disseminate information on leading research initiatives and progress.**

3. **MAKING BEST PRACTICES COMMON PRACTICES: Proactively work to help develop and disseminate best-practices tools and techniques for commercializing research (e.g., model intellectual property management practices geared to collaborative and open innovation environments).**

3.5 Brand, visibility and reputation

STRATEGIC GOAL

To attract a new audience to mining research and innovation and to enroll decision-makers to support the importance of mining research and innovation.

*This strategic goal is underpinned by the Council's judgment that the Canadian mining sector's **brand** is strong in Canada and globally, and is based on a continuous effort to improve its economic, social, and environmental performance. The Canadian mining industry's **reputation** has also improved over recent decades, although there continues to be significant areas of opportunity to improve the mining knowledge base of citizens. Increasing the number of Canadians whose perceptions of the mining industry are based on accurate, relevant, and timely information is a key means to counter negative perceptions and stereotypes that create barriers to:*

- *undertaking new exploration activities;*
- *developing and operating mines; and*
- *attracting highly qualified people to mining careers in general and mining research careers in particular.*

Moreover, effective reputation management through improving the public's knowledge base is critical for garnering public and political support for new investments in research and innovation that, in turn, forms the basis for maintaining and strengthening the performance-based Canadian mining brand.

EXPECTED RESULTS

- Strengthening the public's knowledge base on mining through disseminating accurate, relevant and timely results of mining research and innovation.

- Unsolicited third-party endorsements of the Canadian mining industry brand and research agenda.

- Making CMIC an internationally open and renowned organization with a growing membership dedicated to strengthening the competitiveness of a responsible Canadian mining industry.

DRAFT PROPOSED ACTION PLAN

1. **Establish a national centre for branding and reputation management.**

2. **Communicate CMIC's vision and action agenda to Canada's political leadership.**

3. **Expand CMIC's membership as an internationally open organization dedicated to strengthening the competitiveness of a responsible Canadian mining industry by rebuilding mining research excellence across Canada.**

4.0 NEXT STEPS

CMIC is a new network of industry, academic, and government leaders whose first action has been to develop a Pan-Canadian Mining Research and Innovation Strategy through a series of regional workshops. The strategy will address Canada's key challenges related to mining R&D, innovation, commercialization, and highly qualified people.

Upon endorsement by the federal, provincial and territorial Mines Ministers, the members of the Transition Board will complete the strategy in order to officially launch it in early 2009. Parallel to this process, the Transition Board will proceed with the incorporation of CMIC as a federal not-for-profit organization based on the draft by-laws developed during the last few months. A first Annual General Meeting will be held at the same time as the launching of the strategy.

Appendix I

Consolidated List of Proposed CMIC Actions

TARGETED AREAS OF RESEARCH AND INNOVATION

1. Define initial research sub-priorities within each of the four research themes of environment (energy, water, tailings and effluent management), exploration, deep mining, and process efficiency.

2. Launch in year one at least two well-funded collaborative research projects with national scale and strategic focus, and undertake preparatory work for other high-impact projects.

3. Establish a management process and structure of national scale and reach for bringing on stream additional high-impact collaborative research projects that involve the establishment of research consortia (including industry, funders, and researchers).

HIGHLY QUALIFIED PEOPLE (HQP)

4. Initiate the rebuilding of Canadian educational and research capacity related to the mining industry in universities and colleges.

    - Coordinate and prioritize areas for improved industry engagement with academic and government facilities, including financial support, part-time teaching and research involvement, and academic sabbaticals in industry; and

    - Seek funding for new faculty research chairs (including a Global Excellence Chair), equipment, and facilities linked to targeted research areas at selected Canadian geosciences, mining engineering, mineral processing and related schools/departments.

5. FOR UNDERGRADUATE STUDENTS: Expand the number and variety of industry participants (mining and their supplier companies) in co-op programs (including through drawing on expertise found in such organizations as the Canadian Association for Cooperative Education); expand summer employment opportunities in mining, and strengthen student transitioning arrangements between colleges and universities.

6. FOR GRADUATE STUDENTS: Seek new funding from existing federal/provincial/ terriorial government programs for expanding the number of research internships and topping up research stipends.

7. Collaborate with the Mining Industry Human Resources Council (MiHR) to: map Canada's mining HQP stocks and flows today and into the future; establish networks of best practice in HQP attraction, retention and development; identify initiatives to develop an interdisciplinary mining research and education strategy; and support the development of a number of MiHR

initiatives in such areas as K-12 curriculum development and the development of post-secondary education mining mentoring programs.

COLLABORATION

8. NETWORKING: Develop a comprehensive and widely accessible national database on existing mining research and innovation networks, and identify opportunities for research network growth and development through a sustained information and advocacy campaign conducted in partnership with such organizations as the CIM.

9. FUNDING: Establish a national focal point/mechanism for assisting the mining sector to access federal, provincial, and private-sector research funding programs.

INNOVATION SYSTEMS AND CULTURE

10. INFORMATION: Unlock the value of mining research information through developing a database of Canadian mining researchers, research interests, and projects, and ensuring the mining community has full access to knowledge on "who is doing what and where" (building on and expanding such existing web sites as MineCan); and develop a web-based facility for matching industry requirements with Canadian research capacities.

11. COMMUNICATIONS AND OUTREACH: Proactively strengthen Canada's mining research and innovation culture through workshops on mining research and innovation, and disseminate information on leading research initiatives and progress.

12. MAKING BEST PRACTICES COMMON PRACTICES: Proactively work to help develop and disseminate best practices tools and techniques for commercializing research (e.g., model intellectual property management practices geared to collaborative and open innovation environments).

BRAND, VISIBILITY AND REPUTATION

13. Establish a national centre for branding and reputation management.

14. Communicate CMIC's vision and action agenda to Canada's political leadership.

15. Expand CMIC's membership as an internationally open organization dedicated to strengthening the competitiveness of a responsible Canadian mining industry by rebuilding mining research excellence across Canada.

Appendix II

Members of the CMIC Transition Board

CO-CHAIRS

Engin Özberk
Vice-President, Innovation and Technology Development
Cameco Corporation

John Thompson
Vice-President, Technology
Teck Cominco Limited

BOARD MEMBERS

Jon Baird
Managing Director
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Yves Harvey
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Stephen Lucas
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Vice-President - Exploration, Vismand Exploration Inc.
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Malcolm Scoble
Head - Department of Mining Engineering
University of British Columbia

Bryan Schreiner
Saskatchewan Research Council

Gordon Winkel
Chairperson
Surface Mining Association for Research and Technology (SMART)
and Oil Sands Technology Manager, Imperial Oil Resources Limited