

Land Use Objectives
for
Mine Land Reclamation
in
British Columbia

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Introduction

It is a pleasure to have the opportunity to address you today to discuss land use objectives as well as to review the progress toward meeting these objectives,

I was recently asked what I would consider to be a perfect year for reclamation in B.C. A perfect year would see:

1. All mines performing immediate reclamation as soon as areas become available.
2. All reclamation done to a high uniform standard, meeting land use and productivity objectives.

While we are not uniformly meeting these criteria throughout the industry, the level of reclamation that the mining industry is achieving has steadily improved.

What is Reclamation?

There are many definitions of reclamation although the one that really matters is outlined in the Mine Reclamation Guidelines issued in March 1984, by the Minister of Energy, Mines and Petroleum Resources. The guidelines require that all lands disturbed by mining shall be left in a neat and tidy condition and reclaimed so that the land and watercourses are left in a manner which ensures an acceptable productive land use consistent with the safety and health of the public.

I do not wish to dwell on what is meant by neat and tidy, except that the phrase covers all the non-land use items such as removing scrap, equipment, and buildings.

There are three key words which describe land use objectives. These are: acceptable, productive, and negotiable.

Land Use Objectives

The guidelines state, "The surface of the land and watercourses shall be reclaimed to a land use that considers the potential use of the land, having regard to its best and fullest use."

Land use objectives are negotiable on a project by project basis. They are proposed by the mine as part of an application for a reclamation permit. This application is reviewed by the Reclamation Advisory Committee, which is a committee chaired by the Chief Inspector of Mines and made up of representation from the Ministries of Energy, Mines and Petroleum Resources; Environment and Parks; Agriculture and Fisheries; and Forests and Lands.

Following the review, recommendations are made to the Minister of Energy, Mines and Petroleum Resources who can approve, reject, or revise and approve with any conditions he sees fit to prescribe. As a result of this review, there could be a possible modification of proposed land use objectives. In recent years, the final land use objectives are clearly stated on each permit.

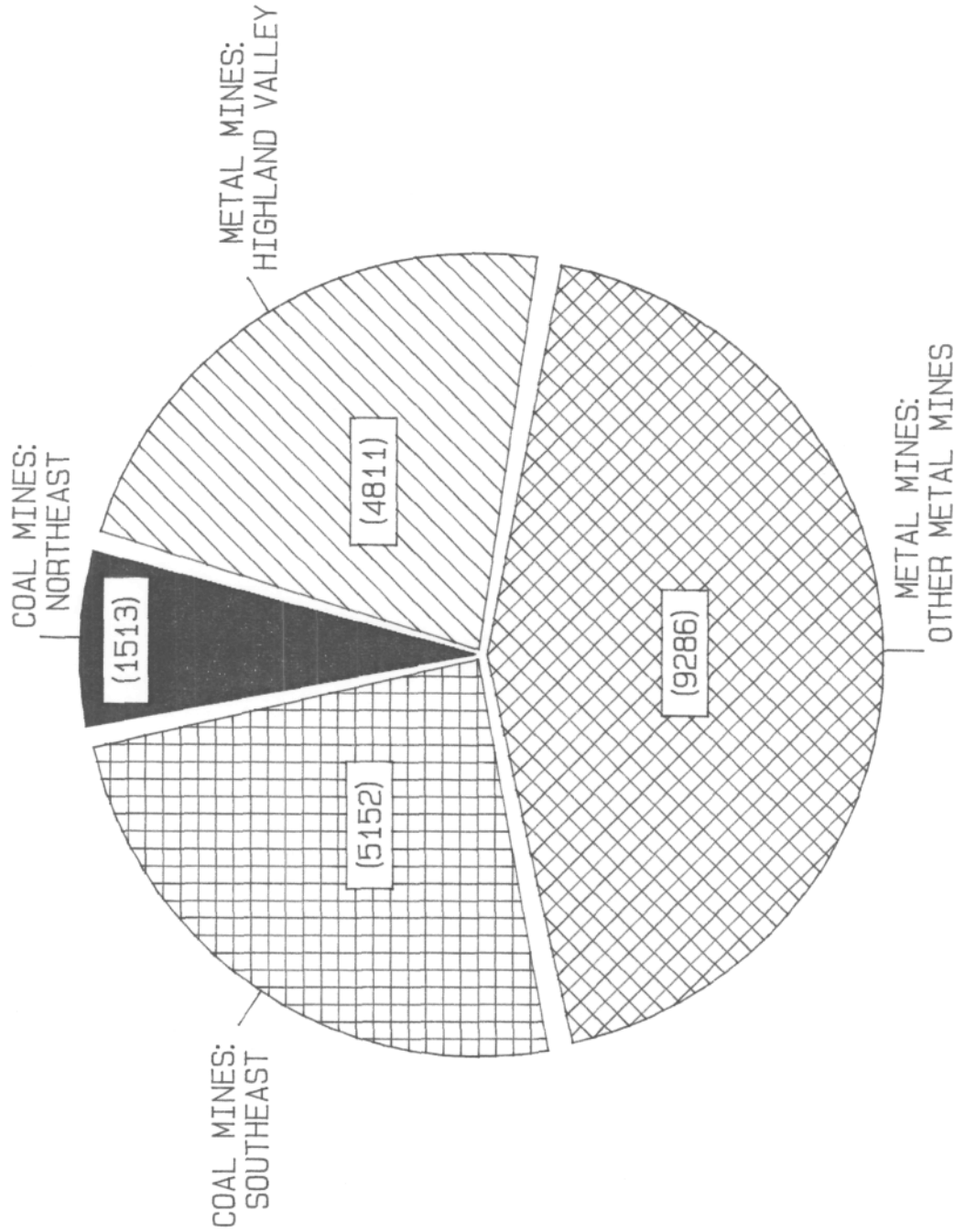
Land Disturbed in British Columbia

Of the 55 mines in British Columbia currently under reclamation permit, the total amount of land disturbed by mining to the end of 1984, was 20,194 hectares (Figure 1). This can be viewed in several ways:

- Coal mines account for 6,665 hectares or 32 percent.
- Metal mines account for 14,097 hectares or 68 percent.
- Coal mines in the Southeast account for 5,152 hectares or 25 percent of all mines in British Columbia.

Figure 1

LAND DISTURBED BY MINING IN B.C., 1984 (20,194 HECTARES)



- Coal mines in the Northeast account for 1,513 hectares or 7 percent of all mines in British Columbia.
- Mines in the Highland Valley account for 4,811 hectares or 23 percent of all mines in British Columbia.
- The Lornex tailings pond covers 1,040 hectares, which is 5 percent of all mine disturbances in British Columbia.

If you look at the relative size of the 55 mines we have under permit, about one-half of these mines are less than 100 hectares (Figure 2). The largest mine is Lornex which is 2,582 hectares. The coal mines tend to be large.

Land Reclaimed in British Columbia

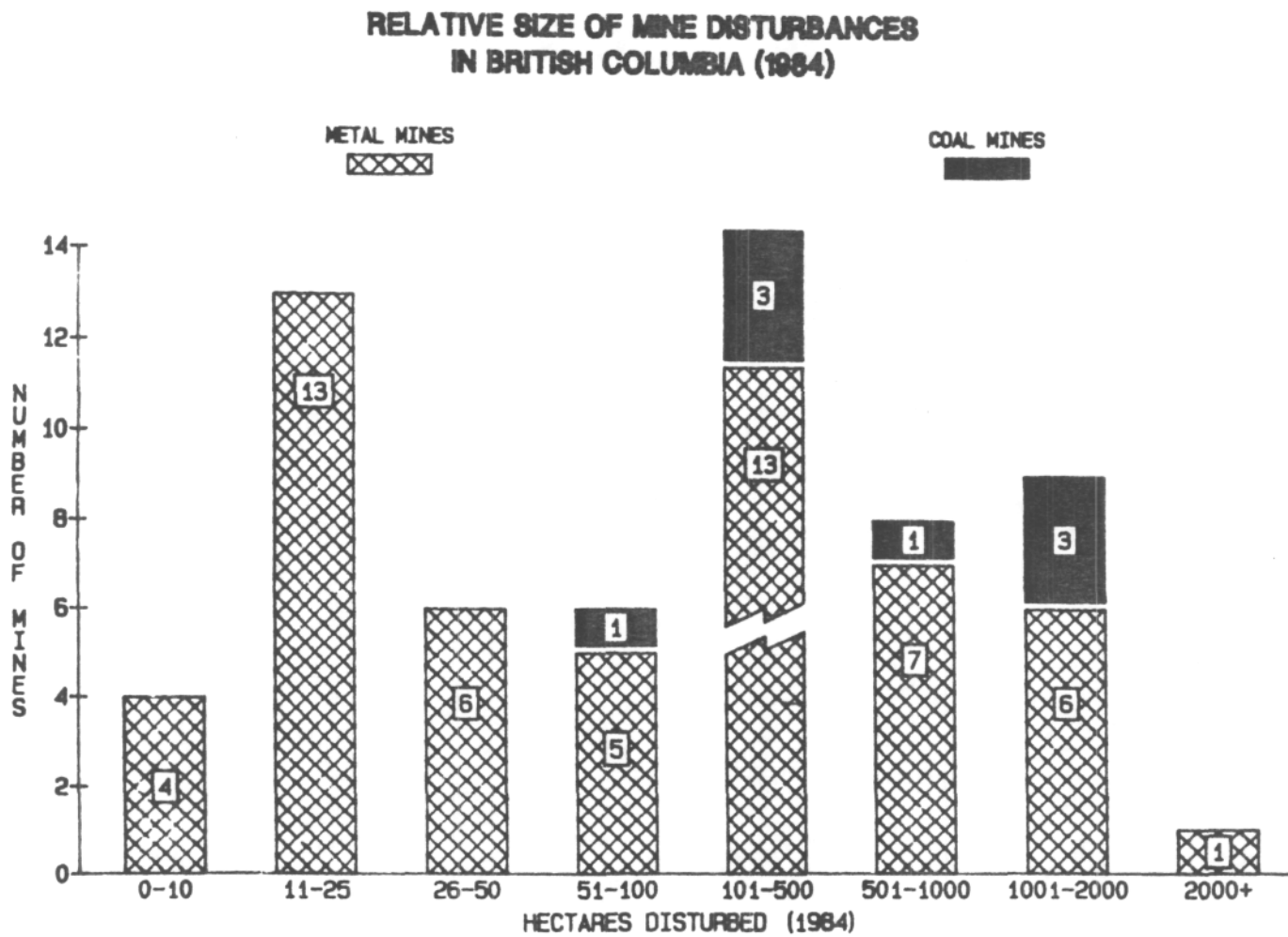
The total amount of land "reclaimed" in British Columbia at the end of 1984, was 3,403 hectares. Reclaimed land in this instance is defined as land where vegetation has been established for a least one year. Therefore, this value probably under-estimates the existing reclaimed land. On the other hand, these figures do not include those mines who have completed reclamation and have had their securities released.

If you compare the total area disturbed and reclaimed from 1982 through 1984, the area reclaimed is increasing at a slightly faster rate each year. In 1982, 13.6 percent of all disturbed land had been reclaimed. In 1983, 15 percent had been reclaimed and in 1984, it was 16.4 percent. Although I am personally not overjoyed by these figures, the trend is in the right direction.

For coal mines, in 1982, 26 percent of their disturbance had been reclaimed. In 1983, this was 27 percent and in 1984, it had dropped to 24 percent.

Metal mines had reclaimed 10 percent of their disturbances in 1982. This increased to 11.3 percent in 1983, and to 12.8 percent in 1984.

Figure 2



In preparing for this talk, we reviewed all reclamation permits and recorded land use objectives which had been proposed for every mine in British Columbia, and then calculated the area which will be reclaimed to each land use (Figure 3). These land objectives are:

Wildlife	36 %
Grazing	12 %
Forest	4 %
Erosion Control	2 %
Industrial	1 %
Not Reel aimable	1 %
Not Specified	1 %

The multiple land use category covers 43 percent of proposed reclaimed areas in British Columbia and covers those mines which envisage several different land uses. They include:

Wildlife and Grazing Forest,
Wildlife and Grazing Forest and
Wildlife Wildlife and Vegetation

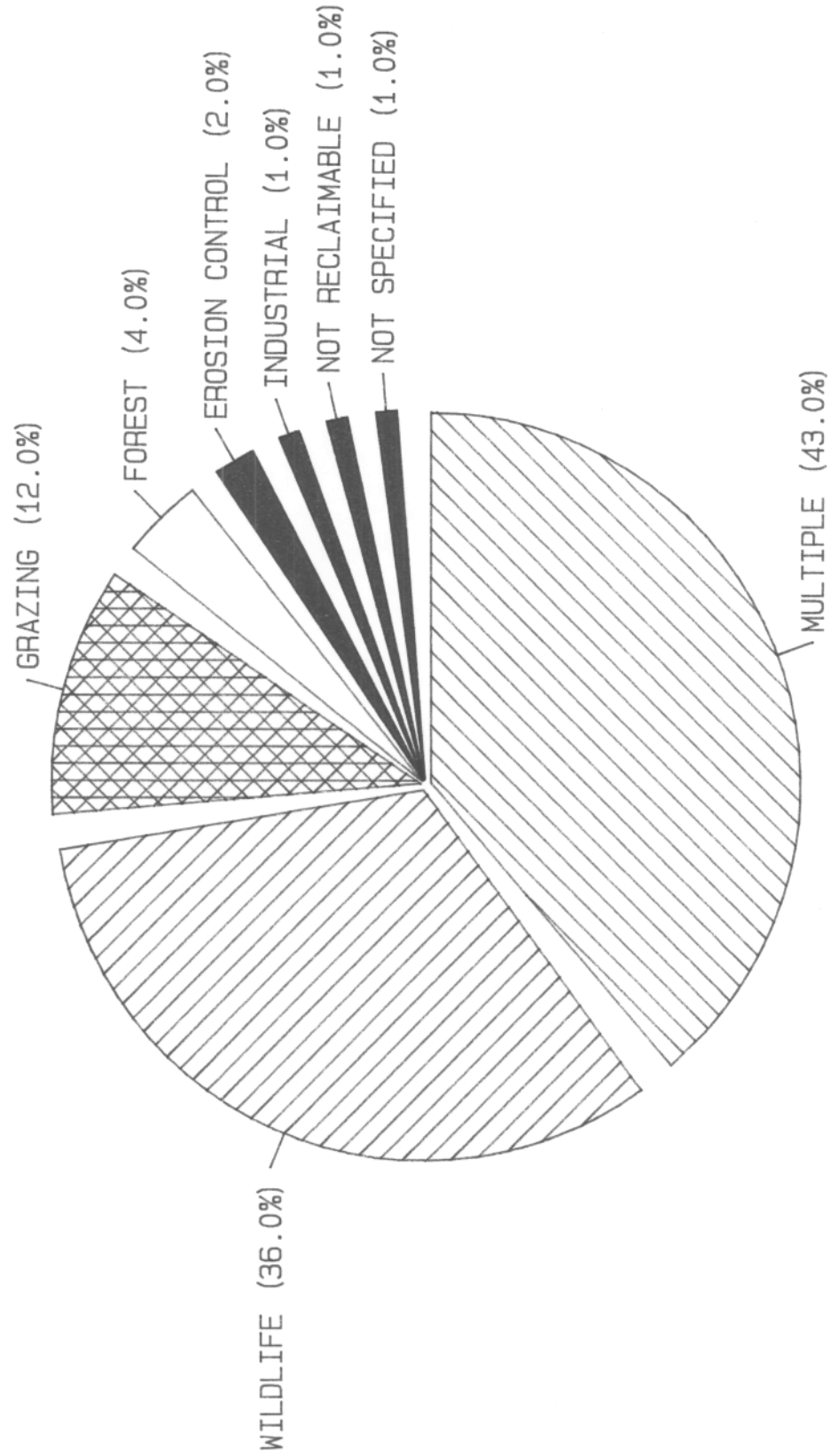
Wildlife Habitat

This land use has been proposed by the largest proportion of mines in British Columbia. It is recorded as wildlife habitat on its own on 36 percent of all mined land and in association with forestry, grazing, or recreation. As a result, 60 to 70 percent of all mined land will be reclaimed to wildlife use.

Wildlife habitat is often regarded as a euphemism for seeding with a grass legume mixture. The creation of wildlife range is not necessarily achieved in this manner. Several mines have evaluated in detail the actual and potential use of reclaimed areas and have modified their programs accordingly. While I

Figure 3

PROPOSED LAND USE OBJECTIVES (%) FOR ALL MINES IN B.C.



do not wish to single out any mine in particular, the coal mines in the East Kootenays have done an excellent job of determining elk and sheep requirements and modifying their reclamation programs to incorporate these needs. The following items should be considered:

1. The use of appropriate forage and browse species. For example, if moose habitat is proposed, then browse species are required. Moose, I am told, do not eat creeping red fescue and alsike clover.
2. A source of palatable water is usually required.
3. Suitable cover for protection will be required. This can be achieved through the use of large boulders or by planting groups of trees.
4. The possibility of metal uptake in plants near metal mines resulting in unsuitable forage of browse must be considered.

Grazing

Grazing land use is proposed for 12 percent of reclaimed area and a fairly large proportion of the multiple use category. I expect that roughly one-quarter of all reclaimed land will return to grazing use.

This land use is readily achieved through the use of agronomic species.

Potential considerations with creating grazing lands are:

1. Cattle will require above normal range management practices to ensure that grazing does not completely destroy fragile areas. It is very likely that fencing will be required to control free range cattle.
2. Fertilization will likely be required in the initial years to maintain and improve productivity.

3. Water sources are necessary and should be considered when planning final watercourse locations.
4. There will be metal uptake in plants near all metal mines and the possibility of toxicities in cattle have to be monitored closely.

Forest Land

Forest land is proposed for approximately 10 to 15 percent of all reclaimed areas. It is proposed primarily on lands which were of relatively higher forest productivity. Most of the mines near the coast have forest as an objective, as well as many of the lower elevation mines in the interior.

While several mines have successfully implemented reforestation programs, many have not.

The major impediments to successful reforestation have been:

1. The lack of adequate planning of reclamation programs.
2. Unsuitable planting stock.
3. Untrained tree planters which have resulted in poor handling and poor planting techniques.
4. Growth of conifers are often inhibited by previously established grass and legume stands. This is especially true where moisture is limiting to plant growth.

Repeated failures of tree planting efforts have led to companies contracting out all facets of tree planting programs with much improved success.

Erosion Control

Although erosion control is an implied objective in virtually all reclamation programs, it only really surfaces as the main objective when all other land use values are so low that it makes no sense to attempt to create any other objective. These mines tend to be in the northern part of the Province in areas of low forest or wildlife value.

Industrial Land

Industrial use is proposed for only two small areas in British Columbia. Texada Island, and the Wolf Mountain plantsite in a gravel pit near Nanaimo.

Not Reclaimable

There are two areas in British Columbia where there were no proposed land use objectives. Indeed these areas were considered to be at too high an elevation to ever support revegetation. For your information, these include Scottie Gold near Granduc and the high elevation areas of the Cassiar mine. Many of you who attended last year's symposium will have heard the presentation from Granduc. That reclamation program involved the removal of all buildings and equipment and was considered reclaimed even though no vegetation was established.

Productivity

The current reclamation guidelines require that, "The level of land productivity to be achieved on reclaimed land shall not be less than existed prior to mining on an average property basis unless the proponent can produce adequate documentation to support the impracticality of this level. Land shall be vegetated to a self-sustaining state using appropriate plant species."

This guideline sets the level of reclamation to be achieved. Whether productivity is capability or actual land use and exactly how productivity is measured will not be covered by me today.

Summary

In conclusion, I have attempted to present to you a general overview of reclamation land use objectives which have been proposed and are being achieved by mines in British Columbia. It has been an interesting exercise for me in preparing this presentation, one which I have enjoyed and one which I hope to do annually.

No talk on land use objectives would be complete without reference to the world famous Butchart Gardens. While the creation of a world famous garden is commendable, most mines can achieve their stated land use objectives in much less dramatic but effective manner.