ARCTIC ECONOMIC COUNCIL

RESPONSIBLE RESOURCE DEVELOPMENT WORKING GROUP

# MINERAL DEVELOPMENT

## IN THE ARCTIC

"Mining will be a valued partner in the prosperity of the Arctic"

# MESSAGE

## FROM AEC RESPONSIBLE RESOURCE DEVELOPMENT COMMITTEE CO-CHAIRS:

It is our sincere hope that the thoughts and recommendations offered in the Report of the Responsible Resource Development Working Group will provide insights and an exchange of ideas around mineral development projects in the Arctic.

The report is a consolidation of insights from a wide spectrum of Arctic stakeholders. It includes feedback from companies that have developed Arctic mining projects and what made them successful, as well as from other stakeholders representing Indigenous groups, potential Arctic investors and government entities.

The Arctic Economic Council's (AEC) Responsible Resource Development Committee would like to thank all the participants who contributed their time and freely shared their expertise in the development of this report. A special thanks goes to the principal contributors, Larry Connell of Agnico Eagle Mines Limited and Lance Miller of NANA Corporation.

We encourage you to reach out to members of the Committee with your feedback and further questions about responsible resource development. More importantly, we ask that you and your organizations join the AEC to bring your skills and energy to the development of this important region and to join us on this exciting journey.

Lilian Brewster and Bruce Harland,
Co-chairs AEC Responsible Resource Development Committee

# EXECUTIVE SUMMARY

Responsible resource development in the Arctic encompasses a comprehensive plan by the Arctic Economic Council (AEC) Responsible Resource Development Working Group to create sustainable economic benefits – consistent with the aspirations of the local Indigenous peoples – and to provide economic growth and long-term prosperity while protecting the environment. Successful mineral development projects build trust and create relationships with Indigenous communities directly impacted by resource development projects. The AEC offers forth this report on the inputs and feedback by Indigenous Arctic peoples, mining companies, service companies, universities, and government officials.

The AEC was created by the Arctic Council during the 2013-2015 Canadian chairmanship. Where the Arctic Council serves as primarily a government-to- government organization focused around policy, the AEC's main mission is to facilitate sustainable Arctic economic and business development. AEC members include business members from the eight Arctic nations and six permanent participant groups recognized by the Arctic Council: Aleut International Association, Inuit Circumpolar Council, Saami Council, RAIPON and Arctic Athabaskan Council.

Recognizing this, the AEC Resource Development Working Group – comprised of private sector business representatives from the United States and Canada, as well as permanent participants from the Inuit Circumpolar Council – was formed. Additional input was sought from experienced business professionals and Indigenous peoples. In this document, Working Group members have considered how best for project proponents to be successful operators in the region. As such, it is a distillation and summary of the observations of many people who have first-hand experience or knowledge of mining industry operations in the Arctic.

The Working Group has chosen to focus on mining for this report and to apply concepts specific to mining toward the report's stated goals and recommendations. This will help to ensure responsible resource development and to enhance the industry's reputation as a driver of sustainable development in the region. Many of the same considerations would apply to other development sectors. This report is intended to serve as a resource for understanding best practices and the unique challenges of operating in the Arctic. Its perspective is mainly that of the active members of the Working Group, however it also includes insights from other stakeholders who have lent their expertise on particular areas of interest.

# INTRODUCTION

## FIVE PILLARS OF RESPONSIBLE RESOURCE DEVELOPMENT

There are key common issues for successful responsible resource development in the Arctic. Governments, industry and local Indigenous peoples working together can generate mutually beneficial development of the Arctic. While there are other challenges facing responsible Arctic development, the five pillars for success have been identified by this Working Group as:

- Human capital;
- Built infrastructure;
- Regulatory and permitting;
- Data sharing and accessibility; and
- Economic viability.

As a starting point, these five pillars also depend on a well-defined mineral resource base. Economically viable mineral deposits are relatively rare and often not found near existing infrastructure. Determining a site to be viable will have to consider these common factors:

- Value of the mineral(s) to be extracted;
- Grade and size of the mineral deposit;
- Location of the mineral deposits and location of the market;
- Cost of bringing supplies into the mine site;
- Access to affordable energy;
- Availability of a qualified workforce; and
- Environmental setting of the mine site.

The region's mineral endowment is complemented by that of its people. Project proponents and northern governments must engage in early and ongoing open dialogue, consultation and cooperation with Indigenous communities – this is a critical component of building mutually beneficial partnerships and ensuring long-term sustainable benefits. As well as the legal requirements of governments in the region, developers committed to responsible resource development in the Arctic must earn their "social license to operate," which goes beyond local engagement and in a northern context includes Indigenous consultation, and free, prior and informed consent.

### PILLAR 1. HUMAN CAPITAL

Human capital refers to the local and non-local expertise necessary for the successful implementation of a project. This can range from the direct workforce needs of a project and local education initiatives, to capacity building within the region to understand and negotiate with a project proponent. Overall, the Arctic is a vast region with large distances between populated centres. In most cases, resource development projects are not

located near communities. Consequently, many resource development projects are not in close proximity to towns or villages where a workforce can be readily accessed, though the impact of a mining project may be felt by nearby communities or residents.

Arctic communities tend to be small and often cannot supply the number of employees or the diversity of qualified skilled personnel required to construct and operate a resource project. Housing is often limited in supply, thus restricting the ease of moving a workforce into the communities adjacent to the mine. Consequently, Arctic resource development projects have tended to rely on a workforce brought from outside the region who work a rotational work schedule, flying in and out of the region at the start and end of the work schedule cycle (be it weekly, bi-weekly or other). This adds significantly to the operating costs of a project through the added cost of transportation and housing and tends to transfer the benefits – in the form of employment, economic development, taxation, etc. – away from the Arctic. While the project may still contribute to the national economy, the benefits often do not fully reach the local population.

Project developers and governments (national and regional) must collaborate with the local communities, including local Indigenous peoples, to address workforce and capacity-building efforts. This approach enables revenue generated through employment to remain in the region and builds the region's capacity for future economic development. This approach also requires the development and implementation of initiatives, in collaboration with community leaders, to improve education outcomes in the region and to prepare and train locals to be able to fill the workforce needs of resource development projects in the Arctic.

Workforce Development - Strengthening human capital through education and training is one role for project proponents to fill. This can be done by partnering with local institutions on local capacity building initiatives focused on skills, knowledge and competency. Successful resource development in the Arctic must set a goal of maximizing employment (both in number and in quality) of Indigenous peoples from the surrounding communities, with the intent that project benefits accrue not only to the broader economy or to governments, but to local Indigenous peoples as well. Maximizing employment from the local region makes financial sense for project owners – ultimately reducing hard costs, such as transportation, and hiring a workforce that is used to the conditions of the mine.

Such a goal implies that project-specific initiatives – such as impact benefit agreements or training provided by the proponent in advance of the project being commissioned – may be required to address barriers to employment where people have little experience with the mining sector. It is noted, however, that to operate effectively, efficiently and safely, a developer's requirement is for a comparatively skilled workforce. Rio Tinto commissioned a study on "Aboriginal Engagement in Resource Development: Industry Leading Practices" which highlighted four focus areas of success: empower, collaborate/partner, consult/involve, inform.

In addition, it is important that wage employment be compatible with traditional activities and practices that are economically, as well as socially and culturally, critical to Indigenous livelihoods and to individual, family, and community well-being. There can be limits to people's preparedness for the challenges of rotational work. Under-representation in a rotational workforce by women can be the result of lack of opportunity, rather than lack of desire to participate. Cross-cultural challenges can also represent a disincentive to participation, such as language, lack of work experience, etc. Few jobs at any resource development project will require less than the mandatory national education standards. Therefore, it is highly likely that, for some people in the region, there will be educational barriers to employment, especially at the management and governance levels of a mining company. This needs to be addressed in a holistic manner, and with long-term planning, for training to be a success.

Consequently, resource developers must develop and implement initiatives to enhance employment opportunities. Typically, local hiring initiatives could include the following:

- Work with local community and regional job centres to maintain a regularly updated database of available qualified employees;

- Recruit for open positions in local communities where locals would expect to find job postings (post offices, grocery stores, or community centres);
- Provide information on workforce requirements, job descriptions, and performance criteria;
- Hire local liaison to help mitigate potential barriers, provide culturally appropriate mine site services, advancement paths, foster retention, and administer exit interviews to find opportunities for improvement;
- Establish a Minimum Indigenous Employment Goal (MIEG) for each 12-month period of construction and operations at the project to include contractors. The MIEG will set best effort employment goals for local-hires and Indigenous employees. It will also establish best effort participation goals for local-hire and Indigenous training and apprenticeship programs;
- Provide cultural awareness training for all mine personnel;
- Fund transport to/from the mine site from these communities to enable project employment; and
- Put in place a culturally appropriate employee and family assistance program (EFAP) to address individual and family problems that threaten an individual's ability to continue working.

A critical component of ensuring local hire and retention is to have in place meaningful advancement opportunities, for example:

- Provide pre-employment training to promising job candidates in such areas as work readiness, life skills and personal financial management to enhance the potential for success once employed;
- Develop an Apprenticeship Training Program to advance the training and development of Indigenous and local employees in specialized trades requiring apprenticeship; and
- Provide on-the-job training in areas such as career development, health and safety, skill upgrading, leadership, diversity and respectful behaviors, life skills, and personal fiscal management with a view to support a successful employment experience. This extends to the non-local workforce, which must be educated on the history and culture of the community and region.

Beyond the mine's immediate needs, a project proponent and its community partners must consider and implement a strategy for building the capacity of the next generation:

- Work with students in local community schools early to let them know the kinds of jobs the mines will be hiring for and the education requirements necessary for these jobs;
- Provide scholarships for students who want to go to school to train for these positions; and
- Provide internships and field trips to the mine site for students to experience firsthand and motivate them to want to work there.

Socialization of a Project – Earning a "Social License" to Operate - A project needs local support to thrive. This local acceptance is referred to as a "social license to operate." It is recognized as vital for a project's support for a proponent to work with the communities, develop rapport and create mutual understanding of the project's potential impact and benefits. Two issues that are common in remote Arctic mining projects are the need for human capacity to build a local workforce and for affordable energy to run the mine. "The Harvard Project on American Indian Economic Development: Improving Tribal-Corporate Relations in the Mining Sector" focuses on the issues surrounding competency and capacity and how more attention could be focused on cultivating partnerships to explore opportunities for energy and human development. A key takeaway is that trust and understanding is a process that needs constant attention and reinforcement.

Described in the "Business Opportunities in Greenland Report", Greenland has included a Social Impact Assessment (SIA) requirement to provide a comprehensive outline of the building and transfer of knowledge; country processing, energy decisions and infrastructure; socio-cultural values and traditions; as well as internships, training and education, and decommissioning. While reports are commissioned and owned by the licensed mining company, the draft reports are shared for study and review by the governing agencies

and communities. Following public hearings, final reports and a White Paper are produced addressing questions identified in the process and made public.

Most exploration projects will never become a producing mine and local leaders may need assistance in understanding the process and timelines involved. SIAs and regular public meetings in the communities have been successful in managing community expectations about job opportunities. Regions with a history of mineral exploration better understand the cyclical nature of the business and the opportunities and risks involved for their local workforce and businesses that provide essential services to mine operators. When both tribal and corporate institutions acquire more internal capacity and knowledge, they have more avenues for engagement and the engagement is more productive.

Capacity Building - Workforce development should also be thought of in terms of capacity building, which also requires early and meaningful engagement with Indigenous peoples. This can start at the community level and incorporate regional or even national initiatives to train or educate a skilled workforce. Training centres have been developed to address the workforce development needs regionally and across the Arctic. The University of Alaska Fairbanks campus operates the "Mining and Petroleum Training Center" and focuses on real world experience for workforce development. Greenland School of Minerals and Petroleum provides Arctic specific training for workforce development.

Jobs, contracting and procurement opportunities can only be capitalized upon if there is a ready and trained workforce and a local business infrastructure. To prepare for these opportunities beyond the basic skill level, there must be focused technical training to fit the expected jobs, as well as contracting and procurement opportunities. This requires planning years in advance of the mine operations in anticipation of the skills and jobs available. Entrepreneurs and small business owners will find opportunities to provide essential services to the mine site operators.

Health, Safety and Security - Workers at mining operations receive significant training in health and safety as basic requirements for safe operation at remote sites. It has been shown that the skills obtained on the job at mining operations benefit local communities. Anecdotal evidence suggests that workplace medical and safety training have helped individuals in emergencies to be better prepared to help their communities. Mine sites provide highly-trained medical personnel who often manage primary care for local workers who don't have access in their local communities. This leads to better overall health and management of long-term illnesses such as high blood pressure, diabetes, and cholesterol.

## PILLAR 2. BUILT INFRASTRUCTURE

The lack of developed transportation infrastructure (roads, ports, railways, etc.), communications infrastructure, and energy supply infrastructure (energy supply and delivery) is a significant challenge to responsible resource development in the Arctic. Access to water and clear wastewater disposal (which are required for water licensing) can be difficult to find. The Arctic is remote with limited access and a harsh climate, all of which have impeded resource development.

The lack of developed infrastructure in the Arctic results in increased costs and has blocked the development of many known ore deposits – often for many decades, most often due to the inability to access the deposit and to ship out the recovered resource.

In most cases, mining operations in the Arctic must construct their own infrastructure – including access roads, port facilities, airstrips, communications infrastructure – and must provide their own power generating infrastructure, since there are typically no electrical grids or natural gas distribution networks available in these regions. At the end of the mine life, these facilities are typically removed as part of required reclamation, leaving behind a further deficit in available infrastructure that could be used for future development in the adjacent region.

Future responsible resource development of the Arctic requires an intentional joint approach between governments, project developers and local communities in developing shared infrastructure that can benefit local residents, entice future economic development in a sustainable manner, and meet the need to protect the Arctic environment. In this way, infrastructure can be constructed that will help the sustainable development of the Arctic, meet the needs and concerns of residents, and be shared with future resource development projects. This goal can be achieved through financial partnerships between governments, resource developers, and Indigenous organizations. This approach to a more sustainable level of infrastructure development suggests that the cost can be shared across multiple end-users, through the use of public-private partnerships (i.e. toll roads, toll ports, etc.), and through tax breaks for construction and operation of shared infrastructure in areas of need within the Arctic.

Shared Infrastructure - The infrastructure required for mining operations can often benefit nearby communities. An example of this is a mine near Juneau, Alaska, which was the largest underground gold mine when it operated from the late 1800's until 1944. To power the mine, an extensive hydroelectric system was set up. After the mine closed, the hydro facilities continued to provide low cost power to the town of Juneau. Today, Juneau has some of the lowest cost electricity in Alaska. At a mine in Northwest Alaska, the port and road system to the mine have provided the opportunity for a nearby community to purchase fuel at cost from the mine operator (through a winter haul from the village using the mine's transportation system).

## PILLAR 3. REGULATORY AND PERMITTING

Regulatory and permitting processes differ by country and can be unnecessarily cumbersome. Improving regulatory certainty, while reducing permitting delays, with strong government support enables Arctic projects to minimize unnecessary delay and expense. This means fairness, timeliness and predictability.

Current practice ensures that in most Arctic regions, resource projects are required to undergo rigid environmental and socio-economic assessment and permitting processes before being permitted to develop. These processes can be cumbersome and add costs to projects that make them uneconomic. The opportunity ahead is to better design processes to improve efficiency, while still delivering outcomes that are consistent with Indigenous priorities and environmental protection. It must be noted that in some regions of the Arctic, co-management systems are used, whereby Indigenous peoples sit at the decision-making table alongside governments on boards that determine both EIAs and licenses.

In some jurisdictions there is a tendency to apply a single permitting process to all projects, regardless of size. The practice of tailoring the process to reflect the size or potential adverse impact related to the activity being permitted has not yet been adopted in the Circumpolar Arctic. This results in smaller exploration projects being subjected to lengthy regulatory processes, whereas the potential adverse impacts may be small in comparison to larger projects. In many jurisdictions in the Arctic, these regulatory processes for resource development projects take many years to be completed (typically three to five years). This inefficiency in the regulatory process acts as a barrier to future development in the Arctic regions and dilutes public confidence in the ability to develop the Arctic in a sustainable manner. It must be noted, however, that these processes are often delayed in order to collect the necessary data one needs to assess the project impacts and to call for more robust ongoing scientific analysis, in particular those related to areas of importance to Indigenous peoples, including particular species.

Balancing protection of the Arctic environment with sustainable development of the Arctic regions in a successful manner will require four key outcomes: making future environmental and socio-economic reviews more predictable and timelier; reducing duplication of project reviews; strengthening environmental protection; and, enhancing consultation with the Indigenous and non-Indigenous residents. Also critical to the permitting process is for governments to hire technically strong people for the permitting system. This can be a

challenge when wages in industry may be higher than in government, resulting in turnover in critical permitting departments.

To achieve these outcomes there must be a harmonized approach between different levels of government. There should be an ultimate goal of "One Project, One Review" with clearly defined timelines. It is recommended that a specific timeline that is reasonable be adopted for the full environmental (or environmental and socio-economic, depending on the legislation) assessment of any resource development project. Specifically, a final "proceed or not-proceed" decision should be issued by the assessing authority in a timely manner (from when a project formally enters the process with a defined proposed development project), assuming no delay caused by the project developer. An ideal timeline for a project proponent would be a response within 24 months; however, this should be scaled according to the project scope and impact, as well as to the capacity of impacted communities. One of the ways in which a project proponent can facilitate this process is by building the capacity and support of local and Indigenous peoples in the region, through various skills development and training programs, at a pace that corresponds with the advancement of the project itself. It is recognized that it is difficult to prescribe a specific timeline for all projects, but northern regions can work toward a benchmark for various mine sizes and their complexity.

Consultation processes with both Indigenous and non-Indigenous residents potentially impacted by a mining project should be well-defined and should take place within this same period. Responsibility for these consultation processes should be defined; specifically, clarifying what consultation is required by the proposed project developer and what consultation is required by the governing authorities. It is noted that this is an evolving area of law in some Arctic jurisdictions, notably Canada, where the Supreme Court has recently made significant rulings on this subject. It is important that all parties understand that the government has a legal duty to consult, as well as accommodate, which is different from the stakeholder engagement and consultation that is the responsibility of the project developer. In all cases, consultation needs to be respectful, meaningful and take place on an equal playing field with the outcomes documented for the assessment/regulatory process.

"One Stop Shop" Approach - One of the key ingredients for success of the mining industry in the Arctic is a predictable and efficient permitting process. To that end, the concept of a mining "one stop shop" may serve as a focal point for all the various audiences impacted by such processes. The establishment of communication lines with different government entities (national, sub-national, Indigenous) in order to foster partnerships, promote mineral potential or to raise awareness of the country's geological resources – all have the potential to benefit by offering a "one stop shop" approach.

Project Predictability and Streamlining - All stakeholders involved in the development of any mining project in the Arctic would prefer to eliminate as many surprises as possible. Predictability and transparency in the process are key success factors for mining development in the Arctic. Projects cost more to develop in the Arctic, and potentially have a different level of risk, than in other regions. A competitive advantage to be gained in a global arena, where costs are lower, is to create a predictable and streamlined approach to permitting.

Consultation and Negotiation - To be considered one of the primary potential industries in the Arctic, mining developers need to work in partnership with local governments, Indigenous peoples and core stakeholders to establish a mutually beneficial, cooperative, and productive relationship. The approach will be characterized by effective two-way communication, consultation, accommodation, and partnering.

Such consultation and discussion should occur as early as possible in the development process, ideally in the strategic development and planning phase of a project. It is understood that everyone involved from the mining industry will have the relevant competencies to make such consultation processes successful. Companies and governments are encouraged to provide the necessary training and mentorship opportunities to support their personnel engaged in community consultation.

Specifically, commitments from the process of consultation and negotiation should aim at:

- Meeting the objectives of free, prior, and informed consent and meeting the particular requirements of consultation under national jurisdictions, such as under historical treaty and modern land claims agreements;
- Improving the understanding of each party's concerns and aspirations through meaningful consultation and cooperation, namely by:
  - Seeking to fully consult on the likely impacts and opportunities arising from mining activities, including consultation during social and environmental impact assessments;
  - Providing the parties with the opportunity to reach agreements with project proponents on new projects where practical and appropriate;
- Defining capacity-building strategies in the development of mining operations and projects, more specifically regarding employment, education, training and business initiatives. These strategies would aim to:
  - Increase the number of local and Indigenous employees within the mineral development project and service providers;
  - Develop partnerships with local residents, Indigenous peoples, and government and community organizations in the delivery of employment and training;
  - Promote the development of business opportunities to service mining project and operation needs by assisting in identifying these business development opportunities and if appropriate, by working toward the development and implementation of partnerships, procurement and contracting opportunities; and
- Understanding the responsibilities to, and embeddedness of, Indigenous culture:
  - Managing the impact of projects and operations on the long-term sustainability of the local culture;
  - Taking into account previous uses of the land and archaeological information at the project planning stage;
  - Promoting understanding of and mutual respect;
  - Understanding the requirements for creating a working environment that is culturally sensitive and supportive for all employees.

Consultation may lead to a response to local interests, negotiated between the project proponent and landowner or rights-holder. This is referred to as accommodation. Generally, local legal systems have required accommodation when rights have been asserted and recognized by the government and where the rights have been affected in a significant way. The goal of accommodation is to balance competing interests and reach a compromise that everyone can live with. Accommodation can take many forms, and as such, the parties should explore the broadest range of options, including benefit agreements, training, development, business opportunities and other initiatives that may transfer some of the economic upside of the project to the local Indigenous groups.

Rio Tinto has published a "Cultural Heritage Guide" to provide clear direction on how to integrate cultural heritage considerations into its work. Part of the company's process includes an External Review Panel to advise and challenge Rio Tinto's thinking.

## PILLAR 4. DATA SHARING AND ACCESSIBILITY

Significant data is collected as part of the permitting process. Much of this information is considered proprietary to the mine and is never made public or shared. An increase in quality of, and access to, mapping and geoscience, including modernized data dissemination as well as sharing of science and baseline data, can improve scientific research and extend the benefits of the data collection beyond the main project.

Effective environmental and socio-economic assessment of a proposed resource project relies on accurate, well-documented information being available to all parties on what the existing environmental and socio-economic conditions are in the potentially impacted region near the proposed development project. This then allows for better predictions of what changes may be experienced

if the proposed development proceeds and for better understanding of the cumulative effects any project may have on the existing environmental and socio-economic conditions of the region.

In some areas, this information is readily available through publicly available data sources; however, this is not always the case for all areas and especially for all types of data. In many cases, the data is not publicly accessible. It may exist, but in databases that are privately held. In many cases, data on certain factors of interest do not exist or exist in formats that make them not useful. For example, rates of unemployment may not exist at the community-level but be available only at the provincial or territorial level, rendering it difficult to understand employment conditions in specific communities near a proposed project; or, there may be no information on a data-type of interest such as education outcomes by community, water flows or local precipitation amounts.

Resource developers do collect extensive baseline data on both the existing environment and socio-economic conditions within the region potentially impacted by a proposed project in advance of preparing an environmental impact statement. In some jurisdictions there are mechanisms for this collected baseline data to be placed into databases that are then publicly available for use in future assessments or by researchers. These databases improve the state of knowledge of any region over time, allow for better assessment and help reduce the cost of future assessment by reducing duplication of future efforts.

Baseline Scientific and Socio-Economic Data - Any project requires extensive baseline data. Canada has a system, positively viewed by industry, that requires mining companies to contribute their geological data to a shared public database. This can greatly facilitate future exploration by companies not having to reproduce certain geological data.

One of the biggest challenges for permitting a project is a robust dataset of environmental data. Because many Arctic projects are in remote areas, the collection of environmental data falls on the project proponent. Gathering the optimum type and amount of data can be a moving target. If jurisdictions want to encourage investment, having objective (usually government-funded) data could greatly aid project permitting.

Indigenous and Traditional Knowledge - Indigenous Knowledge, if it is chosen to be shared, can be a great source of historical, current and future information to help in project design. This includes, for example, animal migration patterns, subsistence uses and distributions of animal and plant resources. Critical for the gathering, interpretation and application of Indigenous Knowledge are professionals that can navigate the inter-relationship between the social sciences with quantitative environmental data. The ownership of Indigenous Knowledge should be retained by Indigenous peoples, and not considered the intellectual property of the company, nor should it be shared without the express permission of the Indigenous Knowledge holder.

## PILLAR 5. ECONOMIC VIABILITY

Resource development in the Arctic is expensive. The remote location, lack of available infrastructure, lack of energy sources, and the shortage of a qualified workforce, all add to higher construction and operating costs. In northern Canada, the average cost of operating a mine has been estimated by the Mining Association of Canada to be 30% higher than for a similar mine in southern Canada where transportation links are available, built infrastructure exists, energy sources are available and there is more access to a qualified workforce. Consequently, economic viability can be a challenge to resource development in the Arctic.

In addition, it is imperative that industry and government educate local communities about the timelines and high capital costs of mining versus other industries – for instance, oil and gas. Many northern regions have experienced oil and gas development. In general, that industry has shorter exploration timelines and higher rates of financial returns than mining projects. Education about the differences between the industries will help to address what are often unrealistic expectations about the amount of potential wealth that will be generated

by mining. The benefit of mining is in the local jobs and local/regional benefits to governments, rather than in supporting an entire national budget or Gross Domestic Product (GDP).

Sources of Capital - Important for early stage mineral exploration is the availability of risk capital. Typically, money has been raised on the public markets; however, there is a recent trend toward private equity financing. Additional funding is contingent on exploration success. If a project can achieve a positive feasibility, capital is often easier to attract as the major companies will participate with their greater financial resources.

A potentially overlooked source of capital can be the Indigenous companies and corporations who are looking to create sustainable opportunities for their region. Having an investment in the project can help ensure a seat at the table for development, and opportunities for service businesses that can meet the needs of the mining project. Alaska is comprised of 12 regional native corporations that were given land and mineral rights. These corporations are not publicly traded, and shares can normally only be inherited. In Alaska, the NANA Corporation and Doyon Limited have actively promoted their own mineral interests and have either funded their own early stage exploration or invested in companies working on their lands.

Commodity Cycle Planning - Early stage exploration financing is often tied to the metal markets. Bull markets have a habit of fostering a sense of enthusiasm that can provide risk capital. Unfortunately, the cyclic nature of the markets results in a boom and bust aspect to exploration. The next effect is three-fold. First, projects lose momentum and costs add up when a program cannot be continuous. For example, mobilization of drilling equipment and starting and stopping remote camp operations add significantly to costs. Secondly, the erratic progress leads to gaps in obtaining continuous environmental data important for permitting. Lastly, unless a community understands the mineral exploration and development cycle, residents can become disillusioned with the project leading to an erosion of social license.

Rate of Return - All companies will have their own internal metrics for financial rate of return (ROI) on a project. Typically, the ROI for projects in the Arctic will be higher than in more developed parts of the world, due to the need to build infrastructure and the great distances for transporting supplies in and products out. Therefore, the deposits also need to be generally higher grade and/or larger tonnage than the global average.

# LEADING PRACTICE GUIDANCE

The mining sector has embraced and implemented a number of leading practices. These have most often been developed in consultation with governments, communities and public interest groups with the objective of strengthening social license in the region.

The Arctic Council's forthcoming "Good Practices for Environmental Impact Assessment and Meaningful Engagement in the Arctic" will provide a comprehensive overview of leading good practice for the Arctic.

Towards Sustainable Mining (TSM) - is the Mining Association of Canada's (MAC) commitment to responsible mining. It is a set of tools and indicators to drive performance and ensure that key mining risks are managed responsibly at members' facilities. Adhering to the principles of TSM, members demonstrate leadership by:

- Engaging with communities;
- Driving world-leading environmental practices; and
- Committing to the safety and health of employees and surrounding communities.

The program was established in 2004 and its main objective is to enable mining companies to meet society's needs for minerals, metals and energy products in the most socially, economically and environmentally responsible way. Since the implementation of TSM in Canada, Finland has also decided to join; other Arctic countries would also benefit from joining the initiative.

The program's core strengths are:

- Accountability: Participation in TSM is mandatory for all MAC members. Assessments are conducted at the facility level where the mining activity takes place. This makes it the only program in the world to do this in the mining sector. TSM provides local communities with a meaningful view of how a nearby mine is fairing.
- Transparency: Members commit to a set of guiding principles and report their performance against the program's 23 indicators annually in MAC's TSM Progress Reports. Each facility's results are publicly available and are externally verified every three years.
- Credibility: TSM includes ongoing consultation with a national Community of Interest (COI) Advisory Panel. This multi-stakeholder group helps MAC members and communities of interest foster dialogue, improve the industry's performance and shape the program for continual advancement.

Voluntary Principles on Security and Human Rights - Established in 2000, these are a set of principles designed to guide companies in maintaining the safety and security of their operations within an operating framework that encourages respect for human rights.

The Voluntary Principles are the only human rights guidelines designed specifically for extractive sector companies. Participants in the Voluntary Principles Initiative — including governments, companies, and NGOs — agree to proactively implement or assist in the implementation of the Voluntary Principles.

Arctic Investment Protocol - To balance the Arctic as a homeland and as increasingly a region for economic development, the Investment Protocol of the World Economic Forum Global Agenda Council on the Arctic aspires to promote sustainable and equitable economic growth in the region by furthering community well-being and building resilient societies in a fair, inclusive and environmentally-sound manner. The following principles lay the foundation for responsible Arctic development:

- Build resilient societies through economic development;
- Respect and include local communities and Indigenous peoples;
- Practice responsible and transparent business methods;
- Consult and integrate science and traditional ecological knowledge; and
- Strengthen pan-Arctic collaboration and sharing of best practices.

As members of the global community ensuring that development in the Arctic is responsible and sustainable, the AEC encourages citizens and organizations around the world to support and put into practice the principles of the Arctic Investment Protocol (AIP).

In addition to the AIP, there are other guidelines, such as the UN Sustainable Development Goals, that should be considered for a Pan-Arctic protocol. The UN Declaration on the Rights of Indigenous Peoples, Aspen Principles, and Canada's Truth and Reconciliation Commission are also worth considering in an Arctic and mineral development context.

# CONCLUSION

In this second decade of the 21st century, responsible resource development in the Arctic must be conducted with a comprehensive plan to create sustainable economic benefits, consistent with the aspirations of the people of the region, in order to provide economic growth and long-term prosperity while protecting the existing environment.

For resource development projects to succeed in an acceptable manner in the Arctic, these projects must recognize the partnership with Indigenous peoples whose traditional activities often overlap with, or are dependent on, a mining operation's environmental footprint. The corporate sector must understand that it must also work "beyond regulatory compliance" to build trust and create healthy relationships with Indigenous communities directly impacted by resource development projects. Building mutually beneficial partnerships with the corporate sector can create long-term sustainable benefits for Indigenous peoples, while encouraging reconciliation and active engagement between Indigenous and non-Indigenous peoples. This will require trust, which can only be built on meaningful engagement in a respectful manner. Corporate sector developers who want to participate in responsible resource development in the Arctic must earn their "social license" to participate in development through such engagement.

There are key common issues that stand in the way of successful and responsible resource development in the Arctic regions. These same issues also stand in the way of improving the quality of life for peoples living in the Arctic regions. Thus governments, industry and Indigenous peoples working together for mutual benefit will succeed. While there are many challenges facing responsible Arctic development, the key success factors include:

## HUMAN CAPACITY

For Arctic resource development projects to be sustainable, project developers and governments (both national and sub-national) must work with local Indigenous governments, groups and communities to address the shortfall of a skilled workforce. This would enable employment benefits to remain in the region and to build capacity for future economic development in the region. This involves the development and implementation of initiatives designed to improve education outcomes

in the region and to prepare and train local Indigenous and non-Indigenous populations to be able to fill the workforce needs of resource development projects.

## BUILT INFRASTRUCTURE

The lack of developed infrastructure in the form of transportation infrastructure (roads, ports, railways, etc.), communications infrastructure and energy supply infrastructure (energy supply and delivery) is a significant challenge to responsible resource development in the Arctic regions. Future development of the Arctic requires a joint approach between governments, project developers and local communities in developing infrastructure that can benefit local residents and entice future economic development in a sustainable manner, while meeting the need to protect the Arctic environment.

## REGULATORY AND PERMITTING

Responsible resource development in the Arctic must respect and protect the region's environment and must involve the Indigenous and non-Indigenous residents of the Arctic in making decisions on how responsible development proceeds – specifically, what development is acceptable and what is not and under what constraints development should proceed. However, these protections need to be balanced against the economic development aspirations of the residents of the Arctic. Balancing protection of the Arctic environment with sustainable development of the Arctic regions in a successful manner will require four key outcomes: making future environmental and socio-economic reviews more predictable and timelier; reducing duplication of project reviews; strengthening environmental protection and enhancing consultation with the Indigenous and non-Indigenous residents of the Arctic regions.

## DATA SHARING AND ACCESSIBILITY

Effective environmental and socio-economic assessment of a proposed resource project relies on accurate, well-documented information being available to all parties. This then allows for better predictions of what changes may be experienced if the proposed development proceeds and for better understanding of the cumulative impacts any project may have on the existing environmental and socio-economic conditions of the region. Indigenous Knowledge will increasingly be an important feature of data collection and utilization in decision-making, with corresponding safeguards in place to protect both the information, its use, and the knowledge holder.

## ECONOMIC VIABILITY

Resource development in the Arctic is expensive. The remote location, lack of available infrastructure, lack of energy sources, and the shortage of a qualified workforce all adds to higher construction and operating costs. New forms of financing will be possible by strengthening the partnerships between industry, governments and Indigenous peoples.

# COMMITTEE MEMBERS

LILLIAN HVATUM-BREWSTER
Co-Chair
Vice-President
Indigenous Relations and
Community Development
ATCO
Canada

BRUCE HARLAND
Co-Chair
Vice President
Business Development
Crowley Marine Services
United States of America

LIZ QAULLUQ CRAVALHO
Vice President
External Affairs
NANA Corporation
United States of America

GEORGE HUNGERFORD
Attorney At Law
Canada

LORI DAVEY
Vice President
Enterprise Markets
GCI
United States of America

LARRY CONNELL
Corporate Director
Sustainability
Agnico Eagle Mines Limited
Canada

PATRICE GILBERT
Vice President
Health, Safety & Community
Agnico Eagle Mines Limited
Canada

LISA GILBREATH
Associate
Pierce Atwood
United States of America

LANCE MILLER, PH.D.
Vice President
Natural Resources
NANA Corporation
United States of America

## PEER REVIEWERS

NILS ANDREASON
Executive Director
Institute of the North
United States of America

VERONICA SLAJER
President
NorthStar Group
United States of America

KY HOLLAND
OIPC Tech Commercialization
University of Alaska, Fairbanks
United States of America

# APPENDIX

## ACTIVE ARCTIC MINING PROJECTS

There are many active mines and many more mining prospects in the Arctic. Iron, gold and diamonds are the predominant resources being extracted. Below is an inventory of active mines:

### CANADA

Alexco Resource Corp operates a silver mine at Elsa, north of Mayo, in the Yukon Territory. This mine has been in operation since the early 1900's and has produced over 214 million ounces of silver at an average grade of approximately 1,373 grams per ton.

Capstone Mining - Minto Mine is an open pit copper mine located 240 kilometres north of Whitehorse in central Yukon, Canada. The mine is estimated to have four years of production remaining.

Dominion Diamond Mines - Ekati Diamond Mine is located in the Northwest Territories, approximately 300 kilometres northwest of Yellowknife. Ekati began production in October 1998, following extensive exploration and development work dating back to 1981. The Ekati process plant has the capacity to process 4.3 million tons per year.

Rio Tinto - Diavik Diamond Mine (60%) is located in the Northwest Territories, 220 kilometres south of the Arctic Circle on a small island in Lake de Gras. Diamonds were first discovered in the Lac de Gras region in the early 1990's, and construction of the mine was completed in 2003. It has since produced over 100 million carats of high-quality rough-cut diamonds and the majority are gem-quality white stones.

De Beers Canada Inc. - Gahcho Kue Diamond Mine (51%) is located in the Northwest Territories approximately 280 kilometres northeast of Yellowknife and 80 kilometres southeast of De Beers' Snap Lake Mine (placed on care and maintenance in 2015). The Gahcho Kue Mine is a joint venture between De Beers Canada Inc. (51%) and Mountain Province Diamonds (49%). The mine began ramping up to production in August 2016 and reached full commercial production in March 2017. It is expected to have a 12-year mine life. Average annual production is 2.5 million carats.

Agnico Eagle Mines Limited - Meadowbank Gold Mine is located in the Kivalliq region of Nunavut Territory, in Canada's Low Arctic. Meadowbank was Agnico's largest gold producer in 2018. Mine commissioning and first gold production came from the Portage open pit and began

in early 2010. Mine production is expected to end in 2019. The company is transitioning it's operations to the nearby Amaruq satellite deposit in 2019 and will continue to use the processing infrastructure of Meadowbank.

Agnico Eagle Mines Limited - Meliadine Gold Mine is located in the Kivalliq region of Nunavut Territory, in Canada's Low Arctic. Mine commissioning and first gold production is expected in 2019.

Baffinland Iron Mines Corporation - Mary River Iron Mine is located on northern Baffin Island in Nunavut Territory. It consists of nine-plus high-grade lump and fine iron ore deposits. Baffinland shipped its first iron ore to European markets in July 2015 with no processing required due to its quality. Mary River consists of mining iron ore from the reserve at Deposit No. 1 at a production rate of 21.5 million tonnes per year.

TMAC Resources - Hope Bay Doris Gold Mine Project is in the Kitikmeot region of Nunavut. Commercial production and operation were achieved in May 2017 at the Doris Mine and Mill Complex. Infrastructure includes a 1,000 ton-per-day processing plant. Nearby Madrid and Boston properties are expected to commence production in 2020 and 2022, respectively.

## FINLAND

Agnico Eagle Finland Oy - Kittilä Gold Mine extracts the Suurikuusikko gold deposits in northern Finland. The mine is the largest primary gold producer in Europe. Production started in 2008 and since open-pit mining was completed in 2012, Kittilä has been an underground-only operation.

Boliden AB - Kevitsa Nickel Mine is an open pit mine in northern Finland. The Kevitsa deposit – first discovered in 1987 by the Geological Survey of Finland – is one of the largest mineral discoveries in Finland. The operation, which comprises a mine and a concentrator, started up in 2012.

Talvivaara Nickel Mine is in Sotkamo, eastern Finland and is a large open pit mine producing nickel, zinc, cobalt and copper. The mine is currently owned by Finnish State company Terrafame Oy (84%) and Trafigura (16%). The mine is exploiting the Talvivaara deposit, one of the largest nickel deposits in Finland. The production process is based on mining and ore handling, bioleaching and metals extraction. Production started in 2011.

First Quantum Minerals Ltd. - Pyhäsalmi Copper-Zinc Mine is an underground mine located in central Finland. Pyhäsalmi is one of the oldest and deepest underground mines in Europe and produces copper, zinc and pyrite. In 1962, it was initially developed as an open pit mine by Outokumpu Oyj, followed by underground development.

Outokumpu Oyj - Kemi Chromite Mine is the largest underground mine in Finland, with an annual production capacity of 2.7 million tonnes of ore. It is part of the integrated ferrochrome and stainless-steel manufacturing chain located in the Kemi-Tornio region.

Yara International ASA - Siilinjärvi Phosphate Mine is a large open-pit apatite mine located near Siilinjärvi in eastern Finland. The mine is one of the largest phosphate reserves in Finland having estimated reserves of 2.35 billion tonnes of ore grading 4.2% P2O5. Production started in 1979.

## NORWAY

For a description of the mineral resources in Norway and the Norwegian mining and quarrying industry please click here.

## SWEDEN

Kiruna, operated by LKAB, is the world's largest underground iron ore mine with three pelletizing plants. It opened around 1900.

Malmberget is the world's second largest iron ore mine with two pelletizing plants. It opened in 1745.

Svappavaara is an open pit mine for iron ore with one pelletizing plant. It opened in 1965.

Boliden operates base metal, gold and tellur mines in Norrbotten and Västerbotten counties:

- In Norrbotten: Aitik is a gold and copper mine, opened in 1965, and is one of Europe's largest copper mines.
- In Västerbotten: Kristineberg is a lead, copper and zinc mine, opened in 1965; Maurliden is a copper, lead and zinc mine opened in 2000; Renström is a copper, lead and zinc mine opened in 1952; and Kankberg is a gold and tellur mine opened in 1966 and reopened in 2012.

Björkdalsgruvan AB is a gold mine in Björkdal Västerbotten, opened in 1988.

## UNITED STATES

Red Dog Mine is located near Kotzebue, Alaska and is one of the world's largest zinc mines. The mine is owned by NANA Corp, an Alaska Native Corporation, and is operated by Teck. The discovery was made in 1968 and has been producing since 1989.

Kinross Gold - Fort Knox Mine is Alaska's largest surface gold mine. It is located in the Fairbanks North Star Borough. It was discovered in 1894 and began production in 1996.

Hecla Mining - Greens Creek Mine is located in Southeast Alaska and is one of the world's top 10 silver producers. It also produces zinc, gold and lead. It was discovered in 1975 and began producing in 1989.

Coeur Mining, Inc. - Kensington Gold Mine was originally permitted in 2005. In 2017, approximately 640,900 tons of ore were mined, and 19,122 tons of concentrate were shipped to an off-site refinery producing approximately 117,285 ounces of gold.

Northern Star Resources Ltd. - Pogo Mine is located in the interior of Alaska and produces gold 365 days a year in an underground gold mine.

Usibelli Coal Mine was founded in 1943 by Emil Usibelli and is located near the town of Healy in Alaska's interior. This is the only operational coal mine in Alaska.

## GREENLAND

Greenland Ruby officially opened in May 2017. Its ruby and pink sapphire mining operation is located in Aappaluttoq, in southwest Greenland, about 155 miles south of Nuuk, Greenland's capital.

White Mountain (Qaqortorsuaq) is operated by Hudson Resources, Inc. The mine was set to open in the fall of 2018 for mining anorthosite (calcium feldspar). The refined products, greenspar and anocrete, are used to make fiberglass alumina, filler, paint and white cement. The mine is permitted for 50 years and has a current life expectancy of over 100 years.

## RUSSIA

There are over a dozen operating mines in the Russian Arctic including mines for iron, gold, silver, nickel-copper-PGEs, diamonds, platinum/palladium, chromite and rare earth elements. Below are links to a few of the most well-known companies and operations.

- Norilsk is the world's largest nickel-palladium producer
- Polyus Gold is Russia's largest gold producer.
- Kinross Gold has operations in the Russian Far East.
- Polymetal is the second largest gold producer in Russia.
- ALROSA is a global diamond mining company.