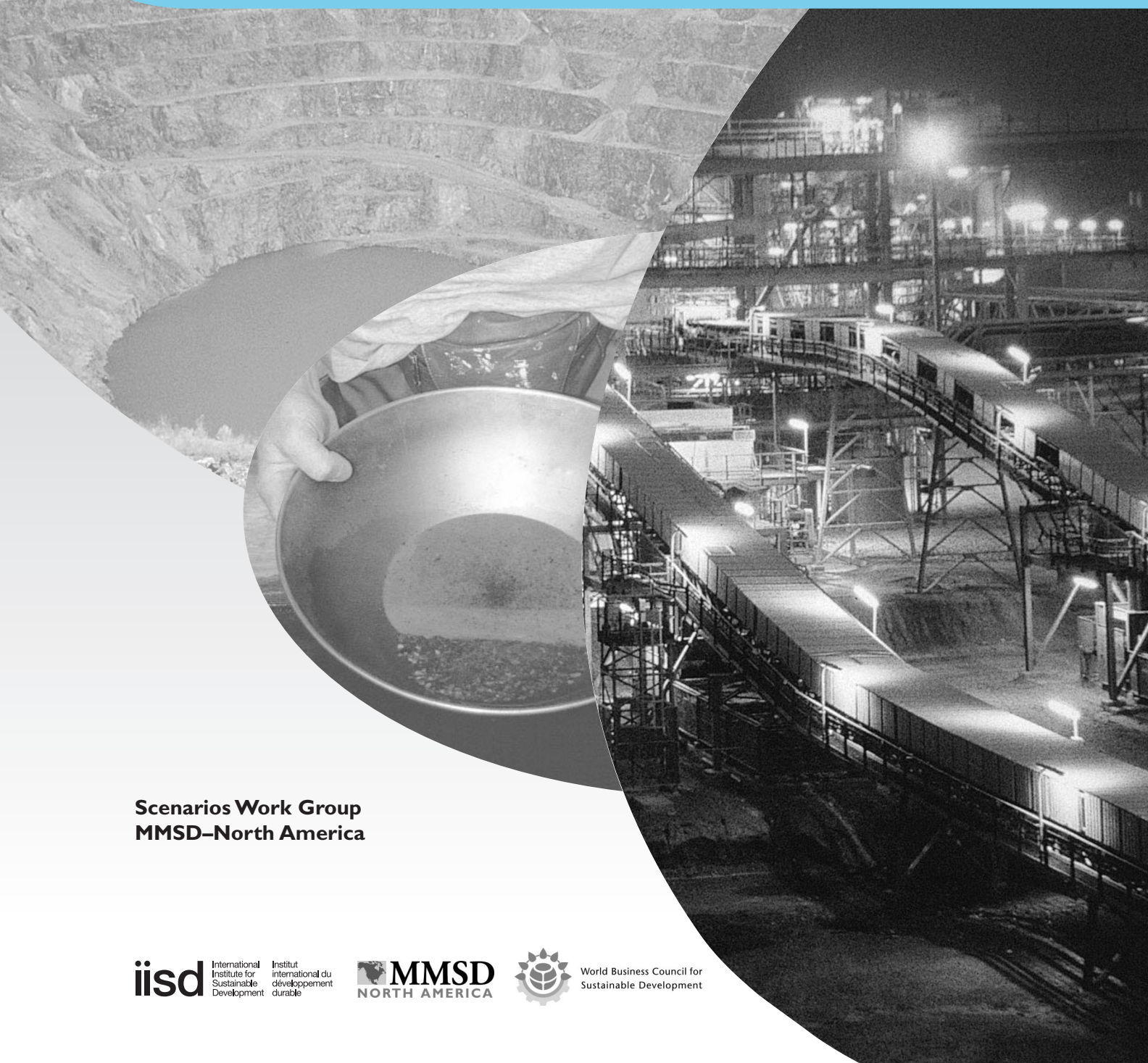


Mining, Minerals and Sustainable Development North America

# Learning from the Future

## Alternative Scenarios for the North American Mining and Minerals Industry



Scenarios Work Group  
MMSD–North America

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World Business Council for  
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**Mining, Minerals and Sustainable Development North America**

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The International Institute for Sustainable Development contributes to sustainable development by advancing policy recommendations on international trade and investment, economic policy, climate change, measurement and indicators, and natural resource management. By using Internet communications, we report on international negotiations and broker knowledge gained through collaborative projects with global partners, resulting in more rigorous research, capacity building in developing countries and better dialogue between North and South.

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## Preface

In 1999, nine Chief Executive Officers of some of the world's largest mining companies came together in Davos, Switzerland. Driven by a concern that a disconnect had emerged between mining/minerals-related practices and the values of today's society, they voiced a concern that their "social licence to operate" was in jeopardy.

Working through the World Business Council for Sustainable Development (WBCSD), they subsequently commissioned the International Institute for Environment and Development (IIED, London) to undertake a global review of practices related to mining and minerals. The resulting project, "Mining, Minerals and Sustainable Development (MMSD)," has been driven by the following four goals:

1. to assess global mining and minerals use in terms of the transition to sustainable development—its track record in the past and its current contribution to and detraction from economic prosperity, human well-being, ecosystem health and accountable decision-making;
2. to identify if and how the services provided by the minerals system can be delivered in accordance with sustainable development in the future;
3. to propose key elements of an action plan for improvement in the minerals system; and
4. to build a platform of analysis and engagement for ongoing cooperation and networking among all communities of interest.

As part of its delivery mechanism, MMSD Global created a suite of regional activities with partners operating in Southern Africa, South America, Australia and North America. In North America, the International Institute for Sustainable Development (Winnipeg) has served as the regional partner working in concert with the Mining Life-Cycle Centre, Mackay School of Mines, University of Nevada, Reno.

For its part, the participants of MMSD–North America opted to pursue five tasks in discharging their mandate:

### **Task 1: Story/Profile**

*Objective 1A:* to develop a profile of the North American mining industry (U.S. and Canada) from the perspective of the nature of the companies that comprise the industry.

*Objective 1B:* to articulate the contribution and implications of mining (to people and their communities, to ecosystems, to economies) through the eyes of various communities of interest and as it has changed over time.

### **Task 2: Test/Guideline for Sustainability**

*Objective 2A:* to develop a set of *practical* principles, criteria and/or indicators that could be used to guide or test the exploration for, design, operation and performance monitoring of individual operations, existing or proposed, in terms of their compatibility with concepts of sustainability.

*Objective 2B:* to suggest approaches or strategies for effectively implementing such a test/guideline.

### **Task 3: Agenda for Change**

*Objective 3:* to collaboratively develop an "Agenda for Change" comprising specific actions and timelines for the North American mining industry and related communities of interest to meet in moving towards sustainable development.

#### **Task 4: Scenarios**

*Objective 4A:* to develop a set of scenarios that bracket the likely futures to be faced by the North American mining and minerals industry and the related communities of interest.

*Objective 4B:* to use the scenario-building exercise as a means to identify and discuss:

- risks and opportunities;
- issues, challenges and areas of consensus and disagreement on their resolution; and
- potential prescriptions (aimed potentially at any or all of the communities of interest) for adjusting mining- and minerals-related policy, practices, behaviour and infrastructure.

#### **Task 5: Final Report**

*Objective 5:* to synthesize and communicate the results of MMSD–North America.

This document summarizes the work of the Task 4 Work Group.

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### **Disclaimer**

To as great an extent as possible, participants in the activities of MMSD–North America were drawn from a range of interests including companies (small, intermediate, large and service); mining-affected communities; First Nations/Native Americans; non-government organizations; government; organized labour and universities (teachers, researchers and students).

While participants were asked to share their knowledge and expertise, they were not asked to “represent” any organization. Further, while a great effort was made to incorporate everyone’s perspective and reach consensus on issues, neither participants nor their affiliated organizations were asked to endorse the results.

Ultimately, however, responsibility for the final outcome must be clearly assigned. In this case, while credit for the richness of the scenarios discussion lies with all participants, limitations that remain rest with us.

R. Anthony Hodge  
Dirk van Zyl  
Mike McPhie

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## I. Introduction

In July 2001, MMSD–North America convened a work group to:

1. develop a set of scenarios that bracket the likely futures to be faced by the North American mining and minerals industry and the related communities of interest; and
2. use the scenario-building exercise as a means to identify and discuss:
  - risks and opportunities;
  - issues, challenges and areas of consensus and disagreement on their resolution; and
  - potential prescriptions (aimed potentially at any or all of the communities of interest) for adjusting mining- and minerals-related policy, practices, behaviour and infrastructure.

The exercise was driven by the ideas grouped under the banner of sustainability/sustainable development. In simple terms, what this means is:

- including consideration of mining/minerals' contribution (positive and negative) to people (individuals, communities, organizations and society as a whole) and the enveloping ecosystem; and
- respecting and allowing for the varying perspectives, roles and responsibilities of the different communities of interest including: companies (small through large and service), First Nations/Native Americans, mining-affected communities, organized labour, non-government organizations, regulators and teachers/researchers/students.

Contributors to the scenarios work group were drawn from the above interests although contributors were not asked to formally “represent” any constituency in any way.

In an initial exercise, 15 of the contributors were interviewed regarding their sense of the future and key influencing factors. The results were compiled and a set of major themes identified that formed the basis of an initial workshop held in Winnipeg, September 5–7, 2001. At that time, a seven-step process was followed:

1. articulation of the focal question;
2. review of past changes;
3. identification of future forces and factors;
4. identification of critical uncertainties;
5. development of the scenario framework;
6. listing of scenario characteristics and story lines; and
7. summary of key characteristics.

The results of the first workshop were compiled and, in turn, served as the input for a second workshop held in Reno, Nevada, October 1–3, 2001. At the second workshop, emphasis shifted from scenario design to consideration of implications. The final scenarios report followed after several iterations were reviewed by contributors.

Scenarios are alternative descriptions of the future. They focus on the forces driving change and the critical uncertainties leading to different possible future outcomes. They are not predictions. Rather, they are stories of different futures, each of which is possible. Stories are a traditional and powerful way of communicating complex and often subtle ideas. They encourage the reader to participate in the experience.

*Scenarios are alternative descriptions of the future. They focus on the forces driving change and the critical uncertainties leading to different possible future outcomes. They are not predictions.*

The process of developing the scenarios and the stories themselves serves to deepen understanding and insight related to the evolving conditions in which we may find ourselves. In this sense, they are considered experiments and, by broadening thinking on the future, they can contribute to the improvement of today's decisions and actions.

Stories provide integrative and qualitative ways of describing things. As such, they are very much a reflection of the values and preferences of those who created them—in this case, the MMSD–North America scenarios team. This characteristic results in strengths and limitations: strengths because of the insights that such an approach can offer; limitations because, in a given group of individuals, the full spectrum of society's values and preferences may not be represented, or the spectrum that is represented may be overweighted in a way that skews the results. For example, in this case, more Canadians than Americans participated and the results may therefore reflect more of a Canadian perspective.

*Scenario technique first emerged following World War II as a method for military planning. In the 1960s the approach was refined as a tool for business prognostication by American futurist, Herman Kahn.*

Scenario technique first emerged following World War II as a method for military planning. In the 1960s the approach was refined as a tool for business prognostication by American futurist, Herman Kahn. However, in the early 1970s, scenarios work reached a new level. As part of their review of the world socio-political situation and its implications for oil prices, the planning team at the Royal Dutch/Shell Group developed a set of scenarios, one of which included the kind of oil crisis that was brought about by the OPEC oil embargo of 1973. When it did occur, Shell was the only oil company emotionally prepared for the change. In subsequent years, Shell's fortunes rose dramatically (Schwartz, 1991).

In the 30 years since, many different types of business, government and non-government organizations have increasingly used the scenario approach. One particularly powerful exercise was undertaken in the early 1990s in South Africa prior to the break-up of the apartheid system. In this case, 22 prominent South Africans—politicians, activists, academics and businessmen from across the ideological spectrum—were convened to consider South Africa's future by using the scenario methodology. For the first time, scenarios were applied in a multi-interest forum focused on a broad social issue. One of those interests was the South African Chamber of Mines. The informal, indirect scenario approach was shown to be different from, but complementary to, negotiation and a powerful method for approaching the future for a society in conflict (Deeper News, 1996).

Within the mining industry, a number of major companies such as Noranda Inc., Placer Dome Inc., Cameco Corporation and BHP Billiton have employed the scenario technique as part of their internal corporate strategy development. However, the exercise initiated by MMSD–North America also breaks new ground. While many companies, governments and other organizations have used the scenarios approach, as far as we can ascertain, this is the first time a broad range of interests has been brought together to consider an entire industry in a multi-country setting.

This report describes four scenarios on the future of mining, minerals and sustainable development in North America. They use a time horizon of approximately 15 years. They are labelled: (1) New Horizons; (2) Phoenix Rising; (3) Perfect Storm; and (4) Money Divides. As will be seen from the subsequent discussion, these labels are an attempt to capture, in a nutshell, the spirit of each scenario.

## 2. How to Use These Scenarios

These scenarios serve as an invitation for the reader to engage in the discussion about the future of North American mining and minerals. They are offered to stimulate thinking.

By using today's events as early indicators of the direction being pursued by the mining and minerals industry, the scenarios can be used to process events as they unfold in today's world. In that way, scenarios provide a framework for assessing new information and anticipating change.

Moreover, comparing alternative scenarios allows an identification of “preferred” futures and much work has gone into the idea of “back-casting” from such preferred futures to identify policy and voluntary behavioural options that can help make that future more likely to occur. Thus, scenario work can be a powerful way of illustrating preferred options and advocating for those options.

In building these scenarios, we have attempted to consider the perspectives of various communities of interest. Thus, effort was put to not only focus on implications for mining/mineral companies, but also on implications for other key interests: mining-affected communities, First Nations/Native Americans, organized labour, non-government organizations, government regulators and the academic community—students, teachers and researchers. Obviously, in attempting to do so, we can barely claim to have scratched the surface of insight that exists. However, our intent was to provide a start to a process that can be significantly enriched over time.

We have included a list of signposts that may serve as early indicators signalling which scenario is emerging. In this context, we suggest that readers consider all of the scenarios equally likely and not choose one as being “most likely.”

The scenarios also serve to raise new questions. Questions are the keys to new insights. At the end of each scenario we have left space for you to reflect and note the key themes or ideas that you saw in that scenario. We have posed four questions:

1. What are the key insights from this scenario from your perspective?
2. What are the major challenges to be faced in moving towards sustainable development?
3. What actions are needed to address the challenges and/or to assist in achieving a more desirable future?
4. What are the implications if these actions are not taken?

These same questions can also be used to guide a review of all four scenarios together.

Finally, we invite you to read the scenarios critically, but with an open mind. The logic and thrust of the scenarios are more important than the details. The details are intended to add context and bring the stories to life. They are not the point, but examples. Some may not fit for you or may be expressed inappropriately. There are often, for example, significant differences in how words or expressions are used or interpreted across communities of interest and between Americans and Canadians. We may have inadvertently used some terms incorrectly. This is a challenge. We urge you not to judge any scenario by one or two details but to reflect on each scenario as a whole.

Our hope is that you will find the scenarios challenging, thought-provoking, interesting and useful.

*The scenarios also serve to raise new questions. Questions are the keys to new insights.*

### 3. Scenario Development

Scenario development involves sequential consideration of the following four discrete steps:

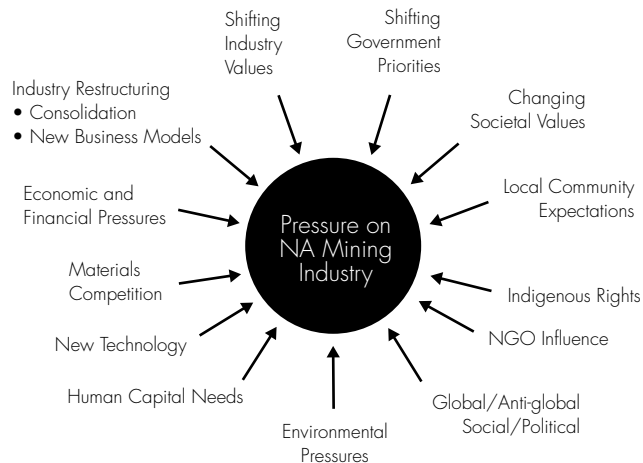
1. identification of the forces driving change in North American mining- and minerals-related activities;
2. identification of the major uncertainties facing North American mining and minerals;
3. choice of the two most dominant uncertainties and development of a framework for developing a distinctly different logic for each of four scenarios in a two-by-two matrix; and
4. crafting the characteristics and logic of each scenario as it is developed.

Throughout this process, a set of characteristics emerges that is common to all of the scenarios. For example, in these scenarios, the basic socio-political-economic system is held constant. In some scenarios work, careful examination of these common elements is undertaken. In this case, time and resource limitations precluded such a review.

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#### Forces Driving Change

Figure 1. Major Forces Driving Change.



#### Major Uncertainties

This step focuses on the key uncertainties facing the industry. Forces and factors, the future outcomes or impacts which are uncertain, are particularly important in scenario thinking because they define the range of possible futures. They are the critical factors leading to divergence in the future. In the Work Group deliberations, two critical uncertainties dominated all others: *societal values* and changes in *economic performance*.

## **Societal Values**

How will societal values change in the future? At one extreme, values could become more open, holistic and inclusive with increased trust and respect for differences. Self-interest would be tempered by willingness to give and take and find workable solutions to problems. There would be an understanding of mutual interdependence across social, economic and environmental factors.

At the other extreme, values could become more divided and rigid, leading to conflict and distrust. Narrow perspectives and self-interest could hamper dialogue and efforts to resolve disagreements. The world would be compartmentalized and segmented. Moral and ethical positions could become fixed and closed creating divisiveness, distrust and acrimony in decision-making.

## **Economic Performance**

What will be the economic conditions under which the industry will operate in the future? On one hand, the industry could experience extended periods of strong prices, growth and productivity supporting the economic viability of new mines in North America and enhanced access to capital.

On the other hand, the industry could experience extended periods of downturn with weak prices, low growth and limited improvements in productivity. The economic viability of new mines would be limited and access to capital curtailed.

## **Framework for Scenario Development**

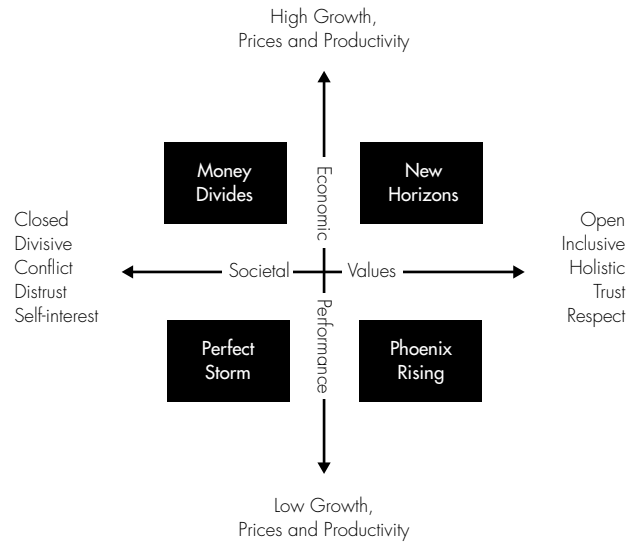
The above two key uncertainties provide a logical framework for developing distinctly different scenarios and may be represented as continuums or dimensions shown as orthogonal axes in Figure 2.

Each quadrant represents a unique combination of outcomes of the two critical uncertainties. For example, the upper right quadrant defines a future in which societal values become more holistic and inclusive, fostering an environment of respect and mutual trust. Simultaneously, a healthy economic environment is envisioned, reflected by strong commodity prices, robust growth and productivity improvement in the mining and minerals industry. It is an optimistic future. Here, as in each quadrant, are posed the questions:

- How does this future come about?
- What developments need to occur for this future state to emerge?
- What are the major characteristics that would describe this scenario?

*For example, the upper right quadrant defines a future in which societal values become more holistic and inclusive, fostering an environment of respect and mutual trust.*

**Figure 2. Scenario Framework.**



In spirit, this scenario reflects a move towards “*New Horizons*.” In stark contrast, “*Perfect Storm*” brings together a societal value set that is divisive and less trusting along with a weak economic environment.

A different mix of these two key variables characterizes each quadrant. Thus, as shown in Figure 2, each quadrant serves as a basis for defining a different scenario. In the following pages, each scenario is described in turn.

## 4. Scenario Descriptions

### Scenario: New Horizons

*In New Horizons, there is a coincidence of strong economic conditions and a high level of trust and respect characterizing overall societal values. For the most part, this same trust and respect are found among mining- and minerals-related communities of interest. Vision and change are guided through collaborative activity involving many communities of interest interacting in a constructive way. Confidence in the future is high.*

*In New Horizons, there is a coincidence of strong economic conditions and a high level of trust and respect characterizing overall societal values.*

### Driving Forces, Logic and Change

- Economic growth and improved margins lead to improved cash flow and access to capital across the industry from majors to juniors.
- The potential for viable business opportunities leads to the emergence of new mining/minerals companies.
- Technology and productivity improvements are critical in lowering costs, more effectively managing wastes and improving margins.
- Within the mining/minerals industry and regulatory agencies, strong leadership recognizes the need for drastic change in social and environmental performance, community engagement and open communications.
- Industry increases investment in sustainable development-related issues. In large companies, social and environmental issues receive an enhanced profile internally as reflected in budget allocations, training and a variety of programs. This same commitment is found in a majority of small companies. In this regard, industry associations take a significant leadership role in translating sustainable development concepts to a scale that can be put into practice by smaller companies from exploration to intermediate operators.
- Initiatives by leaders pushing change throughout organizations, coupled with investment dollars, shift industry values creating changes in the mindset and culture of the industry—there is a new openness to change and expanding capacity to learn across the industry.
- Stock markets reward triple-bottom-line companies.
- Societal views and expectations of the industry evolve, creating a new willingness to engage in dialogue, seek common ground for resolution of conflicts and develop long-term, shared solutions to problems.
- Cooperation creates new opportunities.
- Government, non-government and industry efforts lead to development of an innovative and dynamic mix of incentives (regulatory, financial, voluntary) to encourage good practices.

The above driving forces lead to the following changes:

- Principles of sustainable development are embraced by industry and society.
- A more unified industry establishes operating, environmental and social best practices. Standards rise over time.
- A demonstrated commitment and on-the-ground outcomes lead to greater trust among interests; industry legitimacy rises.



*In New Horizons the global economy recovers with renewed and sustained growth across North America, Europe and Asia. A strong demand for metals, minerals and structural materials results; prices are strong.*

- The financial services industry gains a renewed interest in investing in mining/minerals-related initiatives.
- New mines open with the support of local communities, First Nations/Native Americans and non-government organizations.
- The demand for “green” and “socially responsible” products increases and leads to an accepted system of “certification for sustainability.”
- A restructuring of the industry and its value chain occurs, built around the full metal/minerals life-cycle; major programs lead to enhanced recycling and overall efficiencies of materials use.

## **Story**

In *New Horizons* the global economy recovers with renewed and sustained growth across North America, Europe and Asia. A strong demand for metals, minerals and structural materials results; prices are strong.

Increased cash flow for companies supports investment. A number of technological advances (e.g., application of robotics, advanced telecommunication systems, overall mine design) lead to significant cost reductions thus greatly enhancing estimates of economic reserves at many locations. Many sites previously considered sub-economic are now re-assessed and found feasible. A new high-tech, underground mine dominated by robotic technology opens in 2006 amid much publicity. The mine provides a showcase for improved efficiency and for the implementation of significant new environmental and community practices. Across the industry, this combination of stronger prices associated with the global economic recovery, and the lower operating costs, results in much improved margins and return on investment.

Other developments are also occurring. Accompanying the improved economics is a new generation of senior executives sensitive to evolving social values and experienced in the operational and corporate challenges of modern mining. They recognize the need to engage stakeholders in planning and decision-making, raise environmental and social performance, and improve the reputation of the industry. They understand the need to promote best practices in operations, expand stakeholder engagement and embrace sustainable development principles in practical ways. This leads to a growing recognition for the need to act as a single industry in developing, improving and implementing best practices and significantly improving performance. They must “walk the talk.” It takes hard work. It is difficult.

A set of long-term objectives is established to provide clear goals, targets and commitments to focus direction and gauge performance. A multi-stakeholder process is critical in providing input on goals, plans and operating practices. Expectations are high. The spirit of the “zero accidents” culture that had been previously achieved in health and safety is extended to the environmental and social arenas. There is a commitment by the industry to meet performance standards across the board—no exceptions. Companies that operate mines that do not measure up will not be protected or supported by the industry. The message is clear—bad actors are not acceptable.

All of these new activities are supported by increased research. Priority areas include environmental and social topics as well as ongoing effort related to mining technique. The level of student interest in mining increases dramatically.

Systems of external verification of practices are accepted. Audits, with external participants, are part of the ongoing process. A new openness and mindset are evident in the industry.

One result of this dialogue is the emergence of a common language—terminology that all stakeholders can understand. This is vital in bridging differences, ensuring shared understanding while reducing frustration and mistrust.

As part of this evolution, mining industry suppliers—including engineering, environmental and social consultants—embrace sustainability as a key foundation of their business focus. These companies see themselves as catalysts for positive change in the industry and as influential resource providers on issues related to sustainability. The industry, in turn, supports service providers who demonstrate a commitment to sustainable practices. This creates a climate of positive reinforcement and reward for leaders in the service sector.

A new innovative approach, acceptable to both the hard-rock and energy-related mining segments of the industry, is agreed to for addressing abandoned and orphaned sites. A broad range of interests come together in implementation including industry, government, indigenous peoples, local communities, organized labour, non-government organizations and academic institutions.

Reflecting a major commitment to local capacity building, as much of the reclamation and restoration work as possible is contracted to local communities. A model site is identified and work begins in 2005. The task takes several years, with the site task force meeting on a regular basis to monitor progress against the objectives. An important breakthrough is the creation of a mechanism that sets the rules for the distribution of liabilities related to abandoned/orphaned mines, including a “Good Samaritan” provision, which opens the door to the clean-up of many previously untouchable sites.

With the effective and publicly supported restoration initiative making progress, a new sense of trust and legitimacy begins to emerge among indigenous people, organized labour, non-government organizations, local communities and industry. Evidence of broad acceptance of the key principles of sustainable development emerges and is reflected not only in general policy statements, but also in specific programs of action.

Politicians in Canada and the U.S. take notice of the renewed public interest and support for the industry. Grants are provided to fund joint government, university and industry research projects. Tax incentives are established to encourage contributions to the multi-stakeholder-directed Mine Site Restoration Fund. While the fund cannot “fix” problems at the end of a mine’s life, it supports a new collective effort to manage the long-term impacts of the mine to minimize further risks and hazards. It also has a mandate to mitigate negative impacts through the characterization, identification and planning stages of development. Simultaneously, funding for non-government, community-based organizations to serve in an external verification and reporting role increases significantly.

A major initiative in the U.S. is undertaken to revise the General Mining Law of 1872. Non-government organizations argue that there is no justification for the mining industry to receive such favourable treatment on federal lands. They must pay their fair share. Reflecting a major breakthrough, a collaborative cross-industry group involving the complete range of companies, from small to large, agrees and signals its willingness to change. A joint government-industry-NGO statement is issued recognizing the negative social and environmental implication of past practices and emphasizing the need to distance current from past practices.

In this environment, new mines are possible and a number are opened across North America—the first new mine in decades for some jurisdictions. Planning for new mines is holistic and open, embracing the principles of sustainable development and engaging all communities of interest in the consultation process. Comprehensive mine closure and post-closure plans are jointly developed with community, indigenous peoples and non-government organizations. Full life-cycle costs are built into economic models with major efforts made to include the “true” social and environmental costs.

In Canada, several First Nations treaty and land claim settlements are resolved and implemented. This creates increased land access for mineral exploration and mine development across large parts of the country. First Nations peoples themselves become more active players in the industry.

Consumer expectations in terms of demands for “green” and “socially responsible” products increase significantly. Certification that the metals/minerals have been produced from mines operating according to the new sustainability standards or have been recovered through recycling, gains momentum within the European Union in the next few years and becomes firmly established across North America and Asia by 2010.

The big three auto companies in North America follow BMW’s lead in designing cars from a life-cycle perspective—with recycling of metals and plastics an integral component of the overall process. Early in the decade, metals recycling gains momentum as computer manufacturers dramatically increase efforts to ensure recycling of computers. The role of recycling in the value chain and culture of most industries consuming metals/minerals grows. Some mining companies become more integrated with this activity forming a key part of their business model. Recycling economics improve over the course of the decade. In the first half, premiums are paid for certified “green” and “socially responsible” products. In the second half of the decade, this gives way to lower costs as manufacturing processes and larger volumes increasingly enable recycling to be done more efficiently.

By 2015, the industry in North America looks dramatically different from that at the turn of the century. The industry has transformed itself from an inward-looking, fragmented business at odds with its neighbours, to one that engages in effective dialogue about risk. It has collaboratively developed and implemented a broad-reaching set of best operating, environmental and social practices. It actively supports a fair distribution of the benefits across the various implicated communities of interest. It has significantly expanded its capacity to adapt to change, resolved many legacies of distrust from the past and established new ways of communicating with stakeholders. The list of mining companies included in ethical and green mutual funds has grown dramatically. The overall relationship between the mining industry and the financial services industry is positive. There is a new spirit of optimism in the industry and society. There really are new horizons to look forward to.

### **Reflections on New Horizons**

1. What are the key insights from this scenario from your perspective?
2. What are the major challenges to be faced in moving towards sustainable development?
3. What actions are needed to address the challenges and/or to assist in achieving a more desirable future?
4. What are the implications if these actions are not taken?

## Scenario: Phoenix Rising

*In Phoenix Rising, difficult economic conditions serve to drive innovation. At the same time, respectful social values further facilitate positive change. The overall result is that difficult times give way to more encouraging conditions like a Phoenix Rising.*

### Driving Forces, Logic and Change

- Societal, community and interest groups exert significant pressures on government and industry for moving towards sustainable development.
- Economic and financial conditions exert significant pressures on industry and government.

The above driving forces lead to the following changes:

- Industry restructuring through consolidation and rationalization.
- Innovation and new business models.
- New industry values.
- Behaviour change—openness.
- Performance change—new standards of performance.
- New social and environmental best practices and operational responsibilities.
- New coalitions and support for a transformed industry.

### Story

In *Phoenix Rising*, economic and social pressures initially push the mining and minerals industry to the limits of survival. Low demand undermines economic growth and real prices decline for most metals and minerals. At the same time, public environmental and social concerns remain high and non-government organizations are influential in raising their concerns. Publicity regarding social and environmental problems—globally and nationally—further erodes the mining industry’s image and credibility. Bad performance, unacceptable practices and social risks are exposed and lead to enhanced criteria for financing mining- and minerals-related projects on the part of the financial services industry.

Declining earnings for most companies, and losses for some, lead to declines in share prices. These pressures trigger a series of mergers and acquisitions. This consolidation contributes to rationalization of capacity. Marginal mines are forced to close and new mining initiatives are put on hold or abandoned. Exploration and R&D budgets are cut. Layoffs increase. In many cases, implementation of closure plans is deferred in the hopes of better financial conditions to come. In a number of cases, this leads to serious environmental problems and an increase in long-term liabilities.

The impact of mine closures devastates some mining communities. This raises concerns by governments both in supporting these communities suffering job losses and in dealing with abandoned mines. Bankrupt mining companies are unable to undertake proper closure and post-closure procedures and viable companies are under pressure to develop more comprehensive plans that address environmental and social conditions throughout the entire project life-cycle, from exploration through post-closure. More and more, governments are forced to step in and deal with abandoned sites themselves.

Consultants to the industry re-trench. Though they may wish to serve as positive change agents in the evolution towards sustainable development, a cost-conscious industry has little interest. The overall dynamic creates an atmosphere of uncertainty and discourages new investment in technological or intellectual capital. Mining-related service companies face real difficulty in attracting and retaining highly-skilled employees.

*In Phoenix Rising, economic and social pressures initially push the mining and minerals industry to the limits of survival.*

*As time passes, the determination to change grows. Innovative practices are initiated. Dialogue is opened... to resolve the issues and legacies of the past, build open relationships and create conditions for reducing social, environmental and economic costs while sharing benefits.*

Under these pressures some mining companies vent their frustrations vehemently and publicly. Others seek government relief. But there is little sympathy or support for bailing out mining companies. However, other companies, driven by necessity, embark on new ways of doing business.

As time passes, the determination to change grows. Innovative practices are initiated. Dialogue is opened with local communities and a variety of non-government organizations and other interest groups. New managers with new attitudes attempt to bridge the gap of distrust. There is a response from “external” groups and agreement for the need to improve the situation. There is a transformation in thinking and recognition of the need for change in behaviour and performance—to resolve the issues and legacies of the past, build open relationships and create conditions for reducing social, environmental and economic costs while sharing benefits.

There is great skepticism and some resistance at first, but over time, signs of change begin to build new working relationships. Companies open their books. They invite interest groups to review procedures and practices. There is an open discussion on social and environmental risks.

There is an effort to shift away from acrimonious legal disputes to alternative mechanisms for dispute resolution. Companies step up efforts to address legacies from the past and improve environmental and social performance. Communities are invited to engage in information sessions and working groups to resolve issues. Face-to-face communication replaces newspaper charges and counter-charges while, at the same time, media and communication venues offer information, knowledge and understanding of issues that keep the wider public informed and engaged. Efforts to improve relations and performance, albeit driven by desperation, are genuine and sincere. In the U.S., talks aimed at re-drafting the General Mining Law of 1872 gather momentum.

These changes take time—years, in fact. Leading companies take risks in exposing what they previously guarded as secrets. Non-government organizations and interest groups also take risks in working collaboratively with mining companies. Workers take risks in accepting equity and/or gain sharing. Communities take risks in reducing taxes in the short term with hopes for greater gains in the future. The results are real, broad-based and shared gains on the ground. And gradually, an environment of guarded trust emerges.

At the same time, there is growing peer pressure within the industry—often reflected in share prices—on laggard mining companies to adopt the new attitudes and practices—to adopt sustainable development principles. This is part of a voluntary initiative to increase the degree of self-regulation within the industry, although there is clear recognition that a strong and concise regulatory system with active enforcement will always be required.

This culminates in an industry-wide push to define sustainable best practices in mining operations. There is accelerated research on how to more effectively address environmental and social costs, benefits and risks, including their distribution amongst communities of interest. Certification standards for sustainability are defined and adopted by a growing number of companies as more and more consumers demand “green” and “socially responsible” products including metals and minerals.

In time, these developments create new coalitions. Mining companies are able to approach governments for support as more credible and responsible organizations. Some interest groups, previously highly critical, support these initiatives. Labour and labour unions, along with many local mining communities, encourage governments to support the industry. With a more flexible approach to mining and community development, indigenous people are more actively and often directly involved in mine development and add support to the industry in dealing with governments.

As a result, direct government support to mining increases. This includes incentives like tax credits for implementation of closure and post-closure plans, R&D and training programs, income support programs in many communities and infrastructure projects to assist in diversification of mining communities.

There is no lobbying for reduced standards, back-tracking on environmental regulations or exemptions for polluting or bankrupt operations. Particularly visible are several restoration projects undertaken as model collaborative efforts involving government, mining industry and non-government organizations. The role of government is critical in bringing parties together and effectively underwriting some of the risks involved. All want a viable, socially and environmentally-responsible mining industry whose contribution to the well-being of people and the environment is net positive over the long term.

Some U.S. and Canadian companies embrace a new business model that focuses on lower rates of production over a longer time period, thus generating a higher degree of company and community stability at the cost of short-term financial gain. The result is a lowering and lengthening of economic activity, a smoothing of the bust-boom cycles and an easing of the social stress placed on communities and indigenous peoples. The model leverages social benefits by accepting smaller margins over a longer time frame. It requires community and government support and champions greater stability of cash flow for the business over time.

These changes are widespread but not uniform. Many are more easily embraced in parts of Canada than in the U.S. The conflicts with a more fractious and litigious history are more severe in the U.S. Cynicism is deeper; mining is less important nationally. The adversarial nature of politics in the U.S. and threat of legal action severely undermines cooperation, trust and disclosure. There is continuing concern that these institutional barriers are so strong that the mining industry cannot recover in the U.S. Nevertheless, over time, changes do occur in the U.S., creating a new environment that supports and facilitates meaningful change.

In part, this transformation in the U.S. reflects a revived market for minerals. Depressed global prices don't last forever and rising prices and margins create increased financial scope to expand opportunities for companies to act. And in part, this reflects the shift in performance by mining companies in engaging stakeholders in decision-making.

By 2015, the result is a transformed mining industry. Responsible practices, innovative procedures and new technology have lowered costs, increased efficiency and expanded opportunities for new mines. All-party agreement on a revised general mining law for the U.S. has been achieved.

These changes are possible only because of a dramatically changed social context. Industry and government have engaged in building relationships with all communities of interest through increased openness on risks, respect for diverse views and commitment to new levels of environmental and social performance. Governments have played an important role as regulators, mediators and partners. There is growing hope that the mining industry can rise like a phoenix and be recognized as providing valuable benefits to society.

### **Reflections on Phoenix Rising**

1. What are the key insights from this scenario from your perspective?

2. What are the major challenges to be faced in moving towards sustainable development?
3. What actions are needed to address the challenges and/or to assist in achieving a more desirable future?
4. What are the implications if these actions are not taken?

### Scenario: Perfect Storm

*In Perfect Storm, depressed economic conditions coincide with fractious social conditions. Here the spiral is downwards.*

*In Perfect Storm, depressed economic conditions coincide with fractious social conditions. Here the spiral is downwards. The possibility of reversing the trend seems remote. A Perfect Storm emerges.*

### Driving Forces, Logic and Change

- Low margins and cash flow, low share prices, minimal investor interest and restricted access to capital.
- Cost cutting, deferral of maintenance expenditures, temporary mine closures.
- Leadership stagnates, “old line” thinking continues. Interest in mining as a career diminishes; mining schools shift their focus to related fields to survive.
- Relationships between the industry, non-government organizations and indigenous people become increasingly confrontational—physical blockades and litigation are commonplace.

The above driving forces lead to the following changes:

- Mistrust and lack of support for the industry are perpetuated—the business is close to becoming irrelevant in North America, particularly in the U.S. where mining’s contribution to GDP continues to diminish.
- Venture capital funds dry up and exploration activity almost entirely disappears.
- Political support continues to wane with governments sensing the public’s distrust. In Canada, government financial support programs for exploration are eliminated (such programs never existed in the U.S.).
- Although the commitment to worker health and safety remains high, cost-cutting measures cause organized labour to raise concerns.
- Overall cost cutting on environmental and social programs also leads to heightened concern on the part of non-government organizations, organized labour and communities.

### Story

*In Perfect Storm, mining in the early years of the new millennium continues to struggle as low commodity prices from oversupply persist similar to what plagued the industry during parts of the last two decades of the 20th century.*

*In Perfect Storm, mining in the early years of the new millennium continues to struggle as low commodity prices from oversupply persist similar to what plagued the industry during parts of the last two decades of the 20th century. Low economic growth creates*

insufficient demand for metals and minerals. Investor interest in mining shares continues to languish and mining share values remained depressed. Investment firms lay off the last vestiges of their mining analysts and equity capital markets are effectively closed to the industry. Bankruptcies increase.

There are few technological advances. There is nothing that dramatically alters the basic operating approach and cost structure of the industry or provides any significant improvements to environmental and social practices. In fact, practices degrade since short-term cost reduction takes precedence over long-term planning. The fragmented nature of the industry, with its “silo” mentality and reduced individual company R&D budgets, precludes any form of concentrated and focused research. Funding for, and participation in, joint research efforts with governments and universities is de-emphasized. Technology transfer and learning from other industries simply do not happen. The industry has difficulty in attracting senior managers and professionals from other industries. Mining school enrollments continue to drop.

Leadership across the industry is dominated with “old school” thinking that does not tend to support new ideas, or employees who are willing to challenge old paradigms of thinking or doing. This perspective is also reflected in the leadership of the service companies and consultants who increasingly carry the technical load because of downsizing in the cash-strapped mining companies.

The antagonism and mistrust that existed between the mining industry and environmentalists deepen. The heightened environmental and social awareness across North American society carries over into mining. The media provide extensive coverage of poor environmental and social performance at mines. Investigative reports provide extensive analysis of the environmental damage and social degradation caused by mining.

Several Canadian companies operating in the U.S. go bankrupt almost simultaneously with the U.S. government left responsible for major environmental and social liabilities. The result is increased U.S.-Canada strain with the affected communities openly expressing antagonistic feelings towards the mining industry as well as towards Canada.

The demand on funds from programs to restore abandoned mine sites skyrockets above revenues from existing mine operations. The potential drain on government resources is significant but government itself loses interest in the issue. There is some talk of establishing a code of best practices and standards early in the decade but it never materializes. There is neither the leadership capacity nor the willingness to take on the challenge.

The mining companies respond by hunkering down and becoming even more closed and inward looking. No leaders in the industry emerge to initiate the meaningful dialogue so badly needed. A common language, also badly needed to facilitate meaningful dialogue and understanding, fails to materialize. No leaders of change emerge from any sector or interest group. Government also backs off.

The only dialogue between the industry and the public, community organizations and non-government organizations happens through the media as accusations and charges of poor practices become increasingly common. The industry refuses to acknowledge the limitations of its practices, often citing legally-entrenched standards in their own defense. They are unwilling to engage in any meaningful discussion of the risks associated with their business. Industry lobbying to prevent any tightening of standards is rapid and vehement. Together, this furthers the public’s image of an arrogant, inflexible and fragmented industry. The more militant NGOs stage protests at mine sites that are deemed to have the worst environmental and social practices.

In Canada, First Nations continue to be frustrated by lack of progress in resolving land claims and oppose all resource development projects on their lands. Conflicts over existing mines intensify and physical blockades disrupt operations in many areas.



In attempts to manage costs, uneconomic mines are closed “temporarily” to avoid the costs associated with permanent closure. Certain maintenance costs are deferred in an attempt to preserve cash. High grading of ore bodies provides a short-term approach to maintaining operations, but severely compromises the long-term efficient exploitation of the ore body. Labour unions become increasingly worried about mine safety. NGOs and local communities become increasingly concerned about the potential for environmental disasters. Catastrophic failures occur that place other local sectors in jeopardy, from fisheries to tourism. Adverse economic impacts are widespread and highly public.

There is further consolidation in the industry on a global scale. North American copper mining ownership becomes concentrated in offshore investor hands in the first few years of the decade. North American R&D and exploration budgets are slashed with remaining exploration budgets directed offshore and concentrated on ore bodies in developing nations. The junior mining companies are the first to abandon North America and go offshore. NGOs charge this practice of exporting what they see as poor operating, environmental and social practices as ethically immoral. Only a small number of companies recognize the need for revamped business models that include an interest in recycling.

New mines are not opened in either the U.S. or Canada. Many non-government organizations and indigenous people, frustrated with any progress, become intent on shutting the industry down. In Canada, there is complete deadlock on resolution of aboriginal land claims and the younger generation of First Nations people becomes increasingly militant, in some cases to the point of sequestering arms. The economic benefits that traditionally generated support for new mines from local communities is now not enough to outweigh the social and environmental risks. The open hostility and industry-alleged regulatory quagmire cause companies to look offshore.

By 2015, mining in North America is a sunset industry. With supply from North America winding down, one could argue the seeds are being sown for a sustained recovery in world metal prices as demand and supply become more balanced. However, the impasse in North America means that it will not share in the economic benefits associated with this potential recovery as the industry has migrated elsewhere.

### **Reflections on Perfect Storm**

1. What are the key insights from this scenario from your perspective?
2. What are the major challenges to be faced in moving towards sustainable development?
3. What actions are needed to address the challenges and/or to assist in achieving a more desirable future?
4. What are the implications if these actions are not taken?

## Scenario: Money Divides

*The dominant force in Money Divides is an excess of money. However, rather than serving as a positive force, industry arrogance and societal divisions increase. Government stands back and watches Money Divides.*

*The dominant force in Money Divides is an excess of money. However, rather than serving as a positive force, industry arrogance and societal divisions increase.*

### Driving Forces, Logic and Change

- Economic growth raises prices and creates financial prosperity for the industry.
- Good financial conditions reinforce existing industry values and mindsets.
- Environmental and community interest groups and organizations are strong and influential.
- Uncertainty around security issues and a general atmosphere of distrust and cynicism pervade society.
- Lack of government leadership on environmental and social issues.
- The overall result is a powerful industry at loggerheads with key interest groups.

The above driving forces lead to the following changes:

- Industry cash flows are strong.
- Economic opportunities abound for investment in expansion and new mines.
- Cynicism and distrust of multinational corporations is high.
- Anti-global forces are strong.
- Non-government organizations and interest groups are influential and effective.
- Legal battles are acrimonious.
- Local vs. national divisions; Aboriginal vs. non-government organization divisions; splits within the indigenous communities in the U.S. and Canada.

### Story

In *Money Divides*, rising economic conditions stimulate prices and the financial prosperity of the mining industry in North America. Share prices rise and there is a new sense of arrogant confidence—almost complacency—among executives in the industry. Mergers and acquisitions reflect rising cash flows. There is a sense that with enough money any problem is solvable. There is renewed investment in exploration, R&D and automation technology. Labour demands increase. Some involve strikes. But these are resolved with wage increases. Executive bonuses expand and the industry's leadership revels in its renewed wealth and optimistic outlook.

But all is not well with the world. While the economy and economic wealth are growing, national and personal security concerns are high. Income disparities are rising. Anti-globalization groups are becoming stronger and more sophisticated. Attention is increasingly focused on the abusive power—real or perceived—of large multinational corporations. Corporations across sectors are under scrutiny for unsafe and unscrupulous business practices, particularly in a society that has become increasingly risk averse. Mining companies are not immune; they are a visible target for a variety of interest groups from local community groups to national and international organizations.

In this environment of public uncertainty, non-government organizations are effective in building support and influence. Their concerns reflect underlying public concerns. Public credibility and financial support increase. The influence of non-government organizations is fueled in part by the insensitive and occasionally negligent behaviour of

some corporations. For example, in mining, non-compliant events such as “small” spills and tailings dam failures, are admitted grudgingly and treated as insignificant. Actions, although legal, are taken without consultation. And if there is a problem, money will fix it. There is an attitude by some companies that non-government organizations are more interested in their own power and politics than in really improving society. For their part, non-government organizations see it as exactly the opposite.

This growing state of mistrust eventually focuses on governments. Public interest groups push for legislative changes. In the U.S., for example, the 1872 mining act is a central target. At the same time there are numerous legal challenges. In Canada, First Nations land claims are edging forward amidst growing controversy. In the U.S., Native Americans are watching the Black Hills challenge closely. In both countries, the trend to enhanced indigenous rights is strengthening. Their power and influence is increasing. On the other hand, there is a willingness by some companies to exercise their power by pouring “unlimited” amounts of money into winning legal disputes, lobbying governments and funding large public relations campaigns.

In general, trends in government policy are unclear. Lobby efforts by the mining industry are persistent and effective. Neither side is willing to give an inch. Proposed changes in federal, state and provincial jurisdictions are fiercely contested resulting most frequently in deadlock. Legislators are preoccupied with other matters—security remains a major issue and mining is still not that important—and are unwilling to push changes without a clear public consensus. Politicians do not want to deal with these no-win political situations. While companies argue for the need for flexibility in a tough competitive world, interest groups argue for tough prescriptive command and control regulations. “They will not comply voluntarily. You must force them to comply with stiff penalties.” There is no middle ground.

This polarized world becomes complicated in other ways. New mines and proposed expansions are often supported by local communities. Companies are able to offer significant amounts of money to enhance local community infrastructure or provide support through tax dollars. Established mining communities are often receptive to new mining investment and support the proposals. And business-focused indigenous organizations are also open to proposals that provide long-term community benefits. Some want to establish Native Mining Corporations to be full partners in the mining business.

These local interests are often opposed regionally and nationally. Regional concerns about water quality, for example, see the money directed to local communities as a buy-off to local special interest groups. This creates conflict among communities and competition for benefit packages that erodes trust and communication. Mining companies “buy” local support at the expense of local and regional consensus. Often companies choose to “share” benefits only with certain sectors or interest groups. This divide-and-conquer approach is extremely divisive and destructive.

Nationally, environmental groups oppose expansions or new mine applications either because the operations pose environmental and social risks or because added capacity is not needed. Some provide a strong argument that recycling of materials, which is gaining credibility and support from the public, reduces the need for new green-field mining capacity. Recycling, they argue, is environmentally sound and economically efficient when the true costs of mining are included. Examples of recycling efforts in Europe are often cited. Others focus on identifying environmental and social risks. They focus on specific situations in challenging companies to improve practices.

The result is acrimonious gridlock. The industry is performing well financially and is increasingly efficient in producing needed metals and minerals, but is frustrated in its efforts to expand existing mines and develop new ones. There is local support in some communities but strong opposition from regional and national interest groups.

Some indigenous people see mining as a vehicle for development in their transition from a “bush” to a wage economy. Others are adamantly opposed. Both are in conflict with outside do-gooders telling them what to do.

Many disputes involve protracted legal battles. The permitting process for new mines is paralyzed. Governments are unable to resolve these political disputes, and, in fact, are engaging in their own power struggles between state/provincial and federal regulators.

There are bright lights. Research and development leads to new practices and technologies. There are improvements in managing operations to reduce environmental and social stress. Mining communities are prosperous. Recycling expands as a business opportunity. Small entrepreneurial initiatives based on new business models are effective and encourage change. Some technological approaches are so radical that they could be potentially disruptive to “the current way,” but this is not yet evident.

Other changes are more threatening. Public disagreements are often personal as they target individuals, nationally and locally. Directors are uneasy about their legal liabilities and the range of people willing to serve on mining company boards declines. Areas around national, state and provincial parks are increasingly off-limits to mining activities, either formally, as protected areas, or *de facto* through public opposition. Land use designations are often unclear and open to dispute. The result is a shift in investment to developing countries. Indeed, some countries actively encourage mining companies to invest by establishing fast-track approval processes for new mining ventures. In a global world subject to international scrutiny, this does not mean environmental standards or social benefits can be ignored, but the government is supportive of the development. In this way, despite financial prosperity, the mining industry in North America gradually contracts over time as new mines are limited and old mines are exhausted. For some, it is a mysterious paradox. For others, it is a social victory. Neither “side” thinks that the other side “gets it.”

This paradox of decline in the face of prosperity persists for some time, but it is not sustainable. A cyclical downturn in markets is inevitable. A future of rising conflict and shrinking margins looms on the horizon. Some see a perfect storm coming.

### **Reflections on Money Divides**

1. What are the key insights from this scenario from your perspective?
2. What are the major challenges to be faced in moving towards sustainable development?
3. What actions are needed to address the challenges and/or to assist in achieving a more desirable future?
4. What are the implications if these actions are not taken?

## 5. Scenario Signposts

What events should we look for, or variables should we track, to determine which scenario is emerging over time? Below is a list of signposts and their significance as an early indicator in monitoring changes relevant to the scenarios. No signpost will unambiguously confirm the emergence of a single scenario, but collectively the signposts should indicate which scenarios seem to be emerging and which are not. Notation: NH = New Horizons; PR = Phoenix Rising; PS = Perfect Storm; MD = Money Divides.

Signpost	Significance
• Commodities/metal prices index	Rising → MD or NH Falling → PS or PR
• Investment in new mining technology	Increasing → MD or NH Decreasing → PS or PR
• Global economic growth rates	High → MD or NH Low → PS or PR
• 1872 General Mining Law	Revisions debated, progress achieved → NH, PR Little or no progress achieved → PS or MD
• Bankruptcies	Sharp increases → PS
• Actions of mining leaders (e.g., participation in dialogue; efforts to relax regulations)	Open/supportive of dialogue → NH, PR Closed to dialogue → PS or MD
• Growth of ethical/green investment funds	Increased visibility → NH or PR Little investor interest → PS or MD
• First Nation participation in, or owning of, mining companies	Increased participation → NH or MD No participation → PS Limited participation → PR
• Movement to certification and adoption of best practices by mining companies	Increasing → NH or PR Indifferent → MD or PS
• Triple bottom line reporting	More companies → NH or PR Few companies → MD or PS
• Pressure on “bad actors” by mining companies and other communities of interest	Increased peer pressure → NH or PR Unwilling to criticize → MD or PS
• Public attitudes to mining	Increasingly positive → NH or PR Indifferent/irrelevant → MD or PS
• Divisions and conflicts within local mining communities	Local conflicts → MD

## 6. Summary: Comparison of Scenarios

	New Horizons	Phoenix Rising	Perfect Storm	Money Divides
<b>Major Themes</b>	<ul style="list-style-type: none"> <li>• Strong financial performance—prices and efficiency gains</li> <li>• New leadership, new mindset, new culture</li> <li>• Trust develops through joint actions</li> <li>• Sustainable development embraced by unified industry</li> </ul>	<ul style="list-style-type: none"> <li>• Severe financial pressures</li> <li>• Desperation leads to new mindset</li> <li>• Openness leads to problem solving</li> <li>• New coalitions</li> <li>• Major divergence between U.S. and Canada</li> </ul>	<ul style="list-style-type: none"> <li>• Severe financial pressures</li> <li>• Hunker-down, cost-cutting mentality</li> <li>• Closed to change</li> <li>• Growing safety and environmental risks</li> <li>• Sunset industry</li> </ul>	<ul style="list-style-type: none"> <li>• Buoyant financially</li> <li>• Existing industry values entrenched</li> <li>• Distrust of large corporations</li> <li>• Acrimonious conflict and legal battles</li> <li>• “They don’t get it”</li> <li>• Path unsustainable</li> </ul>
<b>Economic Performance</b>	<ul style="list-style-type: none"> <li>• Strong margins</li> <li>• Increased productivity</li> </ul>	<ul style="list-style-type: none"> <li>• Eroding margins</li> <li>• Bankruptcies</li> </ul>	<ul style="list-style-type: none"> <li>• Eroding margins</li> <li>• Bankruptcies</li> </ul>	<ul style="list-style-type: none"> <li>• Rising margins</li> <li>• Increased capital for investment</li> </ul>
<b>Industry Structure</b>	<ul style="list-style-type: none"> <li>• Expansion</li> <li>• New mines</li> <li>• Recycling increases as economically viable</li> </ul>	<ul style="list-style-type: none"> <li>• Consolidation</li> <li>• Rationalization</li> <li>• Mine closings and selected new mines</li> </ul>	<ul style="list-style-type: none"> <li>• Consolidation</li> <li>• Mine closures, layoffs and rationalization</li> </ul>	<ul style="list-style-type: none"> <li>• Opportunistic M&amp;As</li> <li>• Selective entrepreneurial initiatives</li> </ul>
<b>Industry Values</b>	<ul style="list-style-type: none"> <li>• Openness and dialogue</li> <li>• Sustainable development performance practices adopted</li> <li>• Association builds consensus</li> </ul>	<ul style="list-style-type: none"> <li>• Openness and dialogue (Canada &gt; U.S.)</li> <li>• Commitment to social and environmental performance</li> <li>• Peer pressures to conform</li> </ul>	<ul style="list-style-type: none"> <li>• Old-line culture persists</li> <li>• Focus entirely on costs</li> <li>• Deteriorating maintenance threatens infrastructure integrity</li> </ul>	<ul style="list-style-type: none"> <li>• Closed</li> <li>• “Money solves everything”</li> <li>• Defensive “laager” mentality</li> <li>• Money = power</li> </ul>
<b>Societal Values</b>	<ul style="list-style-type: none"> <li>• Commitment to environmental and social sustainability</li> <li>• Interdependence</li> </ul>	<ul style="list-style-type: none"> <li>• Commitment to environmental and social sustainability</li> <li>• Interdependence</li> </ul>	<ul style="list-style-type: none"> <li>• Strong commitment to environmental and social sustainability</li> <li>• Mining perceived as dirty and irrelevant</li> </ul>	<ul style="list-style-type: none"> <li>• Uncertainty/insecurity</li> <li>• High environmental concerns</li> <li>• Cynicism towards corporations</li> </ul>

	New Horizons	Phoenix Rising	Perfect Storm	Money Divides
<b>Local Mining Communities</b>	<ul style="list-style-type: none"> <li>• More prosperous</li> <li>• More equitable sharing of benefits</li> <li>• Supportive of expansions and new mines</li> </ul>	<ul style="list-style-type: none"> <li>• Severe economic impacts</li> <li>• Increasingly part of dialogue and joint problem solving</li> </ul>	<ul style="list-style-type: none"> <li>• Severe economic impacts</li> <li>• Declining support for companies or mining industry—no economic benefits</li> </ul>	<ul style="list-style-type: none"> <li>• More prosperous</li> <li>• Supportive of expansions</li> <li>• Protesting voices vilified</li> </ul>
<b>First Nations/ Native Americans</b>	<ul style="list-style-type: none"> <li>• Open to development as full partners</li> <li>• First Nation mining companies</li> <li>• Goal = sustainable communities</li> </ul>	<ul style="list-style-type: none"> <li>• Open to development with long-term mutual benefits</li> <li>• Support of industry with governments</li> </ul>	<ul style="list-style-type: none"> <li>• Little interest in mining development—no benefits</li> </ul>	<ul style="list-style-type: none"> <li>• Open to development as full partners</li> <li>• First Nation mining companies</li> </ul>
<b>Role of Governments</b>	<ul style="list-style-type: none"> <li>• Supportive of joint initiatives such as R&amp;D</li> </ul>	<ul style="list-style-type: none"> <li>• Ineffective shifting to support</li> <li>• Regulations maintained</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal involvement</li> <li>• Reluctant participants in managing sunset industry</li> </ul>	<ul style="list-style-type: none"> <li>• Paralyzed—unable to act effectively</li> </ul>
<b>Role of National and International NGOs</b>	<ul style="list-style-type: none"> <li>• Strong credibility and influence</li> <li>• Support external audits</li> <li>• Participate in joint task forces</li> </ul>	<ul style="list-style-type: none"> <li>• Skeptical, but take risks to work collaboratively</li> </ul>	<ul style="list-style-type: none"> <li>• Opposed to mining and negative social and environmental impacts</li> </ul>	<ul style="list-style-type: none"> <li>• Rising credibility</li> <li>• Active and uncompromising</li> </ul>
<b>Technology</b>	<ul style="list-style-type: none"> <li>• Major advances in tele-mining and other technologies</li> </ul>	<ul style="list-style-type: none"> <li>• Innovations adopted through necessity</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal innovation</li> </ul>	<ul style="list-style-type: none"> <li>• Investment in new technology</li> <li>• Increased automation</li> </ul>
<b>Human Capital</b>	<ul style="list-style-type: none"> <li>• Renewed interest in mining programs</li> </ul>	<ul style="list-style-type: none"> <li>• Decline in mining schools and enrollments</li> </ul>	<ul style="list-style-type: none"> <li>• Most mining schools close</li> </ul>	<ul style="list-style-type: none"> <li>• Decline in mining schools and enrollments</li> </ul>

## 7. Towards an Agenda for Change

Following completion, review and revision of the scenarios, a period of time was spent using the insight gained through the scenarios exercise to identify key issues facing North American mining and minerals. In a brainstorming session, 55 such issues were identified. These were subsequently synthesized into the 11 major issues listed below.

### A. Addressing the Legacy Issue

1. Develop a comprehensive approach to reconciling current values/perspectives on acceptable mining practices with the negative legacy that has been left as a result of past values, perspectives and practices.
2. Establish an approach (policies, rules and practices) to mining/minerals projects that will create a reasonable degree of confidence for all communities of interest that acceptable post-closure outcomes will be achieved.

### B. Impact on Practices

3. Develop effective processes by which communities of interest can encourage good performance and discourage bad performance among their peers.
4. Develop an approach for identifying and assessing the distribution of costs, benefits and risks associated with mining/minerals projects involving all communities of interest.
5. Collaboratively design and implement a dispute-resolution mechanism accepted by all communities of interest.
6. Develop a way to adjust the financial/business/economic model currently taught in mining (and business) schools and used by mining companies, the financial services industry and government. New approaches should capture not only traditional economic costs, benefits and risks, but also those that are environmental, social and cultural in nature.
7. Establish processes that will enable a shift in the mining/minerals industry's principal focus from a producer of certain commodities to a material service provider that embraces the principles of industrial ecology—an emerging approach that draws lessons from the natural ecosystem for application in our industrial system. Recycling, maintaining a full life-cycle perspective and working with the ebb and flow of dynamic natural processes rather than trying to “defeat” or “control” them, are all part of industrial ecology.
8. Establish mechanisms and resources for facilitating and tracking progress achieved on these actions over the next 10 years in North America.

### C. Enhancing Capacity

9. Establish the academic and learning support required to build the mining- and minerals-related human capital needs of industry, government and other communities of interest.
10. Strengthen leadership capacity in all communities of interest including companies, communities, indigenous peoples, labour, non-government organizations and government to facilitate more effective design and implementation of change.
11. Build the capacity of all mining-focused communities of interest in a meaningful way, enabling them to interact more effectively with each other.



Each of the above issues was subsequently described in terms of underlying implications, specific actions arising and the implications of inaction. This material was then put to the North American Mining Dialogue convened November 7–9, 2001 by Simon Fraser University’s Centre for Dialogue in Vancouver, British Columbia. In turn, the results of the dialogue were fed into the development of the “Agenda For Change” that is documented in the final report of MMSD–North America.

## 8. Overall Reflections

Perhaps the greatest benefit of a scenario exercise is to stretch the boundaries of the participants' mindsets. Reflections of participants are summarized below in response to the same set of questions that are posed throughout the report.

### **What are the key insights from this scenario exercise?**

1. There is a need for a far more holistic approach to designing, operating and closing a mine than has been typical in the past.
2. The need for such a holistic approach extends not only to companies, but also to government, mining industry service providers and other communities of interest.
3. The sophisticated nature and ease of world-wide communication has dramatically changed the "influencing" environment for mining/minerals projects and operations.
4. There is a need for transparency by all, particularly mining companies and government. Coupled with transparency is engagement that will facilitate greater involvement on the part of individuals and communities in mining/minerals-related decision-making that affects their current and future lives.

### **What are the major challenges to be faced in ensuring that North American mining and minerals contribute to the transition to sustainable development?**

1. Gaining recognition that the drive towards sustainable development is not only the responsibility of the mining/minerals industry (though they shoulder a particular responsibility in terms of their practices), but also of government and the broader society.
2. Overcoming the immense gap between the short-term perspective of the market and the long-term time horizon of sustainability.
3. Finding ways to bring price in line with full costs.
4. Raising standards related to environmental and social implications in a way that is fair and practical while ensuring that adequate movement towards sustainability is achieved.

### **What actions are needed to address these challenges and/or to assist in achieving a more desirable future?**

1. Education of mining companies with regard to the benefits of a more holistic approach (New Horizons) versus the pitfalls of the *status quo* (somewhere between Perfect Storm and Phoenix Rising).
2. Continuing dialogue involving the breadth of communities of interest that have been involved in this exercise.
3. Actions on the part of companies and government that demonstrate the successful steps taken.
4. Development of business models that incorporate "real" costs and overcome the difficulty of discounted cash flow techniques when applied to closure 20, 30 or 50 years in the future.

5. Grooming of new managers on a more holistic approach; shifting the corporate culture and awards system in support of this change.
6. Broader recognition of the many “players of influence” in the industry including mining suppliers, engineering firms, construction contractors, environmental and social consultants; development of ways that their roles and responsibilities are more visible.

***What are the implications if these actions are not taken?***

1. An increasingly marginalized industry in North America.
2. Greater disconnect among government, industry and other communities of interest.
3. A tendency towards more of a Perfect Storm rather than towards New Horizons.

During its short life, this exercise achieved a great deal. However, it suffered also from some limitations. First, time and financial resources precluded a link with Mexico. This is a significant topic that was not explored during this exercise. With the North American Free Trade Agreement in place, it is inevitable that corporate interconnections, regulations, standards and practices across Canada, the U.S. and Mexico will continue to converge.

Secondly, except for maintaining a general overall sense, this exercise did not specifically consider implications of foreign companies operating in Canada and the U.S., nor the implications of U.S. and Canadian companies working elsewhere. With industry consolidation, processes of globalization, the split between developed and developing economies and, in the Americas, the efforts of the Mines Ministers of the Americas (CAMMA) all continuing, implications for scenarios work are profound.

Lastly, opinion, culture, values and history vary between Canada and the U.S. Sometimes these differences are poignant and obvious; often they are subtle or even hidden. Nevertheless, they are always important to recognize and understand when possible. While these differences surfaced in discussion from time to time and every attempt was made to capture such insights in the report presented here, the limited resources of this exercise did not allow an in-depth consideration of this topic.

Taken together, the above kinds of limitations lead to a need to recognize the current work as a first step in what should be a longer, more profound exercise in reflection regarding alternative futures for the mining/minerals industry.

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