

RECLAMATION EXPERIENCE:

AN INDUSTRIAL PERSPECTIVE

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ALBERTA CHAPTER

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## 1.0 Introduction:

This presentation is a review of experience in reclamation from an industrial perspective.

The geographical areas of concern are the yellow and white zones of the province where we have seen an evolution of reclamation criteria starting in the early 1970's culminating in those criteria now found in the Development and Reclamation Approvals of Whitewood, Diplomat, Vesta, Paintearth, Montgomery and Highvale Mines.

Because it is important to understand the whole process I will liken it to a football field. The size of the playing field, the location and size of the goal posts, and the length of the goal line, are all important. We will look at the purpose and continuity of the reclamation framework.

How are reclamation objectives established and what are some of their salient features? What are some of the more important problems? Are there any solutions? And, finally, where are we now?

Northrop Frye, one of western society's greatest modern literary critics, stated the following in 1963 to a group of freshmen at Victoria University, "Wisdom and the advancement of knowledge occur when two people lay down their knowledge side by side and exchange information which leads to greater understanding". Hopefully, that is what we are here for today.

The yellow and white zones in Alberta may be characterized in a land use/land capability sense by two types of predominant ownership: private and public.

The dominant uses/capabilities are: Urban, Industrial, Commercial, Agricultural, and Recreational. By far the largest land area is dominated by the agricultural industry. Consequently, most of our reclamation criteria have been agriculturally oriented.

In the 1970's the first publicly announced criterion was "equal to or greater than productivity". Whether the change in emphasis was due to the inherent difficulties in measuring productivity or the confounding of the problem by the effects of management practices, for a time, the emphasis was on "replacement of soil material horizon by horizon". In the early 1980's this evolved into the concept of "same soil physics and chemistry". This concept was published in the form of the "green book" (Alberta Agriculture, 1981). In addition a new emphasis was placed on "flexibility in capability". The concept of "flexibility in capability" has never been expanded. It was first raised in 1976 in "A Coal Development Policy for Alberta" (Government of Alberta, 1976).

Additionally, as a result of the "green book" a few Alberta corporations found a requirement for 3 meters of soil replacement at some of the plains mines. After several meetings and a presentation by a select group of companies, this was reduced to a depth of

one point seven metres (1.70).

Thus by 1985 reclamation criteria included the following major requirements: Slope, Soil physics (texture, bulk density), Soil chemistry (pH, SAR), Soil depth and Land capability. These are the key existing criteria.

What are key steps in the establishment of land reclamation objectives?

## 2.0 The Establishment of Reclamation Objectives:

Objectives start with a clear enunciation of philosophy and policy as are found in the Coal Policy for Alberta (Government of Alberta, 1976). This presents the framework from which guidelines, standards, enforcement criteria and certification criteria are developed. Essential to the overall process is continuity of criteria and content from one level of regulatory process to the next. This can be facilitated by the presentation of requirements which are easily translatable to operational parameters such as: slope, depth of material, ponding and reforestation.

Whatever form the objectives finally take they must be simple, feasible and measurable. In this way, the operator will understand what is required, and the reclamation officer will be able to enforce the standards and guidelines more easily.

Let us now look at some of the major problems facing Albertans involved in reclamation:

What slopes are economically achievable?

What depth of topsoil and subsoil should be replaced?

How should watersheds be handled?

Should ponding occur?

How do land use and land capability relate to one another?

What minimum standards will be required?

Who makes the final land use/land capability decisions?

Because land use and land capability are presently topical, I have chosen to stress this issue.

## 3.0 Land Use/Land Capability:

### 3.1 Problems: The Most Important Problems Related to this Issue Are:

- (i) There exists a jurisdictional overlap requiring an alignment of philosophical approaches and land use requirements between local and provincial authorities.
- (ii) The capability systems presently in existence are not comparable.
- (iii) Land uses and land capabilities need to be ranked for ease of decision making in different areas of the province.
- (iv) Tradeoffs are difficult to make and assess under the existing system.

### 3.1.1 Jurisdiction:

The jurisdictional overlap which I would like to emphasize exists between the Land Surface Conservation and Reclamation Act (LSCRA) and the Planning Act. Another possible conflict, internal to the provincial government, exists between the LSCRA and the Public Lands Act. That is a matter for future consideration.

Above all, industry does not want to get caught between the Department of Environment and local land use authorities such as the Regional Planning Commissions or Counties. Under the LSCRA, the Department is responsible for land capability and the success of reclamation. Under the Planning Act, bodies like the County of Parkland, dictate end use and hence preferred capabilities. The agreements with project proponents are in the form of Industrial Development Permits, Regional Plans and Land-Use-Bylaws. Which legal document takes precedence?

### 3.1.2 Comparability:

In order to compare either land use or land capability the basis of the systems must be the same and the factors compared must be the same. This similarity must be both in type and physical dimensions.

Capabilities for agriculture, forestry, outdoor recreation and sportfish (Brocke, 1977, Alberta Energy and Natural Resources 1983, Archibald et al 1979, Kabzems et al 1972, Anonymous #1, and Alberta Energy and Natural Resources, 1983 (2)) were chosen to illustrate some of the problems (Table 1). If capabilities are not equatable they are not comparable.

The basis of comparison for agriculture and forestry and, most likely, sportfish is a series of limitations to growth of biological organisms. The system for outdoor recreation is based on assets which would enhance outdoor recreation activities. It would appear that these systems use diffe-



rent bases for comparison; assets versus limitations.

On further analysis, it is evident that the climatic factors used in comparing various landscapes are not the same for all capability systems. Agricultural capabilities are based on quantifiable values for precipitation, frost free period and degree days above 42° F, while forestry is based on climatic maps emphasizing precipitation regions. Outdoor recreation and sportfishing show no climatic factors.

Soil is an important factor in the agricultural and forestry capability systems but different factors for texture and moisture are used for comparisons. Neither outdoor recreation nor sportfish systems use these criteria.

Productivity is very important in the forestry capability system. This factor is based on classes of mean annual increment. No reliance on productivity is evident for agricultural, outdoor recreational or sportfishery capabilities.

Topography is quantified by class in agricultural systems, is qualitative for forestry and is not evident in outlines for outdoor recreation and sportfish systems.

Indicator species such as wheat, jack pine and white spruce are important to agriculture and forestry capabilities. No species are mentioned for outdoor recreation and sportfish.

Finally, to further illustrate the differences in systems, other factors are used for outdoor recreation and sportfish. The latter relies on oxygen levels, morphometry and water temperature and turbidity, while the former relies on qualitative abstract concepts of attraction, ability to sustain use and number of improvements required.

Comparability is a problem.

### 3.1.3 Ranking:

Ranking requires some form of land use policy and a methodology which can be used to determine which land use or capability is most important within the project area. Before and after comparisons aid the process but policy directions will provide the basis for giving priorities to land capabilities. The jurisdictional problems between the Land Surface Conservation and Reclamation Act and the Planning Act complicate ranking of capabilities or uses. A clear delineation of preferred uses/capabilities by each agency would point the way to the types of tradeoffs required.

The methodology to be used for ranking has not been addressed to date. It may become more evident when the issue

of tradeoffs is discussed.

#### 3.1.4 Tradeoffs:

My evolution of thought on this topic is still incomplete. Any solution to tradeoffs should be compatible with existing land use policy, should meet society's needs, should consider opportunities for change and should consider the economic benefits and liabilities of the tradeoff.

Without sufficient policy guidelines it is difficult to make tradeoffs acceptable to the decision makers. The fact that Class I, II, and III agricultural lands are to be preserved makes decisions with respect to them easy. The acceptance of 24° end cut slopes also help land use planning. Nevertheless, there are still important tradeoffs to be met.

Is Class IV agricultural land as beneficial as Class I recreational land? Which type of wildlife should one plan for, if at all? Should wildlife habitat be a residual built into grazing and pasture lands? Should opportunities for different capabilities be capitalized on? How does society register its need for different types of land? From the industrialists point of view the land needs to be saleable after reclamation.

When economics are used to justify corporate reclamation decisions, most regulators feel that industry is coping out. At one time this might have seemed true. Now the costs of reclamation and environmental protection measures account for 15-20% of mining capital costs. It is time to assess and consider the relative economic importance of uses and capabilities for the area under consideration.

#### 4.0 Possible Solutions:

##### 4.1 Jurisdiction:

When land use and capability conflicts arise between Recreation and Parks, Fish and Wildlife and Public Lands, the solution appears to be simpler because of the proximity of the three groups. When local authorities are involved the solution is not easy. This is particularly so when innovative concepts are being applied. Communication between agencies, both County and Provincial, would help align their needs.

##### 4.2 Comparability:

Comparability of land uses and capabilities is most difficult using the existing systems. Value judgements, as different as the number of different policy makers involved, need reconciliation on an objective basis. A system

utilizing similar or equitable factors would certainly help in landscape comparisons.

#### 4.3 Ranking:

This could be further aided by the agreement between the proponent and the government on the ranking of land capabilities before a project begins. Where Class I-III agricultural land is of concern it should rank highest.

What next? Is country residential land more valuable municipally than recreation land? A list of capabilities ranked according to their usefulness to man would help establish priorities for decision making.

#### 4.4 Tradeoffs:

The outline of a process suggesting information required for decision making would help in the elucidation of tradeoffs. Some areas have always been predominantly agricultural and always will be. Others are marginal for agriculture but beneficial for recreation. One might ask, "What is the need for such landscapes"?

The acceptability of tradeoffs is highly dependent on the position of various levels of government. Proponents need to be educated about potential land use issues, and the process to be used to address them and the system which would provide comparability. The Integrated Resource Management Plans are a noble attempt at providing focus to land use issues. The start of presentations, workshops and symposia to discuss issues before they become law is highly endorsed. These forums add perspective to the problem and provide nuances and solutions previously buried. The educational interaction needs to be ongoing. It also needs to occur before the finalization of guidelines and standards.

#### 5.0 Conclusions:

Let's recap and summarize this paper. In doing so I would like to touch on: mining as a temporary use, reclamation as evolving concepts and the usefulness of reclaimed land (i.e. Goal Posts).

The economic life of a mine, providing the economy permits it, is 30 years, a little longer than one generation. Land is out of production for 2-4 years. The whole permit area is never totally out of production. This fact is accepted by most of us here and is becoming more accepted by the general public.

The concepts important to the regulation of reclaimed land have been evolving and will continue to evolve. We have gone from emphasis on "equal to or greater than productivity" to emphasis on "capability". As the evolution of concepts relating to reclamation will continue, interim positions must be established. This is

being done by the Department of Environment. At present reclamation criteria are set for five (5) year periods corresponding to periods of renewal for Development and Reclamation Approvals.

The usefulness of reclaimed land can now be documented. Success stories are evident. Swallows have come back to Whitewood. So have deer, coyotes and rodents. Yields of 45 bushels to the acre of certified barley seed have been grown on reclaimed land. Hay production up to 2 tons/acre in areas yielding the same or slightly lower have been obtained on reclaimed land. Sodic areas have yielded 1.5 tons/acre, a value respectable for similar soils in the same area. Reclaimed land can be useful.

Goal posts are required. Industry needs to know what the overall rules of the game are. As much as the administrative levels of government have tried to provide industry with guidelines and standards political priorities have prevailed. Whenever I played football I always knew the rules, where the goal line was and how far I had to run to score points. The big goal of reclamation is certification.

The provision of criteria and government needs will help industry determine its game plan. The requirements for expediting land use decisions include: a well understood process for resolving conflicts and a system which would permit the objective comparison of different land capabilities.



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Table 1 - A Comparison of Capability Systems

Capability Type	Basis	Climate	Soil	Productivity	Topography	Indicator Species	Other
Agriculture	Limitation	Quantitative	Texture* Moisture*	Qualitative	Quantitative	Wheat	_____
Forestry	Limitation	Qualitative	Texture* Moisture*	Quantitative	Qualitative	Jack Pine White Spruce	_____
Outdoor Recreation	Assets	None	None	None	None	None	Attraction. Ability to sustain use. Improvements.
Sportfish	Limitation	None	None	None	None	None	Oxygen Levels. Morphometry. Water temperature. Turbidity.

\* Different parameters measured in different capability types



# PROCEEDINGS

## ALBERTA RECLAMATION CONFERENCES

1985  
Planning and Certification  
of Land Reclamation  
April 16-17, 1985  
Edmonton Inn, Edmonton

1986  
Reclamation in the  
Eastern Slopes of Alberta  
September 25-26, 1986  
Overlander Lodge, Hinton

C.B. Powter  
R.J. Fessenden  
D.G. Walker  
Compilers



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ALBERTA RECLAMATION CONFERENCES

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1985: Planning and Certification of Land Reclamation, April 16-17, 1985,  
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For more information on the Alberta Chapter or the Canadian Land Reclamation Association please write to CLRA, Box 682, Guelph, Ontario, Canada N1H 6L3.

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