

AN OVERVIEW OF MINE RECLAMATION IN BRITISH COLUMBIA by

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INTRODUCTION

Prior to the early 60's, mining in British Columbia was largely confined to small underground operations. As a result of the development of large open pit mines in the early 1960's and the commencement of open pit coal mining in 1968, the Government of British Columbia introduced mine reclamation legislation in 1969. In 1973, there were changes to the legislation involving the addition of exploration, placer mines, sand and gravel pits and quarries. Although the legislation has slowly evolved through a series of amendments, the intent of reclamation legislation has remained relatively constant and has been in place in British Columbia for almost 16 years.

Reclamation legislation is now covered under Sections 7, 8, 9, 10 and 11 of the Mines Act. The legislation provides for:

1. A report to be submitted to the Minister of Energy, Mines and Petroleum Resources prior to the commencement of operations.
2. Publication of a Notice of Filing in the B.C. Gazette and a local newspaper.
3. Review of the report by the Reclamation Advisory Committee composed of other resource agencies.
4. A bond not exceeding \$2,500 per hectare of disturbance.
5. Issuance of a Reclamation Permit with such special terms and conditions as the Minister sees fit to prescribe.
6. Continual and progressive reclamation over the life of the mine and the annual submission of a report of the progress of reclamation research and operations.
7. Closure of the mine and forfeiture of the bond in the case of non-compliance with any sections of the Act or Reclamation Permit.

In essence, the approach taken in formulating the legislation was to avoid setting any firm regulations until investigation and research had been carried out by each mining company to determine what could and must be done to adequately reclaim the disturbed land. The Mining Regulation Act stated that the land and watercourses must be reclaimed "to the satisfaction of the Minister". In recognition of the varied geographic and environmental conditions that prevail across the province, the onus was placed on the industry to develop reclamation technology in co-operation with the Ministry of Energy, Mines and Petroleum Resources. This philosophy resulted in the formation of the Technical and Research Committee on Reclamation which is the committee responsible for organizing this symposium.

It was not until 1978, at the Second Annual Reclamation Symposium, when Jake McDonald presented a paper entitled "B.C. Ministry of Mines and

Petroleum Resources Reclamation Policy" that detailed reclamation standards were first presented to the mining industry. His paper contained a set of preliminary reclamation guidelines and essentially formed reclamation working policy for mine reclamation in British Columbia.

Another set of draft guidelines was circulated within government and the Mining Association in early 1982 and this culminated on March 1, 1984, in the issuance of the Mine Reclamation Guidelines, by the Honourable Stephen Rogers.

MINE RECLAMATION GUIDELINES

These guidelines outline the criteria for acceptable reclamation by the Minister pursuant to Sections 7, 8 and 9 of the Mines Act. "Areas 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."

The release of these guidelines last year, elicited considerable response from mine personnel, and I have been asked to continue to evaluate and review the guidelines.

I believe that the message is clear,, reclamation continues to be firm government policy. It is also clear that although high standards of reclamation should be preserved in any review, they should be achieved at a realistic cost to the mining industry.

Land Use

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."

The land use objectives are negotiable on a project by project basis. They are proposed by the mine and are reviewed by the Reclamation Advisory Committee. The final decision is by the Minister. They could be wildlife habitat, forest land, agricultural land, recreational land or any combination of these. Land could be used for residential purposes as often occurs in gravel pits near urban centers.

Productivity

"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."

The reason for this guideline is obvious, it establishes the level of reclamation which is to be achieved. There is a mechanism to permit lower productivity.

There is some question over exactly what is meant by productivity, whether this means capability or actual land use. It can be both. In most instances, capability is the critical issue. If an area supports self sustaining species which are capable of developing into wildlife habitat, this would be satisfactory whether or not it was actually being used.

Use of Suitable Growth Medium

"A growth medium which will satisfy land use and productivity objectives shall be placed on the surface. Where necessary, sufficient topsoil or other suitable growth medium shall be saved for use in reclamation programs."

This section is unnecessary if land use and productivity components are fully understood by the industry. It was inserted, however, to remind mining companies of this obligation to prevent inadvertant deposition of good growth mediums, thus reducing final options. There are numerous instances where the best growth medium has been lost during the first few years of mine development.

Treatment of Structures and Equipment

"All machinery, equipment and building superstructures shall be removed. Exemptions may be granted where buildings are maintained and used for another purpose.

Concrete foundations and slabs may be left intact, provided they are covered by overburden and revegetated unless otherwise approved by the Chief Inspector of Mines.

All scrap material shall be disposed of in a manner acceptable to the Chief Inspector of Mines."

This describes the requirements for removing the obvious man-made structures and describes what is required to be done to be "neat and tidy."

Waste Dumps

The guideline presently states, "All waste dumps shall be reclaimed in accordance with land use objectives. Waste dumps shall be recontoured so that the angle of repose of lift faces does not exceed 27 degrees, unless proved through field-scale trials that land use and productivity objectives can be otherwise achieved."

This section on waste dumps has caused by far the largest response and

because of the cost implications is, no doubt, responsible for the current review of these guidelines.

The requirement to re-slope all waste dumps is not now firm policy. What remains policy is the requirement to reclaim waste dumps in accordance with land use objectives. Actually how this is achieved is up to each mining company, although it may very well mean that resloping will be necessary. If nothing else, the release of these guidelines last year, has brought out in the open, the discussion of waste dump reclamation which must be faced by all mining companies.

Certainly, constructing and leaving long unreclaimed slopes is not acceptable reclamation.

Although resloping may not always be necessary to achieve land use and productivity objectives, resloping certainly has worked well. Examples such as Westar Mining or the Bull River mine show what can be achieved through recontouring programs.

Short lifts covered with glacial till may be another way of achieving land use objectives.

Watercourses

"Drainage of the entire minesite shall be restored either to original watercourses or to new watercourses which will sustain themselves in future without maintenance. The reclamation program shall ensure that long-term water quality is preserved."

Reclamation, therefore, includes the restoration of watercourses, the most striking example being reclamation of the Fording River diversion.

Pits

"Pits shall be backfilled where feasible, and in accordance with approved plans.

Where the pit area will be a lake, a report shall be submitted to the Chief Inspector of Mines outlining the source of water, drainage area, maximum level of water, water quality and future use.

Where the pit floor will be free from water, overburden shall be used to provide sufficient cover to establish vegetation."

Pits are recognized as being a cost of mining. There is no requirement to totally reclaim pits although there is a requirement to revegetate the pit floor or establish a lake.

Tailings Impoundments

"All tailings ponds and impoundment structures shall be reclaimed to the approved land use."

The level nature of tailings ponds makes them ideal candidates for agricultural use although wildlife use is often achieved.

Roads

"Unless otherwise approved by the Chief Inspector of Mines, roads shall be ripped and covered with suitable growth medium and reclaimed to the approved land use."

There are many roads which have been reclaimed as part of waste dump reclamation programs. There are many examples of excellent reclamation work done on exploration roads in the East Kootenays.

Toxic Material

"Waste material which is directly or indirectly harmful to plant and animal life shall be disposed of in a manner which prevents adverse effects. Vegetation shall be monitored for heavy metal uptake to ensure that elevated metal levels do not occur. Completely covering potentially toxic material with glacial till or topsoil may be required."

Metal accumulation continues to be a concern throughout the metal mining industry which may effect the choice of land use objectives. Two examples which have been monitored closely are potential heavy metal uptake at Sullivan and mercury at Pinchi Lake.

Acid Generating Material

"All potential acid generating material shall be disposed of in a manner which prevents acid mine drainage."

This guideline is easier said then done. There are a number of mines in British Columbia which have the potential to generate acid. Later today you will have a presentation of some of the problems of inhibiting and controlling acid mine drainage at Equity Silver.

SUMMARY

The philosophy of the Mines Act, which includes matters related to mine safety and reclamation, is not to tell the industry how to do something but rather to set the standard and let the industry accomplish it in the way most suited to them.

I am most pleased to be the first speaker to have explained what the reclamation requirements are. I leave it now to the remaining speakers many of whom will provide details on their programs.