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Operational Needs and Realities in the Search for and Development of a Mine

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1 Introduction

Mines come in all sizes and all types for a myriad of minerals at or in the vicinity of nearly all continental places to one degree or another. The type of mine most likely to raise concerns among the many stakeholders involved is a large mine for non-ferrous or precious metals – copper, lead, zinc, molybdenum among others in the first group and gold, silver, platinum, and palladium in the second – especially if as is commonplace in recent times an open pit excavation is planned. Size alone assures major microeconomic impacts. Surface disturbance of large areas is an inherent environmental impact; ore treatment facilities using toxic chemicals raise the threat of possible damaging secondary impacts.

Many interested eyes turn to any parcel of land that is proposed as the situs of a major mining operation for metallic minerals. Among them may be those of owners of financial interests for whom a successful operation will yield wealth, workers who will gain high-paying jobs, suppliers whose businesses will prosper, local governments whose communities will grow and prosper, and national governments whose economies will benefit. Others such as indigenous peoples, surface or adjoining landowners, citizens of affected communities, and environmental defenders, may focus more upon impacts upon themselves or values they hold, often with alarm.

It is the purpose of this paper to describe the sequence of typical events that lead up to construction of a new mine for non-ferrous or precious metals, the practical and legal needs of the owner of the mineral operating rights for the mine (operator, or mine operator) along the way, and the attendant interactions of the mine operator with other stakeholders in the project.

2 Overview

Undertakings by an established public mining company to find and develop new mineral deposits are motivated of course by the desire to provide a return to its shareholders. There is an awareness both on the part of the company and the community at large, however, that mining operations have a larger significance in terms of meeting mineral needs, protecting the environment, operating an industrial enterprise with importance to local and national economies, generating tax revenues, and providing sustenance to numerous individuals and families constituting the workforce of the company and its contractors and suppliers. Enlightened companies recognize this array of incidental impacts and attempt to conduct operations in such a manner as will generate an overall benefit to affected individuals and institutions and to minimize environmental impacts. Ideally, the industrial operation will provide resources for the local community that will sustain its growth apart from the mining activity during and after its existence. The company itself is only sustainable to the extent that it can be profitable in a manner that responds to the needs of society for the resources it produces.

A mining company is often expected, however, to conduct it operations in a manner that facilitates or is fully compatible with the interests of all stakeholders impacted by a mining project both through operational designs and financial support. In part because of the

whimsicalness of Nature in placing the mineral deposit where it is has been found and in part because of limitations of financial resources, these desires cannot all be met. The best that can usually be had is a formal or informal collaborative process where the desires and capabilities of the participants can be understood and reasonable accommodations reached.

In this regard, it needs to be recognized that the company has a duty to its shareholders and a need based upon good business practices to achieve the objective of mineral production from a proposed mine within a reasonable time frame. Knowledge in advance as to what requirements must be met to achieve that objective and predictability and consistency on the part of governmental entities and other institutions that impose those requirements and control the time line are vital in enabling the company to meet this objective. The company may desire to fulfill its duty as a member of the overall community to respond to local interests and needs in conducting its operations, but as always the task is to settle upon the bounds of reasonableness.

3 Identification of Target Area and Acquisition of Exploration Rights

3.1 Reconnaissance

The process begins with identification of areas with potential for discovery of an economic mineral deposit, a phase of exploration know as reconnaissance. Geology governs the quest. Metallic mineral deposits are most often found in areas where ancient intrusions of molten material into the crust of the earth have been exposed or are near the surface. Although there are numerous exceptions, such conditions are most often found in or on the fringe of mountainous areas where uplifts have elevated and exposed favorable mineral host rocks. A promising target area may be, and often is, identified near the site of prior mining activities, but it may also become apparent through application of exploration methods in previously unmined areas.

Where reconnaissance is successful, localized target areas, commonly referred to as project areas, are identified and singled out for land acquisition efforts and more intense geological investigation.

3.2 Access

Areas with favorable geology within each continent are limited, both quantitatively and legally, and within these limited areas the odds against finding a new commercial mineral deposit are poor. Consequently, access, meaning physical and legal access to the geologically promising areas for exploration and a corresponding ability to secure mining rights in particular areas of interest, is vital.

Access in the first instance derives from the owner of the objective minerals in their natural state (mineral owner). Throughout most of the world the mineral owner as to metallic minerals is the sovereign in one form or another (State). The other extreme is found in the United States of America (U.S.) where because of state policies recognizing private ownership rights prior to attainment of statehood and dispositions of lands, including

mineral rights, by the federal government, metallic minerals are owned privately by individuals or juridical entities, by states, by Indian tribes, and by the Federal Government. In some areas of the world, mineral ownership rights of both the State and grantees of the State have been contested by groups claiming aboriginal rights.

Legal regimes generally exist whereby mineral operating rights, if not outright ownership, can be obtained from the mineral owner by a mineral developer (operator, or mine operator). Acquisition of mineral rights from private owners is usually just a matter of negotiation. Whether such rights are available from the State is a matter of governmental policy expressed in authorizing legislation.

It may be necessary, however, to obtain such rights from a third party to whom mineral operating rights have already been given by the mineral owner, thus establishing two or more tiers of owners to whom the operator must answer. In fact, much of the world's mineral exploration is performed by individuals or small entities who in turn submit their prospects to larger companies with greater technological and financial resources.

Notwithstanding the presence of a legal regime whereunder mineral rights may be obtained from the State, grants of such rights as to particular areas may still be denied because of withdrawals or other prohibitive restrictions. Thus, accessibility is dependent upon both whether application requirements can be met and whether the desired land of is free of restrictions precluding its disposition.

3.3 Terms of the Grant

The initial grant of mineral rights may be an exploration permit or concession, which must later be converted into a mining right or an exploitation concession, or it can be an all encompassing grant such as a mining lease that is applicable through both the exploration and production stages. Most such grants of exploration rights contain similar sets of terms and conditions dealing with initial payments, annual maintenance payments, duration, and the like.

In some countries, the U.S. is an example, both exploration and mining rights can be obtained through self-initiated mining claims. In other jurisdictions, exploration rights can be acquired by self-initiation, but there must later be a conversion to a mining right through exercise of preference rights based upon proof of mineral potential.

Many countries require that the applicant be a citizen or that it be formed under the laws of that country if it is a juridical entity. It may even be necessary to form a separate single-purpose company to hold the mining right especially if the State can reserve equity participation rights such as occurs with contracts of work in Indonesia.

Unless the presence of minerals is already known, initial consideration and annual maintenance costs in an exploration permit or concession should be modest since it is in the interest of both parties that available funds be utilized for exploration operations. To ensure seriousness, the mineral owner will often include escalating work commitments in the exploration grant. A portion of the work commitment may be mandatory.

The term of the exploration permit or concession, considering extension rights, must be long enough to permit the evaluations necessary for conversion to an exploitation right to be made. Practically speaking, time for initial work by the original holder, for negotiations with a more financially capable successor, and for more intense work by the successor, is desirable.

As discussed below, transferability is important since desired development may require participation by a company with greater resources.

Whether included in the initial grant or added later in an exploitation concession or other grant of exploitation rights, the financial and other conditions imposed by the State are critical. At one extreme is the mining location laws of the United States, which permit the holder of a valid self-initiated mining claim on federal lands to hold the claim indefinitely for a modest annual fee and to conduct mining free of any royalty obligation. Although some other nations and some states in the U.S. do not impose royalty burdens, most mineral owners, whether private or public, add such requirements.

Even a relatively small production royalty can be critical to the economic viability of a mine as it often is imposed upon revenues rather than profits, thus causing it to be a direct charge against the operating margin (i.e., "right off the top"). Reasonableness, especially when it influences choices from among investment alternatives, is measured by conformance with typical rates throughout the industry, by the nature of the mineral deposits that exist in the project area, and by overall costs of operations in the project area.

The State itself will sometimes retain also a right to equity participation in any mining operation, usually on a carried basis, and other mineral owners, particularly intermediate owners, will commonly do so. These provisions cause the mineral owner to become a partner of the mineral operator, a status that can have profound political implications if the participating interest holder is the State.

An exploration lease or concession will include rights to use the surface of the affected area if the mineral owner owns or controls the surface. Otherwise, the operator may need to acquire additional rights, such as rights of access across adjoining lands and rights of entry and temporary surface occupancy from surface owners.

4 The Drilling Stage of Exploration

4.1 Nature Of The Drilling Stage

Initial exploration often consists of detailed geologic mapping and sampling. Surface disturbance is minimal and easily reclaimed, thus minimizing the scope of the ancillary surface rights that are needed. Most exploration projects never get beyond this stage. If encouraging geologic conditions are found, however, then a second more significant and much more expensive drilling phase is initiated.

In many jurisdictions, a new factor enters the scene at this stage, the need to obtain a permit from the appropriate governmental entity for the work to be performed on the ground.

Permitting is a means by which a governmental entity gains assurances that public interests are protected from potentially adverse impacts of the exploration operations. Requirements may be perfunctory or burdensome depending upon the jurisdiction. In the U.S., input by members of the public to influence the decision is often allowed. With each increase in the level of operational activities going forward from this stage, a corresponding increase in the intensity of the permitting process will follow.

Faced with a heavy investment that might reveal a valuable or body, the operator now starts looking preliminarily and somewhat hypothetically to the future. Will the potential mine be surface or underground? Will a concentrating facility or leach pads be needed for ore treatment? Will accommodations need to be reached with surface owners? Is water available? Are access corridors available for roads and utilities? What environmental impacts might result and how can they be mitigated? Can opposition by environmental groups by citizen or environmental groups be anticipated? What permits will be required and how difficult will they be to obtain? Are there claims to the area by, or is the area sacred to, any indigenous population groups? And perhaps most importantly, does the currently held operating right include a right to mine and if not, what assurances are there that the exploration right can be converted into an exploitation concession or other mining right?

4.2 Typical Mining Agreements

It is commonplace at this stage for a small entity holding a property that has demonstrated potential sufficient to merit a drilling program to negotiate an agreement with a larger company that has both the technical expertise and financial capacity to take the project to the next stage. Such agreements are often "joint venture agreements" whereunder the larger company bears all costs until a stated level of expenditures has been made or the property has been "proven up", i.e., shown to contain a deposit that can be mined economically by virtue of a feasibility study. In the U.S., Canada, Australia, and some other nations, the joint venture takes the form of a cotenancy joint venture agreement whereby each participant holds an undivided percentage interest in the property and shares costs proportionately. In civil law countries and many other nations, laws require ownership of mining rights by individual or corporate citizens of that country, that do not permit joint ownership of mining rights, or that do not recognize a joint venture as a juridical entity, cause the joint venture to be cast as a corporate entity formed under the laws of the host country. The joint venture agreement is a shareholders agreement whereunder the shareholders are expected to contribute funds in proportion to their percentage shareholding interests.

Corporate and tax laws of the host country affect the workability of the entity that is created. The ability under applicable law to make transfers of all or an undivided percentage of the mining rights is obviously vital to the ability of mining companies to enter into these important contractual arrangements.

4.3 Access And Surface Rights

Progression into the drilling stage will motivate the operator to evaluate further the nature of surface ownership of the target area and of adjoining areas across which access is needed. If areas of the surface are owned or occupied by parties other than the grantor of the mineral rights, acquisition of surface use rights and rights-of-way may be necessary for the conduct

of the drilling operations. Looking ahead, the acquisitions may go so far as to establish a basis for permanent use of all or part of the parcels in question in the event a mining operation is ultimately undertaken.

4.4 Implications of Adverse Probabilities of Drilling Success

It is extremely difficult to make a new discovery of minerals and the investment required to search is highly speculative indeed. Even more daunting are the odds against finding a deposit with high enough grade and low enough mining costs to remain viable through periodic commodity price swing cycles. Justification for such seemingly irresponsible dispositions of capital is provided by the immense gross value of the minerals that can be extracted from the rare ore body that is brought into production.

Fueled mostly by the hope of a find, drilling programs proceed to some degree or another in just about every region where geologic conditions offer promise, notwithstanding problems that may need to be overcome before a mine can be constructed. Usually the same ultimate result is achieved -- no promising mineral intercepts and abandonment of the project. Few people outside of the industry realize how overwhelming the ratio of failures to successes is in the mineral exploration business. Most geologists, no matter how competent they are, spend entire careers without ever being credited with a new discovery that ultimately becomes a mine. Investments with such risk can only be made by contributors of the most speculative of venture capital, such as those who fund one of the many Canadian junior mining companies, or by mining companies who can divert significant amounts of cash flow generated by existing mines. For a mining company with existing operations, the investment is essential, as its continuity and enhancement of the value of its stock can only be achieved if depleting reserves are replaced. For the investor in a small company, the lure is potential dramatic increases in the value of the purchased shares if any kind of success is achieved in finding any prospect with possible, let alone actual, value.

One of the results of the extremely low percentage of successes during the preliminary evaluation and drilling phases is a constant turnover of exploration properties. Therefore it is not cost effective or operationally prudent for the governmental mineral owner to evaluate each application for exploration rights on the basis of the mining activity that might eventually derive from it. The U.S. federal mining laws, which provide for self-initiation of mining claims, is highly efficient in this regard because it allows location and relinquishment of thousands of mining claims each year with a minimum of fuss. On the other hand, failure to do a long-term analysis leaves consideration of the pros and cons of a potential mine in suspense until it becomes a reality. The operator thus proceeds with a greater degree of risk of unforeseen conflicts down the line than would exist if longer term evaluations were performed and public input were received at the outset.

A fundamental dichotomy is thus created between the desires for predictability and the desires for efficiency on the part of the government and the community at large on the one hand and the mining operator on the other hand. Predictability would require advance evaluations of large areas, or at least of areas of exploration interest, and withdrawals or impositions of protective restrictions prior to the issuance of the exploration right. This can and is being done to some degree or another in most places, particularly in the U.S. with respect to vast areas of federal lands. Although increasing the level of predictability for the

operator, advance "zoning" of this type has the result of reducing areas where access will be permitted without necessarily eliminating controversy over a mine that is found in an area that is left "open". If performed on a site specific basis in reaction to an application, an initial suitability review will create both costs and delays that in most instances will be shown to have been unnecessary. How to handle the conflicting considerations bearing upon advance planning for mining is thus a conundrum that plagues both land administrator and mining operator alike.

5 The Planning And Feasibility Study Stage

5.1 The Shift In Focus

Occasionally, the exploration drilling reveals the presence of a mineral deposit showing characteristics that may make it economically recoverable. Extremely high-grade intercepts can cause a mine almost to be a certainty, but this is very rare.

If the discovery is made by a small company, participation by an established company with greater technical and financial resources often occurs either by agreement or by takeover. Because the smaller company often wants to grow as a player in the industry, the contractual arrangement will in many instances provide for joint participation in the manner discussed above.

In any event, a major shift in focus occurs. Additional drilling becomes definitional to determine grade, geologic conditions, metallurgical characteristics, and deposit boundaries. Engineers become involved to begin planning the configuration of a possible mine and to undertake cost analyses. Environmental baseline data is collected so that impacts and remedial measures can be evaluated and permitting requirements can be evaluated. These activities can be expensive, running into many millions of dollars for a large prospective mine.

If operations to this point have taken place under an exploration concession or similar limited grant, it will necessary at this time to convert it to an exploitation concession or other right to proceed with mining. Obviously sufficient assurance that the conversion will be granted must have been given to the mining operation prior to this stage to justify the preliminary investments that have been made. Issuance of exploitation grants may be conditional upon the demonstration of some degree of mining potential but usually such requirements do not go so far as to necessitate a showing that a mining operation is probable. In almost all cases, the holding fees are increased.

5.2 Additional Land And Water Rights Acquisitions

Planning for a mine involves much more that designing the excavation itself, whether it be underground or surface. Any mine requires surface facilities to some degree or another and routes for vehicular and utility access. The surface facilities may be as simple as an equipment storage area and a loading platform for ores from an underground mine or as massive as a complex of haul roads, waste dumps, crushers, conveyors, stockpiles, leach piles, leachate collecting and treatment facilities, mills, concentrators, mill tailings ponds,

electricity substations, explosive storage areas, reservoirs, warehouses, repair shops, assay laboratories, offices, employee change rooms, parking areas, etc. that are typical at a large open pit mine. These are sometimes referred to as "ancillary facilities". If the operator is fortunate, property rights to construct and operate these ancillary facilities will have been granted with the mining right itself; otherwise such property rights may be more difficult and costly to obtain than the mining right.

As definitive drilling and preliminary mine planning take place and the configuration of the mine complex begins to take shape, efforts are undertaken to acquire the lands needed for ancillary facilities, rights of way needed for access, and water rights needed for mining and processing operations. Interaction with governmental regulators increases as information is gathered about permits and approvals that will be needed and the always critical factor of timing. Permits may be needed in respect of the more focused drilling itself and attendant road building and support facility construction.

5.3 Public Involvement

Public announcements trigger interest of the public at large, often for the first time, raising questions and concerns about the possible impacts of the contemplated mining operation. How these concerns are addressed is crucial to the operator as hostile public opposition can delay, or even prevent, ultimate mine construction. Apart from these practical considerations, good community relations are a policy objective for most companies both because of a general desire to act in a public-spirited manner and because of appreciation of the benefits that flow from a supportive public attitude. In addition to activities related to the commencement of mining operations, there will be ongoing interactions between the operator and local residents and governmental entities with respect to operating issues and potential additional permitting relating to expansions.

The situation can be fairly straightforward or quite complex depending upon the setting. Water rights acquisitions in particular can be controversial, as well as difficult and expensive, especially in dry climates such as those prevailing in the Andes region of South America. Water diversions from existing sources, especially surface waters, can cause traditional uses, particularly agricultural uses, to be curtailed, thus displacing water users and changing local economies. A mine operator may have to pay large sums to prior users for such diversion rights and then have to follow up with applications for governmental approvals of the ensuing changes in points of diversion and places of use. If distant sources are involved, easements will also be required for transportation of the water and for storage facilities. Sensitivity on the part of the operator to the impacts of such diversions and proactiveness in addressing the implications thereof on individuals and communities is a vital factor in pursuing sustainable development goals.

5.4 Surface Rights

Measures are generally taken at this stage to secure surface rights and easements for the projected mine and ancillary facilities. This may be a matter of negotiating with surface owners or it may require obtaining additional grants of rights from the State. Since the decision whether to undertake a mining operation will not have been made, agreements with surface owners are often structured as options with respect to outright purchase.

The property of interest may be held by a large number of occupants of small tracts either through ownership or pursuant to leases or permits. In the worst cases, the occupants can be squatters holding possession without legal right. It may not be a necessity at this uncertain stage of the operation to disposses these surface occupants but the ability to do so if the operation goes into a mining phase has to be considered.

Another class of surface occupants whose rights are a mixture of mineral claims and corresponding surface possession includes artisanal and small-scale miners who once again might not have recognizable legal rights. The well-known Garimpieros of Brazil provide an example. Dealings with the rights and claims of small miners may be the responsibility of the State in the first instance relying upon nonconsentual removal by legal process or termination of mining rights as provided by law. The situation can be delicate for the producer, however, upon whom blame will be placed for inadequate compensation or personal losses as to the individuals or small companies involved. Inertia on the part of public officials stemming from political considerations may delay the process.

Acquisitions of rights-of-way and easements for vehicular and utility access across adjoining lands must also be finalized. Concerns about impacts of vehicular traffic, especially if haul trucks are involved, and about lengthy linear surface disturbances, may cause these efforts to be difficult.

5.5 Environmental Impact Analyses

No matter where the property is situated, environmental analyses must be performed during the prefeasibility stage. Initially, baseline data concerning pre-existing conditions are gathered. They relate to such things as air quality, surface and ground water quality, hydrologic conditions, soil and vegetative conditions, wildlife and wildlife habitat, and threatened or endangered species. Impacts upon the baseline conditions from the contemplated operations are evaluated and measured against permissible standards of contamination or disturbance. Designs may be altered to reduce adverse impacts. Finally, a preliminary reclamation plan is designed.

Four groups in particular are considered in the effort that is made to identify and address environmental impacts, to complete a design that will minimize adverse impacts, and to prepare a plan that will achieve responsible reclamation. They are the governmental permitting agencies, the local citizenry, organized environmental protection groups, and the company itself. With respect to the permitting agencies, the objective is to identify substantive and procedural requirements and to ensure that they can be satisfied. With respect to the local citizenry and organized environmental protection groups, an additional effort is made to understand general concerns and philosophical attitudes that may engender opposition no matter how much success is achieved in satisfying legal requirements. With respect to the company, at least if it is a responsible company, application of an environmental ethic that promotes environmental protection conscientiousness at all stages and at all levels to achieve the best practicable results in both operational procedures and reclamation planning, irrespective of legal minimums, is the goal.

Enlightened companies will at this stage initiate discussions with community officials as well as potentially adverse citizen and environmental groups both to promote understanding through accurate information disclosures and to receive input as to problem areas. A formal collaborative process can even be structured. These meetings can lead to negotiations where the mine operator may make commitments to involve community representatives in the planning process, to take measures to provide greater assurances as to feared environmental impacts, and to commit resources to community infrastructure and amenities. They may also include planning for transitions when mining ceases. Success, even partial success, in these undertakings will benefit both the mine operator and the environmental and citizen groups. The operator will reduce or eliminate organized opposition to the project and the community and environmental groups will benefit from the additional environmental safeguards and community support. It is a process that will continue after a decision to construct a mine is made if the feasibility study phase leads to that result.

6 A Decision To Mine

6.1 Preparations For Mining

If all goes well, a feasibility study will be generated that demonstrates the technical and economic viability of a mining operation. Activities begun during the pre-feasibility study evaluation period to set the stage now must be extended to achieve the desired culminating results. Operating plans are finalized, applications for permits are submitted and review procedures are initiated, and land and water acquisitions are completed.

A guiding force at this stage is the securing of financing. If it is to be from external sources, close scrutiny of property rights, permitting requirements, and tax and regulatory regimes will be made on behalf of the lenders to give them knowledge of all pertinent details and assurance that no evident legal or practical impediments exist that might preclude successful completion or operation of the project. Much of this depends upon whether the mine operator can follow up with prior efforts to cause all of the required elements to fall into place.

6.2 Environmental Impact Reviews; Public Scrutiny

Unfortunately, it is only after this stage is reached that insurmountable adverse environmental impacts or public or institutional opposition may put the project in jeopardy. The extent of that threat is affected to some extent by the preparatory work and public relations efforts undertaken by the mine operator in prior stages.

In the U.S., especially if the project is to take place on public lands, all aspects of the proposed project will be scrutinized in the context of an environmental impact study performed under the National Environmental Policy Act. In all cases, corresponding and often overlapping reviews will be performed by independent regulatory agencies of the particular state involved. Among other things, these reviews will consider whether a myriad of environmental protection and reclamation requirements under separate state and federal laws can be met. Ultimately, bonding requirements to assure reclamation will be imposed

upon the mine operator. In one form or another, and to one degree or another, similar requirements are imposed under the laws of most nations throughout the world.

Two subjects of environmental concern stand out. The first relates to the concern shared by the mine operator and the public alike over the potential adverse impacts on water quality that can result from acid drainage created by exposing mineralized rocks, especially those containing sulfur compounds, to the atmosphere and from releases of chemicals utilized in leaching, concentrating, and other ore treatment processes. The concern relates to possibilities of sudden, devastating discharges from breached containment reservoirs or damaged surface protection liners and of more insidious long-term surface and ground water contamination that can result from slow leakages from tailings ponds and leach piles, runoff from waste dumps and ore stockpiles, and continuing exposure of mineralized rocks to the atmosphere in abandoned open pits and underground passages.

Technology has advanced to the point where good design and operational practices and careful reclamation will minimize to acceptable levels, if not essentially eliminate, these threats at most locations. Nonetheless, a legacy of continuing water contamination from old abandoned mines and more recent instances of highly publicized operational failures, such as occurred at the infamous Summitville mine in Colorado, justifiably fuel public concerns and public demands for assurances that no significant risk of such calamities exists in connection with the proposed operation. Unfortunately, the risks, no matter how remote, cannot be absolutely eliminated. Similarly, opposition to a proposed mine for base metals or precious metals where these risks exist often cannot be abated no matter how conscientious the operator is or how compelling the explanations of protective measures to be taken are. In some states in the U.S. public opposition to projects where such risks will exist has led to public referendums on proposals to prohibit certain types of mining, particularly those where cyanide leaching will occur. In one state with a long mining tradition, Montana, such a referendum was passed.

The second concern is more nebulous. It involves an emotional feeling, often deep seated and occasionally faith based, that the subject lands should be left in their natural or current condition and not suffer defacement from the proposed mining operation. In other words, the intangible value of the land in its pristine state (which may include lands already transformed by human occupancy) is believed to exceed the benefits that will be realized from the industrial mining operation. That position above all others is the most difficult for a mine operator to overcome as demonstrations of technical proficiency do not carry the day. Frustration is experienced over the fact that the ore body is where nature placed it, not where the operator chose it to be.

Numerous examples exist where these intangible concerns have either delayed or stymied proposed mining operations, especially in the U.S. Foremost among these is the ill-fated New World Mine just outside the boundaries of Yellowstone Park where the mine operator, buffeted by public opposition, was ultimately forced to sell its properties to the U.S. federal government notwithstanding the possibility that the operator could achieve compliance with permitting and reclamation requirements. Another example is the Imperial Gold Mine in California where permitting has been delayed for years because of a claim by the Quechan Tribe of Indians that indirect impacts of development on unoccupied federal lands will degrade sacred and historic values of the area that sustain the tribe.

It is here that the hidden undercurrents of politics come into play for the decisions that are made ultimately reflect national and local governmental attitudes and policies toward the proposed industrial operations. Jobs are usually the key determinant although considerations such as foreign exchange needs, national prestige, economic multipliers, mineral needs, downstream manufacturing benefits, and foreign trade balances can be powerful influences as well.

The risks to the operator from such opposition are to some extent unavoidable and must be faced at the outset. Unfortunately, the principal way to minimize them and to give greater security to the early exploration investments is to evaluate both physical conditions of and public sentiment as to interesting target areas in advance and stay away from those where the perils are the most pronounced. This gets back to access and shows how legal access does not necessarily equate to practical access.

6.3 Surface Rights Acquisitions

Interaction with local communities and residents increases as previously tentative issues now become real. Those most directly impacted are the occupants of areas that must be cleared of residents for the operation. The process generally involves efforts to achieve mutually acceptable cash payment or relocation agreements and resort to eminent domain condemnation procedures or governmental intervention if they fail. These activities are very delicate as all participants want to avoid hardship and emotional trauma to the affected resident both because of compassion and the desire to avoid perilous adverse publicity.

Direct and indirect rights of the operator to obtain the needed surface areas depend upon the laws of the local jurisdiction. The guiding principle that has governed historically in most locations, but which has been eroded or overruled many places over time, is that the surface estate is subservient to the mineral estate. This principle is manifested in eminent domain laws such as those that exist in the western states of the U.S. whereunder the operator has a private right of action to obtain occupancy of land necessary for the mining operation subject to payment of fair compensation. Where prior surface occupancy exists at the sufferance of the governmental entity involved or pursuant to terminable grants, the governmental entity itself will need to take the necessary action. In some countries such as Brazil, the plight of the surface owner may be turned into opportunity through a statutory right to a production royalty on minerals produced from the acquired land.

The traditional predominant status of mining has been eroded or eliminated in some areas, particularly in the U.S., where permits are conditioned upon prior agreements with affected surface owners.

6.4 Local Community Issues

Issues relevant to the local communities, perhaps ultimately the most vulnerable stake holders, pertain to zoning regulations, housing, public transportation, medical services, educational facilities, utilities, and other items of infrastructure, and the attendant taxes, fees, and costs attendant to the community's ability to provide them. New communities of an unsavory nature akin to mining boom towns of old may also enter the scene. Mutual needs

must be addressed. The company must balance its desire for essential community provided services and a need for a place with employee amenities with a corresponding need to consider what contributions it must make, both in the form of taxes and direct grants and expenditures, to ensure that needs are met. The perspectives may conflict. The operator may expect many things to be provided by the community without additional compensation as part of the community's duty to serve all of its residents. The community on the other hand faces problems of financing expansions of existing infrasture in advance of increases in tax revenues that will provide the necessary funding and difficult decisions as to how much is needed and for how long.

A hard reality of the mining business is that all mines have a limited life span and are vulnerable to premature closures because of adverse financial conditions. In some areas, multiple mines developed over the years such as exist in northern Chile, or mines with long life spans such as the Bingham mine in Utah, will sustain a mine-based economy indefinitely. In other situations, single or even multiple mines with shorter life spans, such as the gold mines of northern Nevada, necessitate advance planning as to what happens when the mining activity declines or ceases. A fundamental issue is whether and to what extent these concerns should be shared by the mine operator with the community and the extent to which the operator should facilitate and assist in advance planning for the time when operations cease. That, of course, is the essence of the concept of sustainable development.

6.5 Governmental Assurances

At this stage the mine operator and its lenders, faced with the attendant risks to an investment often amounting to hundreds of millions of dollars, desire assurance that government granted property rights are secure, that import and export of personnel and equipment can occur, that mineral products can be exported for sale, that freedom of currency selection and movement is assured, and that royalties, taxes, and imposts are stable. Some governments will enter into economic stabilization agreements whereunder the State covenants that necessary permissions to meet operational and financial needs will be given and that the level and nature of taxation and other economic burdens will not be increased.

Governments of lesser developed nations that enter into economic stabilization agreements do so because of the economic and technological advances that may be realized from the major industrial activity. Beyond the natural economic benefits flowing from the industrial activity, the government may demand in return commitments from the mining operator as to preferential hiring of local contractors, training of local citizens, and technology transfers so as to facilitate of individual and regional advancement.

7 Where To Spend The Exploration Dollar

Either before the decision to conduct an active exploration program in a particular area of the world or after opportunities for more intensive drilling investigations become available, the mining company must decide whether initial or further expenditures in that area should be curtailed or made at all. These judgments are based upon numerous factors.

At the outset, countries with nationalistic policies discouraging or prohibiting participation by foreign entities in the development of mineral resources will be avoided. Obviously, those nations that encourage operations by foreign-based entities will be favored. Even where favorable conditions exist, it is still necessary to evaluate the overall political climate in host countries to estimate the likelihood of shifts to more nationalistic legislative agendas and the potential of expropriation. Many nations, motivated in part by a desire to participate in the surge of activities since the 1980's in respect of gold mining, have replaced restrictive nationalistic laws with mining and taxation laws that encourage investments by foreign-based mining companies.

Political stability is obviously important. This is illustrated by the events in Indonesia since the mid-1990's as a dramatic surge in exploration activities quickly subsided in the face of fallout over the demise of the apparently fabulous but sham Bre-X property and general uneasiness over political unrest.

Finally, the regulatory climate must be examined to see if a negative attitude about mining, or at least certain types of mining, exists. If a negative public attitude exists, the result will be a higher level of opposition to mining proposals and more rigorous requirements for obtaining governmental permits. This may be manifested by policies of the party in power either at state or regional levels or at the national level. From time to time, negative governmental policies and public attitudes in certain provinces in Canada and in various states of the U.S., and on the part of the U.S. Federal Government with respect to western public lands, have had profound negative impacts upon the conduct of mineral exploration activities in the affected areas.

Whether to proceed with exploration will also be influenced, of course, by the level of promise that exists for discovery of an ore body that is rich enough to justify proceeding in the face of a high level of unpredictability as to whether if found, it can be mined. Although major ore bodies remain to be found in such picked over areas as the western U.S. and Canada, for example, the prospect for success may be greater in more isolated and lesser developed areas in Africa, Asia, and South America.

The overall impression formed from an evaluation of these vital questions leads to a judgment as to whether the investment is justified in light of the various rights and authorizations that will be needed and the predictability of how much it will cost and how much time it will take to get them and what financial and tax burdens must be faced. If the anticipated expenses are too high or the predictability of timely success is too low, alternative investment opportunities in other areas may be more attractive. Thus it is that some areas, indeed some provinces and nations, are de-prioritized as desirable locations for investment of exploration capital.

Evidence of the impacts of such judgments on a global scale is demonstrated in data showing annual exploration expenditures by region. Dated compiled by the Mineral Economic Group and published in the Mining Engineering magazine (May 2000) shows that expenditures in the U.S. as a percentage of reported exploration budgets for nonfuel mineral targets decreased from about 22% in 1992 to 10% in 1999 while during the same period the percentages applicable to Latin America increased from about 14% to nearly 30%.

8 Summary

It is intended that the foregoing discussion illustrate fundamental concerns of a mining company in the context of a typical, but by no means uniform, scenario of the events leading up to the opening of a mine. The following list converts the concerns into a set of conditions that the mining company would like to see in an area where financial resources are to be expended in the search for and development of a mine:

1. Access to areas with favorable geology for the conduct of exploration.
2. Absence of conflicting claims to mineral ownership from aboriginal groups or others.
3. Ability to obtain exploration rights expeditiously and for nominal initial fees.
4. Reasonable financial and operational terms in grants of exploration rights.
5. Term limits and renewal rights giving adequate time to perform initial evaluations, especially if conversion to an exploitation right requires high financial commitments or demonstration of a commercially viable mineral deposit.
6. Ability to obtain permits for more intense drilling and trenching exploration programs expeditiously and with reasonable conditions and requirements.
7. Access and surface rights for the conduct of exploration either in the grant of exploration rights itself or through negotiation with surface owners and condemnation authority as a fallback position.
8. Ability to transfer a grant of exploration rights so as to involve other entities with greater financial and technical capacities.
9. Exclusivity as to the ability to obtain exploitation rights as to the lands covered by an exploration right.
10. Reasonable conditions for the conversion of exploration rights to exploitation rights and expeditious processing of applications.
11. A mine permitting process that (a) proceeds along a set time line (presuming adequate input by the mining operator), (b) imposes reasonable design and operating requirements according to prevailing industry standards, (c) allows participation by but does not relegate de facto approval and enforcement authority to non-governmental entities, (d) imposes economically and technological practicable reclamation requirements, (e) imposes reasonable bonding requirements, (f) does not provide for discretionary denial if the mining operator otherwise qualifies for the permit.
12. The ability to obtain surface use rights for mining and ancillary activities from a governmental owner and a legal mechanism such as a private right of condemnation to secure surface rights from private owners if negotiations fail.
13. The ability to obtain water rights and utility services.
14. Reasonable tax burdens and enforceable assurances of stability from the State.
15. Local communities that can provide needed housing and governmental services.

A willingness on the part of local citizens and citizen groups and representatives of indigenous populations to work with the mining operator to address sensitive issues and to identify and achieve common goals within reasonable parameters.

9 Conclusion

Ultimately, the major concern of the mining operator, as is demonstrated by the lengthy description above of the entire spectrum of activities from general reconnaissance to an operating mine, is predictability that a mining operation can go forward at the location where minerals might be found so long as fair compensation is paid for necessary property rights and reasonable operating and environmental protection standards can be met. The absolute worst thing that can happen is denial of an opportunity to mine after extensive expenditures over long periods of time with little chance of success and major investments for site specific evaluations have finally identified an economically exploitable mineral deposit.