RESOURCE MANAGEMENT AT HIGHLAND VALLEY COPPER

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Abstract

Resource management in today's setting involves the recognition and basic understanding of the interrelationships and interdependencies within the ecosystem. The successful extraction of mineral resources requires an equally well-structured and results-oriented approach to the land and water management. Land and water management involves establishing baselines of information, carrying out appropriate research, conducting suitable field trials, developing end land use plans, and carrying out the accepted plan.

Consultation and consensus represent new approaches which recognize the multi-use demands on the physical resources of the earth by our society. This integrated resource management approach will serve as the framework for Highland Valley Copper.

L'environnement - présent et futur -
à la Highland Valley Copper

Dans le contexte économique actuel, le succès d'une bonne gestion environnementale exige le temps, l'attention et la coopération de tous les membres de l'organisation. En milieu de travail, ceci représente un défi de créativité en ce qui concerne l'exécution des tâches requises, avec les ressources disponibles et dans le contexte législatif existant. La planification environnementale requiert le développement d'activités à long terme au niveau des opérations et de la régénération, ainsi que l'engagement à les réaliser, ce qui peut avoir un impact sur la rentabilité à court terme. Les exigences en matière de recherche doivent être anticipées et exécutées dans un délai raisonnable. L'analyse critique ainsi que la sélection de tous les produits utilisés dans la mine ne peut être que bénéfique pour l'environnement. La Highland Valley Copper s'efforce à mettre sur pied la recherche et la planification requises pour répondre avec succès au défi posé par l'environnement.
Introduction

Minerals represent but one of the resources which make up the earth. Oftentimes in the pursuit of the business which provides our livelihood, the surroundings become somewhat obscured. The environmental phenomenon now sweeping the world is causing society to reassess those values which are the current standards. Land, water, air, minerals, wildlife, plants, and people are all resources which contribute to the overall well-being of the earth and society. To be successful over time, the needs of the whole must be addressed.

Multi-tasking, multi-discipline, and multi-use are all common buzz words today which reflect the common needs/goals to recognize the importance of addressing the interactions and interdependency in many facets of life. Multiple land use is a term which is used in addressing the various competing interests in the resource debate. Multiple land use is a complex issue for which simple answers are sought.

As the country struggles with the environmental revolution, business most often finds itself the star attraction – a role for which it is often ill-prepared. While loosening the purse strings and attempting to achieve instant remedies is often the initial reaction, the more rational approach recognizes that miracle cures come infrequently and that thoughtful research, careful planning, hard work, and TIME together usually achieve the desired results. Of these four components, TIME is the least clearly appreciated. The maturing period of a tree (80-140 years) doesn't fit well into the 10-20 year life span of a mine.

The Property

Highland Valley Copper is the amalgamation of four distinct mining operations - Bethlehem Copper Corporation; Cominco Ltd.'s, Valley Mine; Lornex Mining Corporation Ltd.; and Highmont Mining Company.

The land which is held under various agreements covers approximately 25,000 hectares. Approximately 6,000 hectares will be disturbed by the mining operation. Two of the four mining areas (Bethlehem and Highmont) are shut down and reclamation work has begun. Reclamation is being carried out on the Lornex site while no work has begun on the Valley site.

Besides covering a significant geographical area, the property has substantial climatic variation. The highest areas to be reclaimed are at 1600 metres and the lowest area is 1100 metres. Freeze-free days can vary from 40 at the Highland plantsite to 80-100 at the western extremity of the
Highland tailings ponds. Precipitation is limited, with high elevation areas on the north side of the valley being moisture deficient, high elevation areas on the south side of the valley having moisture surpluses, and the valley floor being moisture deficient, ranging from -150 mm to -250 mm. Maximum average monthly summer temperatures reach 14 degrees Celsius.

Mineral Resources

The mineral potential of the Highland Valley has been recognized for many years - long before the current operations came into being. The remains of some of the small operations are still evident. Highland Valley Copper plans to complete a comprehensive review of all available geological information and assess the mineral potential on all claims held.

Future exploration work will need to focus, not only on the minerals of economic value, but also on the mineralogy and chemical/physical properties of the rocks. Since economic determination may simply be an arbitrary cut-off grade, the material which may become waste will vary with time. The characteristics of the waste material will impact on the final land management plan for the project.

For the present mining operation, knowledge of the chemical and physical characteristics of the waste rock is essential to the planning process associated with the short- and long-term dump and land reclamation. Certain features such as rapid weathering characteristics and/or low contained metals may make waste rock in certain locations a preferred commodity and, as such, it should be utilized to its best advantage. Since material movement has a cost component, it is essential that all relevant information pertaining to cost evaluation be available and be given due consideration.

Overburden will need to be lab-analysed and field-tested to establish its reclamation potential. Testing of the various components within the overburden mantle on the Valley deposit has indicated varying degrees of suitability, both in texture and in metal content.

Land Resources

The land resources which Highland Valley Copper utilize fall within two Ministry of Forest management districts. Forestry grazing leases for much of the area are held by local ranchers. The valley bottom land which Highland Valley Copper holds in fee simple is also leased to a local rancher.

Reclimation of the available area on the property has been made more difficult because of the free-ranging
cattle. The cattle have quickly learned where the reclaimed areas are, and these areas have become the preferred grazing sites. Highland Valley Copper has found it necessary to fence the Bethlehem and Highmont tailings areas to allow crop establishment. Additional fencing will be required in a number of areas if there is to be a reasonable opportunity for success.

Although full-scale reclamation has only been undertaken within the last five years, it is important to recognize that basic research has been ongoing since the early 1970s. What was missing was the continuity of the process so that each year's results were cumulative in development. Today, there is a good understanding of plant species survival rates and metal uptake capability.

With the development of regularized waste dump plans, the long-term land forms are being established. These land forms will be the basis for the development of alternative land uses and the subsequent vegetative cover. It is essential that no one aspect of the planning process be viewed in isolation. Climate, material type, species suitability, and competing land-use objectives need to be considered.

In developing specific land-use objectives, it is necessary to understand the sequential process by which ecosystems develop. Grasses and legumes may be required initially to stabilize the soil surface and control erosion. In so doing, the soil horizon may be conditioned for the planting of trees ten to fifteen years in the future. During this soil-conditioning period, it may be necessary to restrict the use of the land or, alternatively, provide mineral supplements to the cattle's diets to compensate for inadequate metal ratios in the plants growing on the waste material.

To restate the position, end land use planning cannot be viewed in isolation. An integrated perspective must be applied and reasonable compromises developed. Implicit in this evaluation is the fact that many educational disciplines and many government ministries need to be involved to ensure that a holistic approach is taken.

Since green does not necessarily mean successful reclamation, it is important to identify as early as possible the areas where basic research will need to be applied so that reclamation dollars are not wasted. Successful reclamation must be considered simply as another aspect of the business which must be managed cost-effectively. Present indications are that the evaluation period for the success, or lack thereof, of a reclamation technique may vary from six to ten years, minimum. Given this time frame, it is essential that all people and agencies involved recognize the long-term commitment required to fulfill environmental obligations.
In looking to the future, the diversity of climatic zones combined with the variety of land forms provide many land use possibilities. The tailings land areas have the potential to be used as marshlands, wildlife habitat, open range, seed/forage production and recreation areas.

The waste dump areas with the flat surfaces, ravines, and sheltered and exposed areas have the potential for grazing, wildlife habitat, recreation, and, in some cases, marshlands. It is expected that forest cover will reestablish in some areas.

The open pits have the potential to retain water, while the slopes will reestablish as wildlife habitat.

Water Resources

The region originally had a number of small lakes situated both in the valley floor and in depressions above the valley floor. The Valley mine is situated at what is the height of land between the Pukaist Creek and Witches Brook watersheds. The watersheds from the Highmont, Lornex, and Bethlehem mining areas feed into the Witches Brook/Guichon Creek/Nicola River system, while the streams west of the areas mentioned feed into the Pukaist Creek system. Both watersheds eventually end up in the Thompson River system.

By agreement with the Ministry of Environment, three lakes (Quiltanton, Big Divide, and Twenty-four Mile) were taken out of the regional water system and compensation was paid to enhance the regional fisheries/wildlife habitat. Most of the water within the confines of the mining property is, by licence, used as process water after the downstream users' requirements are met. Dewatering wells surround the Valley mine and are essential for the wall stability of the mine. The well field which was used to service the Bethlehem mill is retained for supplemental feed to the Highland mill.

Water quality information has been gathered for the Highland Valley area for most of the mining activity period. Along with the background environmental studies which have been carried out on an ongoing basis, a good database has been established from which to build. Evaluation of the information already available will help in establishing the direction for the future.

Having identified a number of potential uses for tailings ponds, open pits, and waste dumps the next step is to, where possible, continue testing to establish the practicality of the proposals. Field testing is considered to be an essential part of the verification process. In cooperation with local Ministry of Environment personnel,
and with the guidance of knowledgeable consultants, field tests with fish are being undertaken to develop appropriate research data.

In assessing the marshland/wetland potential, a similar approach is planned. While the details have not been finalized, the intent is to seek out and work with regional groups/agencies who can bring depth and understanding to the problem. Public involvement will form part of the plan development process.

Since water quality and quantity are permitted requirements, it has been, and will continue to be, important that Highland Valley Copper work with the agencies in developing long-range plans which address water management for the region.

In looking to the future, the potential exists to restore much of the previous capacity of the region. The potential water storage and recreational capacity for the region is such that it cannot be overlooked. It may, in fact, be that the final surface area which is available will rival or exceed the initial area. Again, suitable water quality for the agreed end land use will be the governing factor. The tailings ponds have the potential for marshlands, fishing, recreational areas, and storage capacity for irrigation and hydro-electric generating capacity.

The open pits have the potential for irrigation storage capacity, fishing and recreation. Recharge rates and water quality are two unknowns at this time.

The Challenges

As in all endeavours, there is the opportunity to consider each situation as an asset or a detriment. In highlighting the opportunities within the land and water resources after the mineral resources have been removed doesn't mean to belittle currently perceived problems. The reclamation research and operational work done to date have shown that growth is achievable and what species have been most adaptable. This step has been most encouraging.

At this time it is critically important to recognize that basic research needs to be continued in addressing the environmental concerns which are raised. It is also critically important that openness of thinking be encouraged among all educational disciplines towards problem identification and problem-solving, rather than problem-creating. If mining, and metal mining in particular, is to survive these turbulent, environmentally sensitive times, it will be necessary for the industry to become proactive in its approach to research and development. The time has come to act, not react and retreat into a shell.