

WHAT IS THE MINING LIFECYCLE?

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Aboriginal engagement is an essential component of the mining lifecycle.

First Nations located in the area of a project site hold inherent Aboriginal rights and treaty rights to and over their traditional territory and exercise those rights in their territory and assert certain rights and claims in respect of surface and subsurface rights. First Nations wish to be consulted with respect to the impact of mining projects upon the exercise of their Aboriginal and treaty rights, and have their interests accommodated through a negotiated process with the Crown and the mining company.

The Crown has a duty to consult with Aboriginal communities. This duty flows from the honour of the Crown. The fundamental objective of the modern law of treaty and Aboriginal rights is reconciliation of the rights and interests of Aboriginal peoples with the Crown. This requires that the Crown consult with Aboriginal communities when considering decisions or actions which have the potential to adversely affect treaty and Aboriginal rights as recognized by Section 35 of the Constitution Act, 1982.

While the duty to consult is the Crown's duty, courts have confirmed that the Crown may delegate "procedural aspects" of consultation to third party proponents. Proponents are in the best position to share and discuss information about their proposed projects with Aboriginal communities and to consider ways to adjust their project plans to minimize, avoid or otherwise address any potential adverse impacts identified by communities.

Meaningful consultation and engagement with Aboriginal communities positively supports each phase of the mining process.

MINING LIFECYCLE



EXPLORATION – Life Cycle



EXPLORATION – Prospecting & Claim Staking

A prospector, often a geologist, will explore Crown land by walking through the bush to collect soil and rocks for testing. If the findings from the prospecting are good, a prospector will stake a claim on that land. To do this they must have a license and must go to a mining recorder's office to legally obtain the mineral rights for that land. This means that that prospector, or company, has the rights to explore that land for a certain amount of time but does not mean that they own the land.

EXPLORATION – Drilling

An exploration company will bring in a diamond drill and set it up in an area where they expect there will be minerals in the ground. The set-up includes a drill rig, which includes the large drill with a drill stem that a diamond encrusted drill bit attaches to. The large drill and drill bit are designed to extract a cylindrical (tube-shaped) solid core from the ground in lengths of anywhere up to and over 1km. The solid rock core is usually 3-9cm in diameter and is placed in core boxes that are marked with the location, and depth of the hole.

EXPLORATION – Resource & Reserve Calcs

A 'qualified person' will prepare a material database / report based on geological premises, facts, interpretations and can be broken into resource types.

Measured Resource: A resource whose size, grade and physical characteristics are so well established and can be estimated with sufficient confidence to support production planning and evaluation of the economic viability of the deposit. **Indicated Resource:** Parts of the mineralized body in which the size, grade and physical characteristics of the resource have been estimated from detailed exploration, sampling and testing information is close enough that continuity of mineralization and grade can be reasonably assumed. **Inferred Resource:** A resource whose size and grade have been estimated based on geological evidence and limited sampling data to assume that the mineralized body is continuous.

EXPLORATION – Environmental Assessment

Environmental assessments are intended to identify, predict and mitigate any effects that mining projects may have on the environment. An assessment reviews the mine operations affect on fauna and flora as well as social and economic considerations.

EXPLORATION – Feasibility Assessments

These assessments or studies can vary greatly in degree of detail; ranging from the low level ‘Order of Magnitude’ to the midrange ‘Prefeasibility Study’ to the high level and very detailed ‘Feasibility Study’. These studies are a collection of technical resource information and are presented in report format with drawings and tables.

EXPLORATION – Community Engagement

Through proactive communication, the mine will hold public forums to address concerns and engage communities to build understanding, trust and to identify opportunities. Although important in any community, this model is imperative in remote ones, where mining serves to improve the socio-economic circumstances and stimulating a diversified local economy that will flourish throughout the life of the mine and well beyond.

EVALUATION – Advanced Exploration

If the core samples produce favorable results but additional resource conformation is required a bulk sample maybe required. A bulk sample is when a very large extraction (typically < 1000 tonnes) is mined. The bulk sample can be used to test / evaluate marketability of the resource by examining the mining extraction methods, processing, and material handling.

EVALUATION – Studies

These studies are similar to the exploration studies, differing only in the level of detail. A low level ‘Order of Magnitude’, midrange ‘Prefeasibility Study’ and the high level and the more detailed ‘Feasibility Study’ all have a greater design component and up to 60% of the engineering must be completed to achieve this degree of accuracy.

EVALUATION – Environmental Assessment

As before, the environmental assessment examines a project to determine what the environmental, social, economic and health implications are resulting from the mining activities to a higher degree of detail.

EVALUATION – Mining Engineering

Mining engineering is the theory, science, practice and application of extracting and processing minerals from the environment. At this stage the extracted method is refined to establish a comprehensive mining plan. Mine engineering is carried out throughout the exploration phase and beyond.

EVALUATION – Economic Assessment

A Preliminary Economic Assessment (PEA) study is an economic analysis of the potential viability of mineral resources. The CSA defines that the PEA have two elements that distinguish it from other studies, namely that, by definition it cannot be a PFS or FS and it can only demonstrate the potential viability of mineral resources, not the technical or economic viability of a project.

EVALUATION – Community Engagement

Engagement spans the entire life of a project. It is fundamentally about keeping communities properly informed, and determining under what conditions these stakeholders are willing to support the project. To foster a trusting relationship, engagement should begin as early as possible and continue throughout the mining lifecycle.

EVALUATION – Permitting

The provincial government must ensure that mineral rights and ownership are respected, and that the mining sector is regulated to prevent possible contamination of the natural environment and infringement on the interests of local communities. These latter objectives are accomplished through a system of permits and approvals.

DEVELOPMENT – Infrastructure

The development of a mine is similar to building a town; require roads, bridges, rail, ports / harbors, airport, water treatment, wastewater treatment, fire protection, warehouse buildings, shops, camp / housing, telecommunications, power generation and distribution, fuel storage and distribution.

DEVELOPMENT – Mine Design

The two most common types of mines are open pit and underground mine. The open pit obtains the extraction of the ore from the surface by removing the overburden, blasting and hauling the rock to a stockpile. The underground mineral extraction is subgrade and brought to surface via a ramp or vertical shaft.

DEVELOPMENT – Hoisting Plant Design

Vertical shaft mining requires a hoist to raise the ore from underground. There are a variety of different hoisting types (friction, Blair, double drum and single drum) and the selection of the hoisting type depends on depth of shaft, available budget, schedule, payload and operators experience.

DEVELOPMENT – Mill/Processing Plant Design

Upon extraction of the ore the material must be refined by separating the valuable minerals from the waste rock. This is completed by crushing the material, screening, run through a grinding circuit, material handling and separating. The desirable material is called concentrate and the waste material is called tailings. The tailings are permanently stored in a secure facility at the mine site and can contain 5 to 20 percent of the economic minerals that could not be recovered from the ore.

DEVELOPMENT – Material Storage

After the material is mined it is either discharge into bins or stockpiled to await further processing. After processing the concentrate is stored in tank, covered stockpiles, bins or rail cars. The tailings are transported via conveyors, truck or pumped into tailings impoundments. There are also water storage from the mine water treatment in holding ponds.

DEVELOPMENT – Mining Engineering

At this stage the mining engineer is responsible for the development, operation and maintenance of the mine plan; including mineral extraction methods, extraction rates, material blending, scheduling, additional exploration planning, ventilation and operations evaluation.

DEVELOPMENT – Project Management

The project manager is responsible for planning, organizing, securing, and managing resources to achieve specific mining goals. Responsible for the effective allocation of resources to support the business and successfully execute the project, maintain awareness of potential impacts of the work on the environment and take action to ensure these are minimized and drive succession planning through people development.

DEVELOPMENT – Community Engagement

Communities that are involved in a project are more likely to work toward its success. Entering into a formal agreement with a community affected by a project can provide a competitive advantage to a company by limiting disruptions, reassuring investors and non-governmental organizations, and accessing local labour and knowledge.

PRODUCTION – Mine Production Open Pit & UG

Production of a mining operation, open pit or underground, requires drilling, blasting, ore handling, waste rock handling, mine air ventilation and mine dewatering. Open pit and underground ramp material is either conveyed or transported by large haul trucks. Underground shafts utilize a hoist to transport man and material.

PRODUCTION – Mine Ore Processing

Production rate of a mining operation is dependent on the supply of the ore to and from the material processing plant. Many large-scale mines also have ore processing facilities where extracted ore is sent for processing and various physical or chemical separation processes. Not all mined materials are dangerous, but many heavy metals and naturally radioactive materials that are removed from the earth can be very hazardous to human health.

PRODUCTION – Tailings waste management

The type, amount, and properties of mine waste produced at different mines varies depending on the resource being mined, process technology used, and geology at the mine site. Waste management plans are developed as part of the mine approval process in Canada, and consist of waste storage area selection and design, strategies to address problematic waste, and long-term stabilization of waste as part of mine closure.

PRODUCTION – Environmental Monitoring

It is essential that an environment monitoring program be set up and operated for making well informed decisions about the environment and how it will affect the community. Environmental monitoring is critical to understanding whether the quality of our environment is getting better or worse. Information gathered through environmental monitoring is important to both the mining and local communities.

PRODUCTION – Community Engagement

The goal is to provide lasting benefits to local communities through dedicated programs to enhance economic, environmental, social, educations and health care standards. Once established it is important to continue to maintain strong relationships with the communities surrounding the mine. Community engagement must maintain a high level of transparency, respect and two-way dialogue and to create positive opportunities by establishing mutually beneficial relationships with our local communities.

MINE CLOSURE – Mine Closure Plans

All land affected by mining development activity must be rehabilitated after the activity has finished. A closure plan outlines how the affected land will be rehabilitated and the costs associated with doing so. A closure plan must be developed and acknowledged by the ministry before mine development can begin.

RECLAMATION – Land Restoration

Land reclamation and restoration is designed to meet the increasing demands to manage and restore greenfield and brownfield sites to natural habitat or agricultural use. Reclamation is defined as the process of reconvertng disturbed land to its former or otherwise productive uses. This involves the removal of structures, decontamination and land surface reconstruction such as contouring, soil replacement and revegetation.

MINE CLOSURE & RECLAMATION – Environmental Monitoring

Monitoring programs are used to assess the effectiveness of the reclamation measures and to identify any corrective action that may be needed. In addition, mines may require long-term care and maintenance after mine closure such as ongoing treatment of mine discharge water, periodic monitoring and maintenance of tailings containment structures, and monitoring any ongoing remediation technologies used such as constructed wetlands.

**Thank you for your time and
enjoy the conference.**

QUESTIONS and DISCUSSION