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Biophysical Regulation of the British Columbia Coal Industry: The Kaiser Experience

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ABSTRACT

The effectiveness and efficiency of the British Columbian Coal Guidelines Review Process (CGRP) as an environmental assessment process is appraised in this post-project evaluation. All companies wishing to mine in B.C. must obtain approval for development through CGRP. CGRP incorporates both biophysical and socioeconomic assessments. This study is confined to biophysical assessment as a study of socioeconomic assessment has been undertaken separately (Phipps 1987). Environment refers to a variety of concerns affected during the exploration, development, operations, and termination stages of a coal mine: water quantity and quality, air quality, fish and wildlife, agriculture and forestry resources, recreation and esthetics, hazards and noise.

The Kaiser Resources or Westar Mines experience was chosen because Westar developed its Harmer Ridge mine before CGRP while Greenhills went through the process. The study reveals major improvements in the mine development process and environmental regulation and protection over the past fifteen years in B.C.

It is difficult to assess the degree to which CGRP effected the development changes. Historically, coal mine activities were very detrimental to the enuironment. However, improvements in technical Knowledge and greater developer and gouernment experience resulted in significant beneficial changes to enuironmental regulation and quality which were not necessarily due to CGRP. Overall, however, CGRP resulted in improved environmental management, largely because of the

inclusion of previously nonregulated issues, such as wildlife and heritage resources, in the process and the increased degree of government involuement in the early stages of mine development. Recent changes simplified the process but further improvements could be made, particularly with respect to assessment of cumulative impacts.

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ACRONYMS

ALR	Agr icul tural Land Reserve
CGRP	Coal Guide1 ines Review Process
CGSC	Coal Gu idel ines Steer ing Committee
EIA	environmental impact assessment
ELUC	Environment and Land Use Committee
HCB	Her itage Conservation Branch
MAC	Mine site Advisory Committee
MAF	Ministry of Agriculture and Food
MDRP	Mine Development Review Process
MEMPR	Ministry of Energy, Mines and Petroleum Resources
MOE	Ministry of Env ironment (1986 revised: Ministry of Environment and Parks)
MOF	Ministry of Forests (1986 reuised: Ministry of Forests and Lands)
MLPH	Ministry of Lands, Parks and Hous ing (defunct as of fall 1 386)
MTH	Ministry of Transportat ion and Highways
RAC	Reclamation Advisory Committee
TIDSA	Tour ism Industry Development Subs id iary Agreement

BIOPHYSICRL REGULATION OF THE BRITISH COLUMBIA COAL INDUSTRY: THE KAISER EXPERIENCE

INTRODUCTION

Beanlands and Duinker (1983) state that without evaluation of environmental impact assessment (EIA) processes "we will never be able to upgrade our prediction and assessment skills" (p. 33). me purpose of this study is to determine the effectiveness and efficiency of the British Columbian Coal Guidelines Review Process (CGRP), now the Mine Development Review Process (MDRP), in dealing with biophysical assessment concerns. Since 1976, all companies wishing to mine in British Columbia had to obtain approval for development through CORP. CGRP incorporated both biophysical and socioeconomic assessments. This study is confined to biophysical concerns as a companion study has been undertaken on socioeconomic assessment (Phipps 1987). Environment is used in a broad sense and refers to a variety of concerns affected during exploration, development, operation, and termination of a coal mine: water quantity and quality, air quality, fish and wildlife, agriculture, forestry, recreation, esthetics, hazards, and noise.

The Kaiser Resources or Westar Mines experience has been chosen as a focus for the study for continuity, in that Westar has developed coal mines before and after CGRP was implemented. A comparison of the development of the two mines indicates the improvements in the mine development process and environmental regulation and protection as a result of CGRP.

To collect data and information for this study,

interviews were conducted with company representatives, local and provincial government officials and others involved in and affected by the development of both coal mines to assess the impact of CGRP on environmental management. The interviews were conducted both with rag ional representatives of the provincial government in the southeast coal block and with ministry headquarters officials. From this, and other information obtained, it was possible to assess the utility of the provincial assessment process, CGRP. The post-project ● ualuation provided insights into EIA management and decision-making processes as well as suggested improvements in administrative procedures.

PRODUCTION AND EXPORT OF COAL IN BRITISH COLUMBIA

British Columbia is Canada's principle exporter of metallurgical coal, exports nearly 11-million tonnes annually in 1981 and 1982 (Env Cda 1982). Total Canadian production in 1982 amounted to 42.8-million tonnes (Env Cda 1982). Of this, 14-million tonnes were coking or metallurgical grade. Japan was the largest recipient of the exported coal, for use in the steel -manufacturing industry. some thermal coal is shipped from British Columbia to Manitoba, Ontario, and Pacific Rim countries.

Until late 1984, when Denison's Quintette and Teck's Bullmoose mine* opened in the northeast, the only coal producing area in British Columbia *uas* the southeast coal block where approximately 12-million tonnes of metal lurag ical coal was mined annually: the new northeastern mines increased provincial production to 20-million tonnes. The southeastern coal mines have the capacity and proven reserves to produce 20-million tonnes annually.

Coal was first discouered in the southeast in 1873 and mining began in 1897. Average annual coal product ion between 1897 and 1968 uas l-mill *ion* tonnes from five mines at Coal Creek, Morrissey, Corbin, Natal, and Hosmer (BC MOE May 1984~21). The 1960s saw a growing interest in coal deposits of the Elk and Flathead Valleys. There were two reasons for this: (1) the expanding steel-making industry in Japan and (2) the perceived need to moue away from dependency on oil and hydro electricity to meet Canada's energy needs (Cda CEAC 1978:20). The resultant exploration led to the opening of the Kaiser Resources Ltd. Harmer Ridge mine in 1969, Fording Coal Ltd. mine in 1972, and the Byron Creek Call ieries mine in 1974 (BC MOE May 1984:21). In 1980, Westar Mines Ltd.'s Greenhills and Crows Nest Resources Ltd.'s Line Creek mines were approved with product ion beg inning in 1983. The effect of this massiue coal production expansion, from l-million tonnes in 1968 to 15-mi 11 ion tonnes in 1983 (BC MOE May 1984:33), uas to substantial ly increase the value of coal from 0.3 to 3 percent of the provincial export economy (table 1).

Table 1.
VALUE OF BRITISH COLUMBIA EXPORTS TO OTHER COUNTRIES, 1965-1982.
(percentages)

	1965	1970	1972	1976	1980	1982
Forest Products	61	58	61	57	58	51
Minerals	18	18	16	16	15	14
Crude Petroleum & Natural Gas	2	3	3	S	S	4
Coal	0.3	2	3	6	S	9
Fish Products	4	3	4	3	3	4
Others	13	17	13	12	14	18

NOTE: Calculated from table entitled "Foreign Exports of Principal British Columbian Products", B.C. MOFinance (annual).

This almost offset the 10 percent decline in the value of forestry products during the same period. Coal seemed to be, until the past few years, the "new" staple of British Columbia's resource-based economy.

Understandably, such large-scale cxpansion of coal operations in the southeast has affected the cnuironment. Early coal mining operations tended to be underground or localized on small surficial deposits with small equipment. The new mines are, without exception, surficial but on a much larger scale than previously. Oeposits are usually 45 to 85 meters beneath the surface, requiring the removal of massive amounts of overburden or waste material to be reached (BC MOE May 1984:36). The magnitude of problems connected with coal mining in mountainous areas increased significantly. The relatively small waste piles associated with underground mining became mountains of rock and soil to be disposed of, usually by dumping into a valley or rauinc. At the base of the ravine was inevitably a stream or river, a valuable resource in itself, but which also could distribute mine-related pollutants far beyond its boundaries.

The relationship between major mining phases and the mechanisms of impact on land and biological resources (table 2) reveals that the most significant impacts occur within the mine boundaries. However, a number of impacts are induced in the region beyond the mine site, particularly those associated with water quality, air quality, and wildlife changes. The impacts of mining, which occurs on approximately 0.5 percent of British Columbia's land base, are intensive and difficult to manage. A mountain which has been literally "cut down*, or a ravine which has been filled, cannot be reclaimed their original condition. In contrast, forestry logging damage is extensivc, involving

Table 2.

RELATIONSHIP BETWEEN MAJOR MINING PHASES AND IMPACT MECHANISMS ON LAND AND BIOLOGICAL RESOURCES

Impact Mechanisms	Local: Within the site 'mine'[2] — Mining Activity					Regional: Shadow effect beyond the mine site — Mining Activity				
	Development	Extraction - Underground	Extraction - Surface	Beneficiation/Storage	Further Processing - Hydrometallurgical	Development	Extraction - Underground	Extraction - Surface	Beneficiation/Storage	Further Processing - Hydrometallurgical
Surface Disturbance										
Direct removal of soils - subsoil	• •	• •	•	• •	•	•	•			
Vegetational Changes										
Direct removal	• •		• •	•						
Modification of species	• •	•	• •	•	•		•	•	•	
Density changes	• •	•	• •	•	•		•	•	•	
Wildlife Changes										
Loss of habitat	• •	•	• •		•		•	•		
Barrier to movement	• •	•	• •	•	•	•				
Change in Water Quality										
Temperature					• •					
Chemical		• •	•		• •		• •	•	• •	• •
Suspended solids	•	•	•	• •	• •	•	•	•	• •	•
Changes in Water Movement										
Surface	• •	•	• •	• •	• •	•		•		•
Underground	•		• •		•			•		
Change in Air Quality										
Chemical					•					
Particulates	•	•	•	• •		•		•	•	
Microclimate										
Ground Shock	• •		•	• •		•		•	•	

[blank] not expected
. slight
• • 'moderate to major

1. Many potential impacts identified can be reduced significantly by remedial procedures.
2. Includes the area within the mine site boundry and a 1-2 km by buffer zone

(ADAPTED FROM CANADA. ENVIRONMENT CANADA 1984:189.)

large tracts of land, but rehabilitation, through tree-planting, fertilization, thinning, and other treatments, is much more plausible.

A major problem in trying to manage impacts of a mine operation on the environment is that there is no choice as to where the mine can be located: it can only be where the deposit exists. Theoretically, the province could decide to reject an economically viable mine proposal on the basis of other land values, but such a decision has not occurred in British Columbia in relation to coal mines. If the option not to develop has apparently been foreclosed then the:

> mitigation of impact rests with the management of processes and with the restoration of landscapes to a form and biota which will be as little damaging as possible to other landscape and resource values. (Cda CEAC 1978:21)

The implementation of CGRP was the provincial government's response to the need to manage the developmental, operational, and clean-up processes of a coal mine in order to maintain some of the other resource values.

A number of potential land use and environmental constraints to future mine development in the southeast have been identified (table 3) which necessitate closer monitoring of new or expanded development in the area.

Table 3.
POTENTIAL LAND USE AND ENVIRONMENTAL CONSTRAINTS TO FUTURE MINING DEVELOPMENTS IN SOUTHEAST BRITISH COLUMBIA

Probability of future development	high
Agriculture	low
Forestry	low-medium
Urban growth	low
Wildlife/wilderness preservation	high
Tourism and outdoor recreation	high
Fisheries	high
Water quality	medium

SOURCES Adapted from table 55, Env Cda 1982:231.

It is the wild1 ife, fisheries, water qual ity, and outdoor recreat ion values which will be moststrongly affected by future mine development even if it is undertaken with great care. The challenge remains to mitigate the impacts through management of the processes and use of the best technology and Knowledge • xper ience can provide.

ENV IRONMENTAL ASSESSMENT FRAMEWORK

Before analyr ing CGRP, it would be useful to dcf ine anv ironmental impact assessment (EIA) and the components of a good model. Whitney and McLaren (1985) have assessed oar ious EIA methodologies and derived an ideal EIA process. In add it ion, Munn (1982) ident if ied six desirable qual it ies of an cnv ironmental impact assessment method. Melding Whitney and McLaren's framework with the qual it ies Munn suggests will provide a framework for evaluating CORP.

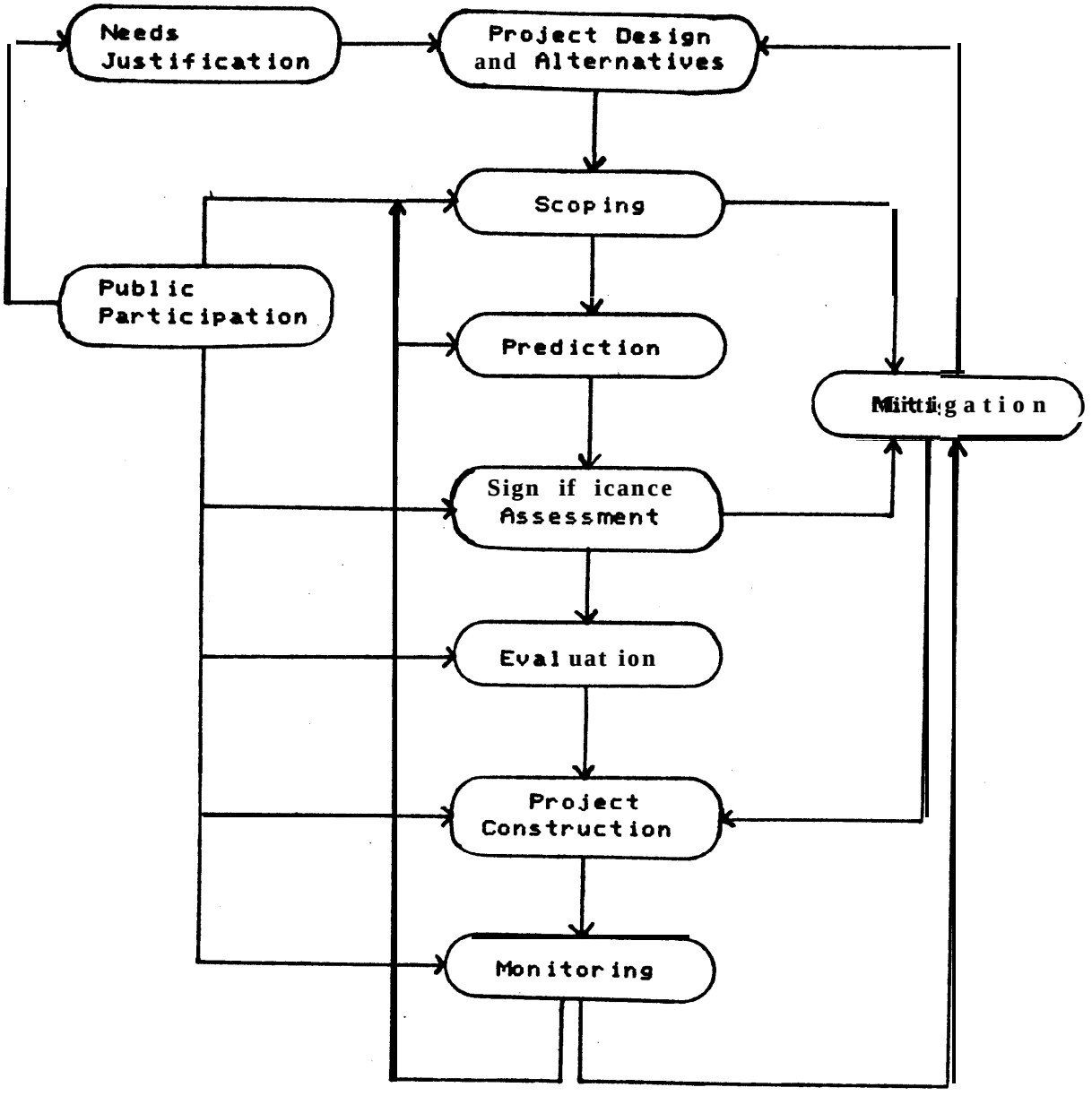
Whitney and McLaren (1985) identify a six-step process (fig. 1) consisting of:

scoping
predict ion
s ign if icance assessment
eval uat ion
monitor ing
mit igat ion.

Two other component5 of EIA methodology are also discussed: public part ic ipat ion and project needs just if icat ion. Publ ic part ic ipat ion forms an important input into the scop ing, sign if icance assessment, eualuat ion, and monitoring sect ions of an EIA. Adequate just if icat ion of the necessity of the project by the proponent should always be included in EIA according to Whitney and. McLaren (1985:4).

Munn out 1 ines six desirable qual it ies of an cnv ironmental impact assessment method: comprehens iv ity, select iv ity , mutual exclusivity, presence of conf idcnce 1 imits in deal ing with uncertainty, object iv ity , and whether or not the project predicts interact ions. Some of these qualities correspond to components in Whitney and McLaren's framework; others reflect on the properties of the EIA itself.

Figure 1.
FLOW DIAGRAM OF AN IDEAL EIA PROCESS.
Source: Whitney and McLaren 1985:3.



Scoping or, in Munn's terms, selectivity, involves the identification of valued environmental components by relevant social groups. The environmental components identified by the public will be disaggregated by analysts into their measurable relevant component parts. Linkages with other environmental components will be discerned. Scoping also involves the establishment of appropriate boundaries for the prediction study which may be administrative, temporal, technical, project, or environmental. Munn (1982) stresses that the EIA method must be comprehensive; the full range of important environmental elements must be detected as well as expected and unexpected impacts. Consideration of mutual exclusivity should also be made. Mutual exclusivity refers to the attempt to avoid double counting of effects and impacts as far as possible, given the extent of environmental intcrrelationships.

Prediction is as an explicit forecast about the future condition of an enuironmental component. Three prediction methods are delineated by Whitney and McLaren (1985:8):

(1) use of previous work carried out on the prediction of the behavior of an enivronmental component in a similar circumstance;

(2) conduct formal research and verify hypothesis of what will happen to the component in the postproject monitoring stage;

(3) use "quick and dirty" methods based on expert judgment or extrapolation of verified predictions from a different development.

Interactions should be predicted for the physical, social, and economic environment. All three authors feel some element of uncertainty should be incorporated into the prediction phase. This is usually done by means of a sensitivity analysis where the impact predictions are qualified with a statistical

Establ ishment of conf idcnce 1 imits in predicting impacts will indicate areas requiring further study or monitor ing. Whitney and McLaren also stress the importance of basal ine studies and the predict ion of basal ine change without the project.

The magnitude of predicted change to enu ironmental components is determined in the significant assessment phase. Often a change in the magnitude of an effect may produce unexpected changes in other parts of the system. Sign if icance assessment should identify interact ions and the ir magnitude. There are a number of criteria used in undertaking significance assessments, including without-project comparisons, cumulative effects, impact durat ion, risk, stab ility and res il ience of • nu ironmental components, their relative magnitude, and qual ity standards <Whitney and McLaren 1985:10).

The evaluat ion stage of the impact assessment compares impacts of each component of the environment to determine the relative importance of each impact. If alternatives are being considered, then the project with the least overall impact is preferred. Whitney and McLaren re-emphasize the importance of hav ins al ternat ives to compare. If a proposal is self -evaluated or evaluated on its own worth , then the environmental and soc ioeconomic costs should be weighed against similar benefits and if the benefits outweigh the costs, the proposal can proceed. A number of methods and their pros and cons to assist the decis ion-maker are enumerated by Whitney and McLaren. Included in the discuss ion are agreggat ion, d isagreggat ion, measurement scal es, and we ighting. The importance of public involvement during the evaluation stage is stressed.

surveillance and effects monitoring. Surveillance ascertains the degree to which the construction and operation of the development comply with the operating guidelines set by the government. Effects monitoring measures actual impacts and compares them with predicted impacts. If the difference between the two is unacceptable, then mitigative measures may be required.

Mitigation can be recommended at stages other than monitoring, namely scoping, if it becomes clear a project will require mitigation in order to proceed, and significance assessment, when adverse environmental impacts are revealed. Mitigative measures can take a number of forms: changes can occur within the project design itself, its location; remedial measures can be applied to the environment; or compensation can be made.

Munn highlights the importance of overall objectivity of an EIA method. Preconceived notions of the assessor, proponent, or government agency should not be automatically supported *by* predictions derived from the method used.

Whitney and McLaren outline the "ideal" framework for impact assessment, realizing that, due to budget or time constraints or project scale, it may not be feasible or appropriate to apply all of the criteria. They suggest that the selection of the elements to be included be based, among other things, upon public goals concerning the environment and its quality, the nature and significance of the predictions made, and the overall evaluation.

EVOLUTION OF ENVIRONMENTAL ASSESSMENT IN BRITISH COLUMBIA

During the 1960s and first half of the 1970s, British Columbia experienced rapid economic growth in the natural resource sector. Several hydroelectric, coal and metal mining projects were developed, without a formal environmental assessment and often without regulatory controls such as site-specific waste or water permits (O'Riordan 1986:663. A range of environmental problems emerged as a result of these developments. In response, the government passed the provincial Environment and Land Use Act (1971) which allowed for the formation of a committee to resolve environmental and development conflicts. The Environment and Land Use Act was used as a tool to develop more specific guidelines for undertaking environmental and socioeconomic impact assessments of major development projects. The Guidelines for Coal Development were published in 1976 (BC ELUC 1976), followed by the Guidelines for Linear Development in 1977 (BC ELUC 1977). The latter guidelines dealt with powerlines and pipelines. Guidelines for other types of industrial and hydroelectric development were also developed but not published (O'Riordan 1986:66). The assessment processes were based on standard environmental impact assessment procedures: a multi-stage process, checklists of evaluation issues, and identification of government and agency contacts,

THE STUDY AREA

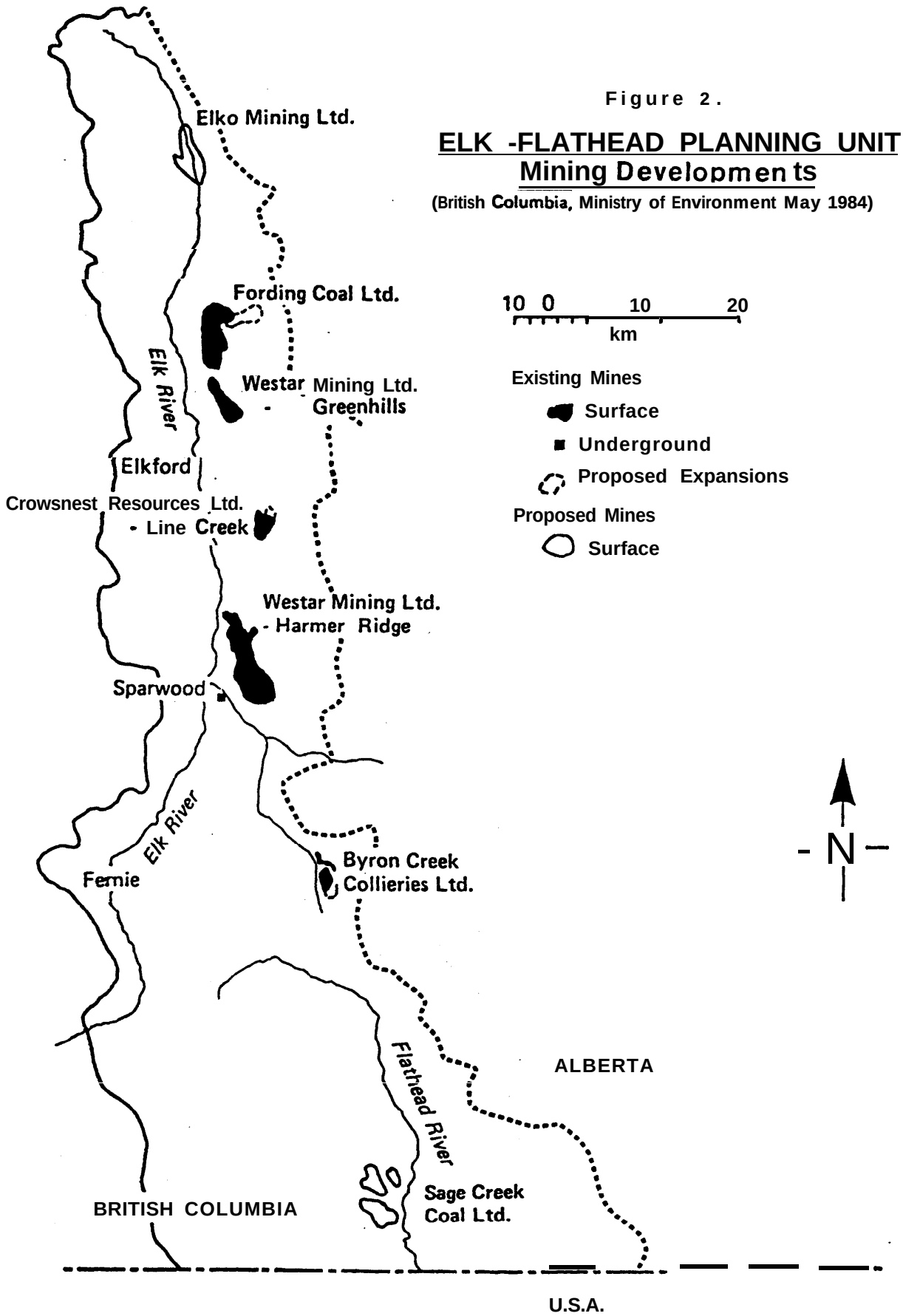
This study focuses on tuo mines located in the southeast coal block: the Harmer Ridge/Elkview Complex, here inaf ter referred to as the Harmer Ridge mine, and the Greenhills mine <fig. 2). Both mines are currently ouned by Westar Mines Ltd., formerly called B.C. Coal Ltd. and, previous to this, Kaiser Resources Ltd. The Harmer Ridge mine was opened by Kaiser in 1969 while the Greenhills operation was opened by Westar in 1983. The Westar operations were chosen as the focus of the study because Harmer Ridge was developed prior to the implementat ion of the CGRP while the Greenhills mine passed through the process.

In 1968, Crous Nest Industries (Shell Resources) and Kaiser Resources entered into an agreement which runs until 2060. It gives Kaiser title to 160,000 acres for the purpose of min ing coal: al 1 other permitting rights belong to Shell (Thorner 1984). Revers ionary rights in the agreement give Shell control over the land when Kaiser ceases to operate or in 2060, uh ichever occurs first (Thorner 1984). Kaiser carried out extensive . exploration between 1968 and 1973 (BC DDE 1976:18). The Harmer Ridge mine and Elkview Preparation Plant were developed in 1969. The principal government contacts were with the Ministry of Energy, Mines and Petroleum Resources (MEMPR) i n Victor ia. The Ministry of Environment (MOE) was Kept informed via Kaiser's progress reports. No formal gu idel ines existed for mine developments at that timer general ly, Kaiser made decisions and apprised the government of them after the fact. A number of the permits for water, air, and effluents discharge were not issued to Kaiser until tuo

Figure 2.

ELK -FLATHEAD PLANNING UNIT
Mining Developments

(British Columbia, Ministry of Environment May 1984)



years after the mine uas in product ion (Mickel son 1984; Mill igan 1984).

By contrast , the Greenhills mine was developed under the Coal Guidelines Review Process. Explorat ion act iv it ies occurred in the Greenhills area throughout an 1 l-year period, from 1969 to 1980, with a project prospectus submitted in 1979 to the Coal Gu idel ines Steer ing Committee (CGSC). Background studies and monitoring programs were conducted for Greenhills: almost none were done for Harmer Ridge. The stage I environmental assessment was submitted in March 1980 and approved in July 1980. The stage II submission was made in January 1981 and stage III permit appl icat ions were submitted shortly thereafter in March 1981 (Bail lergeon 1984). All permits were received by July 1983 (Baillergeon 1984) and the mine commenced production in the fall of that year. Approvals at each stage were given by CGSC.

COAL MINING DEVELOPMENT APPROVAL

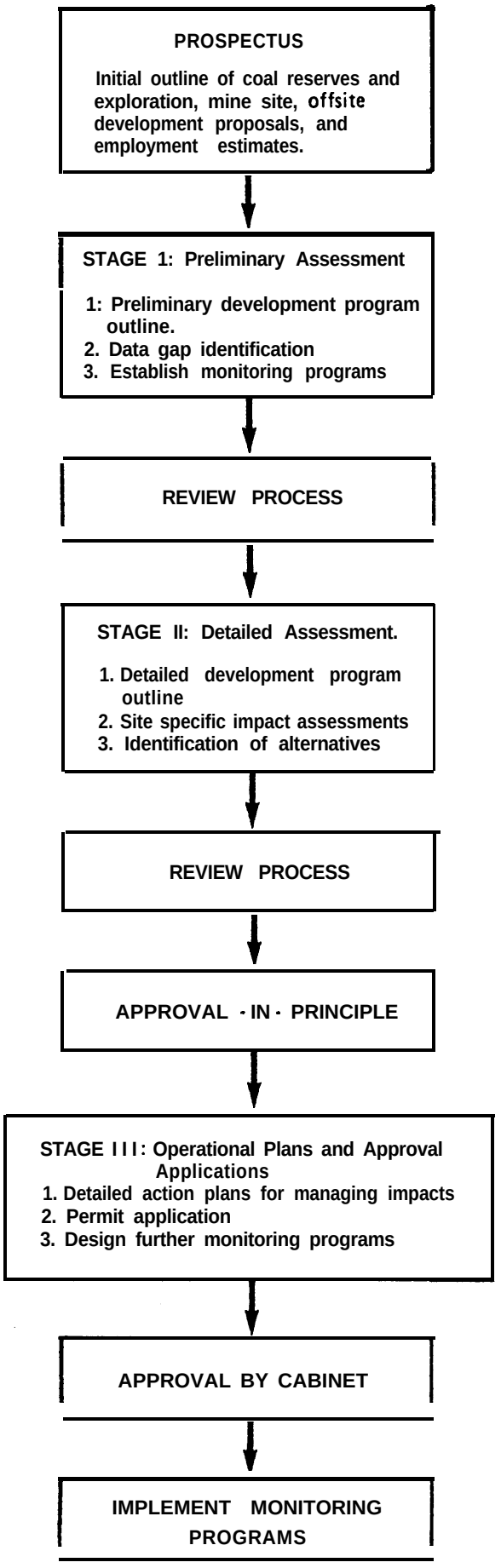
Prior to 1976, British Columbia did not have a coal mine deuelopment policy. Coal mines were developed almost completely under the auspices of the Ministry of Energy, Mines and Petroleum Resources (MEMPR), contact with other ministries took place only when a mining company was apply ins for the permits necessary to operate the mine. The permits obtained from the provincial environmental ministry formed the basis of the air, water, and waste management plans for the mine (Baillergeon 1984). Wildlife, fisheries, recreation, provision of community infrastructure, townsite deuelopment, and heritage resources were not considered.

The implementation of the Coal Guidelines Review Process in 1976 uas the first formal attempt to coordinate the standards, regulations, and monitoring of biophysical and socioeconomic factors influenced by coal mine deuelopment. The procedures manual for CGRP, Guidelines for Coal Development, was administered by the Coal Guidelines Steering Committee (CGSC). CGRP required all coal mine proposals to go through four distinct stages prior to final approval for construction and development: prospectus and stages I, II, and III <fig. 3). Approval-in-principle could not be receiued until three of the four stages were completed. Final approual remained dependent on gaining the necessary permits and licences for operation.

The prospectus submitted by the company functioned primarily as notification to the government of the company's intention to develop a coal property. The prospectus briefly outlined the "coal reserues, exploration, mine site, and

Figure 3.

COAL ASSESSMENT PROCEDURE OF THE COAL GUIDELINES REVIEW PROCESS



(British Columbia ELUC 1975.1

offsite development proposals " (BC ELUC 1976:5) and gave project ions regarding product ion and labor force.

Stage I formed the prel iminary assessment of the proposed project. An initialoutl ine of the probable mine development program impacts was required based, in part, on a matrix in the procedure manual which arrayed the impacts of Possible development act ivities on environmental components. The manual also contained a detailed checkl ist, with information sources , which could be used to identify data gaps requir ing implementat ion of monitor ing programs. Maj or impact5 were al50 ident if ied, assessed, and al ternative solut ions cons idered.

A detailed assessment of the development program formed the bas is of the stage II submission. Site-spec if ic impact assessments for al 1 natural *enu* ironment parameters inuol ued in the mine development were requested, as well as al ternat iue proposal s for managing ident if ied enu ironmental impacts. The use of benefit-cost analysis, where applicable, was encouraged CBC ELUC 1976:8). Acceptance of the stage II submiss ion implied approval - in-pr inc ip le.

The developer still had to obtain various permits and 1 icences in order to proceed with the project. This was done in stage III. Once all of the necessary permits, 1 icences, and leases were obtained, the company was expected to conduct monitoring programs as required by various agencies.

BIOPHYSICAL PARAMETERS

LAND USE AND LAND CAPABILITIES

Agriculture

Agriculture is not significant in the Elk Valley in terms of people employed or number or size of herds (Sasaki 1985). The majority of the agricultural land in the Elk Valley is in Canadian Land Inventory agricultural capability classes of 4 and 5, with "minor components of class 3 and 2 on some: of the better floodplain lands" <Murdoch 1985). Agriculturc is further constrained by the lack of accessibility to inexpensive summer forage - namely Crown range - causing ranchers to rely only on private holdings (Sasaki 1985). The total value of beef ranching, annual livestock, and hay sales has been estimated to be $7 million (Malmberg 1384). Coal mining had a significant impact on agriculture, primarily by providing employment potential for area residcnts, decrcasins emphasis on agricultural activities (Malmberg 1984). Elk and other game species have become "nuisance animals" (Musil 1984) to farmers by feeding on cash crops, or competing with livestock for cattle grazing areas. Other, more subtle, impacts haue occurred: reclamation of mining areas has favored wildlife, leading to a loss of grazing areas: there are increased numbers of non-farming people liuing on ranches, leaving land lying fallow.

The Ministry of Agriculture and Food (MAF) has had little involvement in the with coal deuelopments in the Elk Valley because of their location in the mountains, away from agricultural land. Rlso, since CGRP was implemented, no mine

developments have been proposed in the agricultural land reserve (ALR). A further constraint to MAF involvement exists because most agricultural land in the valley is range land and therefore falls under the Ministry of Forests' jurisdiction. MAF sat as at review agency on the Minesite Advisory Committee (MAC), a CGSC subcommittee, which coordinated intermin istry biophysical and technical rev iews, ident if ied 1icences and permits required, and summar ized major policy issues for CGSC. Principally because of -the mines' locat ions, CGRP has had little impact on agricultural issues in the Elk Valley, al though mining has had the aforementioned indirect impacts.

Recreat ion

The recreat ion potent ial of the Elk Valley area is underrated. Rlthough scenery in the region is very good, the mining history is ignored, the "gateway to the province" 1ocat ion of the southern transprov inc ial highway as a potent ial source of tourism is ignored, and residents are unaware of the recreat ion opportunities in the valley (Witfield 1984). Conversely, there are complaints about recreat ion opportun it ies being impinged upon by too much or too 1 ittle access, hab itat destruct ion, air and water pollution, and increased popu1at ion impacts. The concerns expressed by MLPH are supported by the 1982 Travel Industry Developmennt Subs id iary Agreement (TIDSA) study, The B.C. Rocky Mountain Tour ism Region.

The Ministry of Lands, Parks, and Hous ing (MLPH) had little or no input into coal devel opments prior to CGRP. Subsequently, the Parks and Outdoor Recrert ion Division of MLPH sat on MAC. As a MAC member, the Parks and Outdoor

Recreation Division was primarily concerned with the cumulatiue effects of the several coal mine developments in the region; site-specific impacts were not a major issue (Witfield 1984). MLPH tried to mitigate ouerall impacts of increasing user demand by having coal companies contribute to a fund which could be used to finance additional recreational facilities, expand park boundaries, and establish a neu park. However, MLPH had no legal authority to force the companies to oblige and the recreational base and infrastructure were not enlarged.

Currently, the recreational base of the Elk Valley is adequate to support existing levels of activity. However, it will not support increased numbers of recreationalists who may come to the area and use its fncilities. Sports fishing and wildlife hunting, with the exception of elk hunting, may not support increased numbers of participants without further restrictions on licences and permits (Demarchi 1984; Martin 1984). If some TIDSA recommendations were implemented, facilities would be created to handle the anticipated increase in visitor traffic. This, in combination with some means of accounting for and mitigating cumulative impacts in the vicinity of the Elk Valley, would ensure an adequate recreation resource base in the years to come.

While CGRP has provided the forum for expression of outdoor recreation concerns in British Columbia, it has not created significant benefits for recreation in the southeast coal block (Witfield 1984). MLPH did not have legislative power to enforce compliance with its wishes and, therefore, was not able to achieve its goals. There is evidence to suggest that if the provincial government had wanted to

obtain these goals, they may have been achieved. This was the case in the northeastern British Columbia coal mine developments, where the Parks and Outdoor Recreat ion Division sought the establ ishment of several parks and reserves. Trade-offs were made between the provincial government and the coal companies which saw the parks • stabl ished (Macaulay 1987).

Forestry

The value of coal mining and forestry to the Elk Val ley economy is est imated to be within 5 to 18 percent of being equal (Cullum 1984). There has been cumulative pressure on the forest resource base from all industrial sectors in the Elk Valley (Dominy 1984). The Ministry of Forests (MOF) priority, when presented with a proposed development on pr iuate or public forest land, is to salvage merchantable timber if there is enough lead time. Reclamation is not a forestry concern until a pit site is abandoned. MOF involvement in mine development has not been much affected by CGRP. MOF had already been involved in the coal mine development process from exploration through to reclamat ion as a permit-issuing agency prior to CGRP. A timber removal permit was required to cut down trees for exploration roads and to remove timber before commencement of mine operations. MOF sat as a review agency on MAC and is still a member of Reclamation Rdv isory Committee which reports to MEMPR on reclamation applicat ions and plans submitted by coal companies. Overall, the impact of coal mining on the forest resource base has been minimal, due to the relatively small amount of land utilized by the coal mines and because the mines are located in subalpine and alp ine regions where

forest cover is often sparse.

Wild1 ife

mere are s ign if icant hunting and nonhunting uses of uildlife in the Elk Valley. The big game species most sought after by both user groups is elk, followed by mule and white-tailed deer, moose, big horn sheep, and waterfowl. Most residents believe elk should receive the most attent ion for hab itat enhancement and restoration (MOE and MLPH, May 1982: 133, 153).

Prior to implementation of CGRP, there was no means for Min istry of Enu ironment (MOE) involuement in proposed coal mines with respect to wild1 ife. Harmer Ridge was explored and developed with no potential wild1 ife study: as a result, valuable winter range was destroyed. Fish and Wildlife Branch inuolvement allowed for data collection and monitoring of wild1 ife to occur. Follow u p programs related to inf ormat ion collected through observation and monitor ing cannot be implemented g iven the authority of the Fish and Wild1 ife Branch.

The cumulat ive impacts of both mining and reclamation in the Elk Valley are beg inning to be discerned. Disrupt ion of migrat ion routes and winter range has led to concentrations of an imals, particularly elk, on mine properties and agricultural land, where they have interfered with mine and ranch act iv it ies. To compound this problem, mine reclamation programs continue to be targeted toward further increases of the elk Population. MOE developed the Elk-Flathead Strategic Management Plan (May 1984) which attempts to deal with cumulat ive effects of development in the region. Objectives and standards are set out for a number of areas including

wildlife, fisher ies, water qual ity and quantity, and air quality. However, MOE 1acks legislative jurisdiction to force compliance with this plan. Despite this, an agreement was reached between coal mine and MOE officials in 1386 to cooperate in an effort to attain some of the wildlife goals in the strategic plan (Dick 1986).

CGRP permitted wildlife considerations enter into mine deuelopment plans for the first time. Through the process, studies and monitor ins programs could be in it iated and mit igat iue measures undertaken to some extent. Limitat ions to the effective use of the information collected cannot be blamed on CGRP but rather on the legislative and financial constraints of the wildlife branch.

NO ISE

No ise levels have not been' a major concern in the southeast coal block, as all of the mines have been developed in the mountains far removed from the surround ing communities. Therefore, CGRP did not have an effect on how mine noise was treated.

WATER RESOURCES

Quantity

Water quantity or supply management in southeastern Br it ish Columbia changed 1 ittle between the deuelopment of Harmer Ridge and Greenhills projects (Fellman 1985). The water and waste management branches of MOE were responsible for issu ing effluent and waste permits and water licences before CGRP. The primary concern regarding water quant ity has been that there be enough water present to supply all uses, a goal which is currently being met. With CGRP, more

background information such as a hydrological studies, water quality surveys, and streamf low gauging, was requ i'red prior to development of a water management plan.

ity.l

Thtre was a general consensus by Westar, other coal compan its, and government agenc its that a trend toward improved uattr quality txisttd in the Elk Valley, despite the fact that receiving uater quality cannot be 1icenced. Insttad, the government stud ied the receiving water conditions and changed effluent and stdiment load allowances in tfflutnt and waste permits to achieve the desired water quality. New knowledge and technology also resulted in more stringent cond it ions be ing introduced into the permits.

Sed imentat ion of creeks and rivers was originally a major problem, primarily due to a lack of experience by government and company personnel in deal ins with mountain-top coal mining (fig. 4). The construct ion of dams and settlement ponds al 1 ev iated this concern. Suspended sol id objectives of 10 mg/1 are now included in the companies' effluent permits. Prov inc ial object ives are 25-50 mg/1, indicating the effect iueness of the regional water management program.

Nitrate and nitrite loading of the water due to mining has also been a problem, particularly with Fording and Greenhills. However, the concentration of these elements in the r iuers has not been lethal to fish or humans (fig.5). The amount of nitrogen and its compounds that enter the wattr has been reduced by dry blasting and dewattring of blast holes prior to loading explosives. Ammon ia concentrat ions, a nitrogen compound, have been decreasing in the Michel and

Figure 4.

SUSPENDED SOLIDS IN THE ELK RIVER.

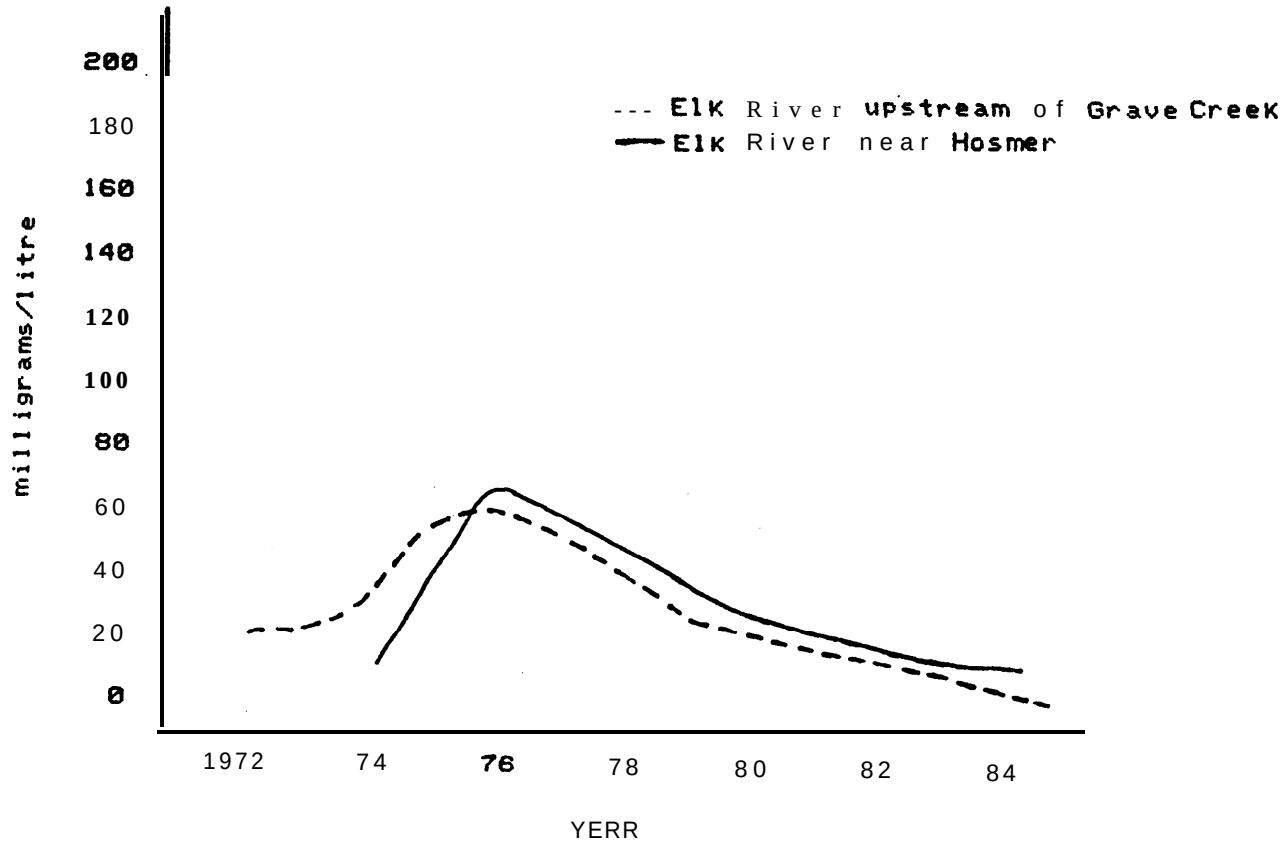
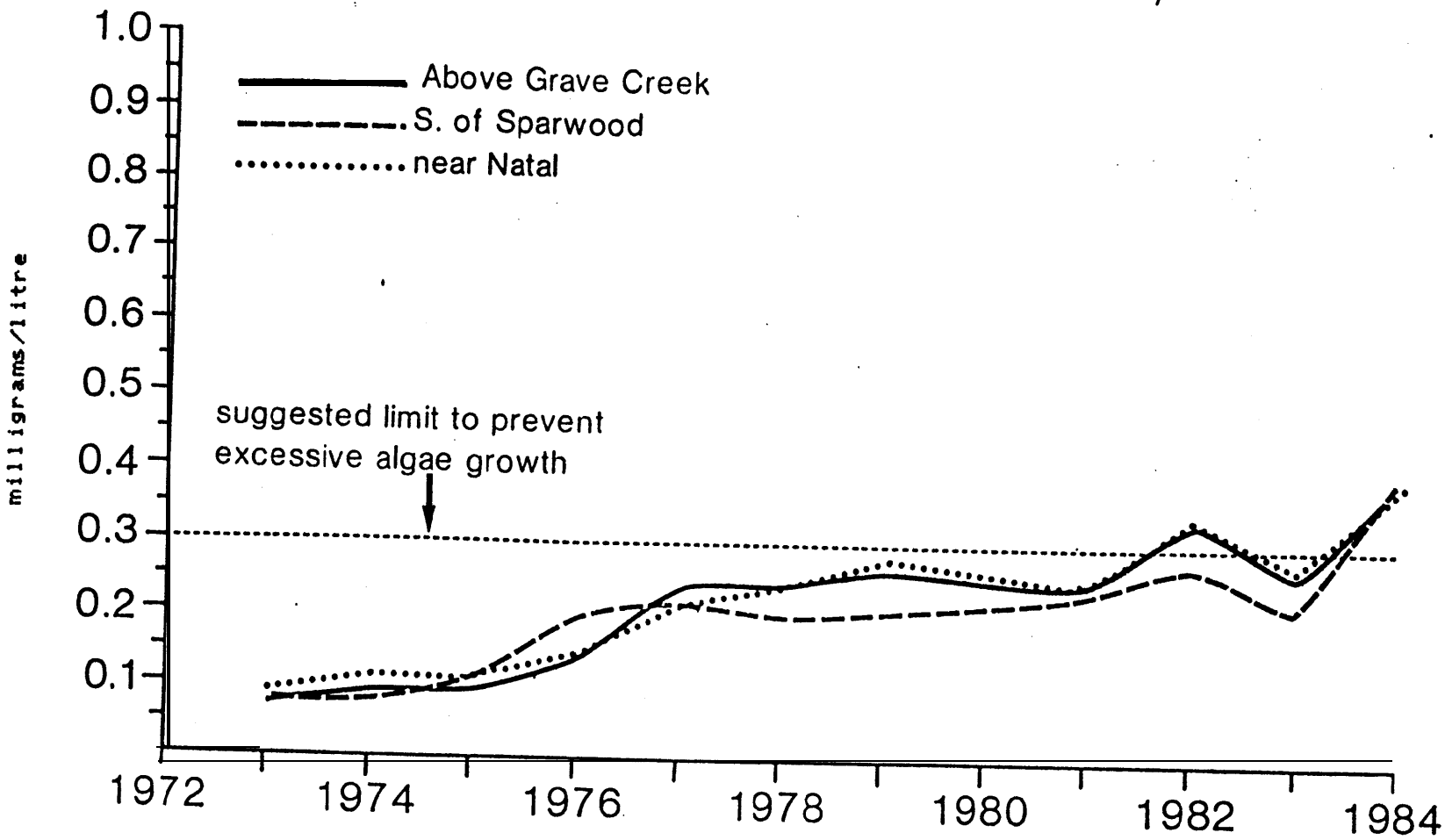


Figure 5.

MEAN NITRATE & NITRITE LEVELS, ELK RIVER: 1973 - 1984

(B.C., Environment Jan. 1984 and Westar 1984)



Natal area (Fig. 6) because of the closure of the Michel coke ovens and a clean up program implemented by Westar.

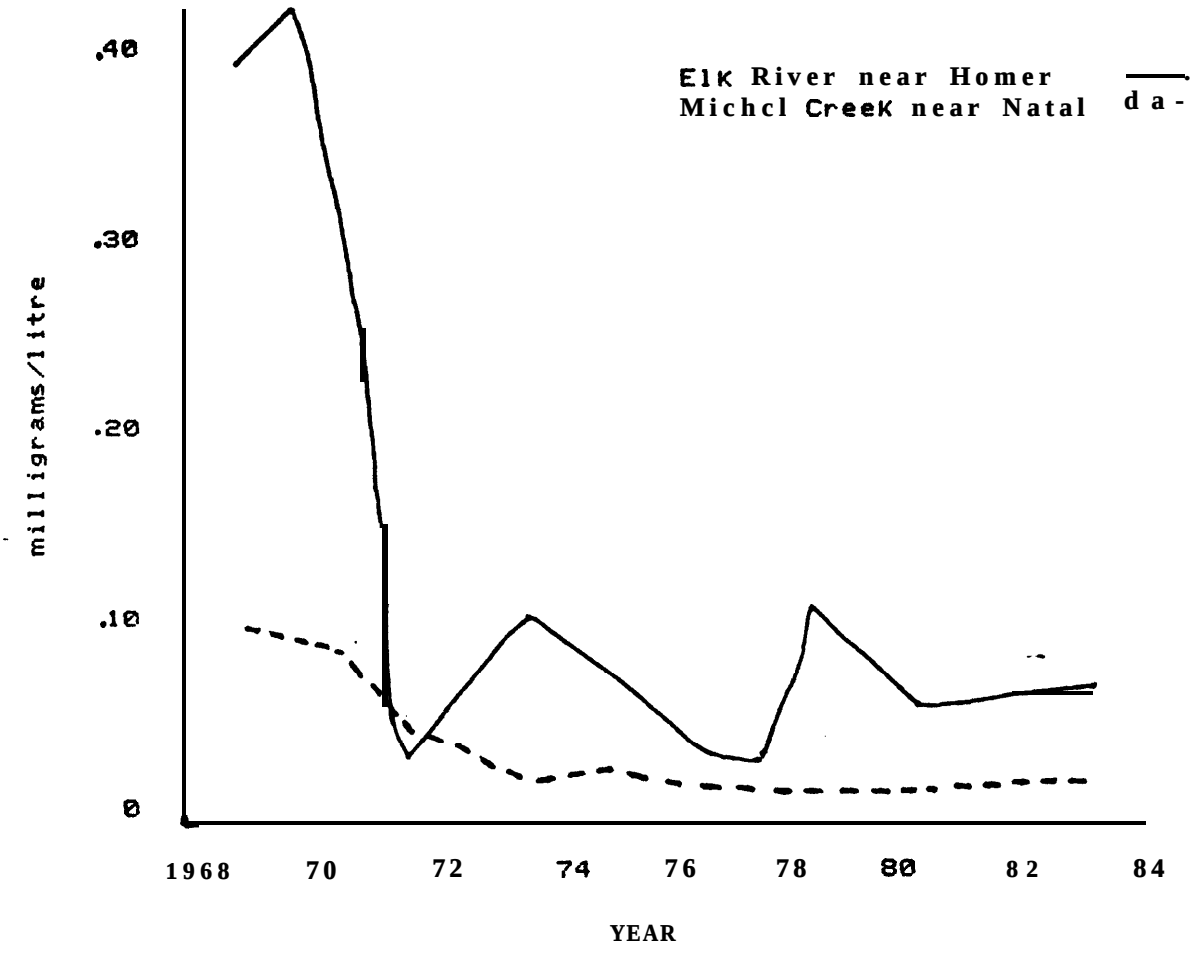
General ly, early involvement permitted by the existence of CGRP in the Greenhills development allowed the government to ass ist Westar i n planning its project. Extens ive background mon itoring and enu ironmental studies were completed before permit cond it ions were rat in stage I II. Potent ial problems, such as sediment loading, were avoided by early planning.

FISHERIES RESOURCE

The rivers and creeks of the area support a strong sports fishery consist ing of Dolly Varden char, cutthroat, rainbow and eastern b rook trout, mountain wh itef ish, and Kokanee. The main stem rivers have been 1 ittle affected by coal development act iv it ies but the number of tributaries in the region has declined. Companies tend to focus on the small streams or tributaries they may be affecting, ignor ing the impact of its degradation or demise on the river into which it feeds.

There was no mechanism for fisheries involvement in coal mine developments prior to CGRP. Since CGRP, there has been a "window approach'@ with one MOE representative deal ing with coal compan ies regarding the gu idel ines. Fish and wildlife was involved at stage II of the process and again in stage III with some input into stream permitting for water use. Westar and MOE did a joint creel census on the Elk River (1982-3) which resulted in a new management scheme being developed.

Figure 6.
AMMONIA CONCENTRATES IN THE ELK RIVER AND MICHEL CREEK.
Source: BC MOE Jan 1984120, 63.



CGRP did not permit fisheries officials to deal with their primary concern of the cumulative effects of several new mines and population increases in the region. CGRP did allow some fisheries input into stream permitting but the most effective work with the mining companies has occurred outside of the guidelines as evidenced by the Elk River creel census and the resultant management program.

AIR QUALITY

The most serious air quality problem in the Elk Valley has been fugitive dust. When the Elkview Preparation Plant was constructed, the required air permits did not include ambient air quality monitoring. There was a continuing problem with visible pollution from the plant air dryer stacks which was blown, by prevailing winds, into Sparwood suburbs. A variance or special permit uas in place for a number of years, but Westar was unwilling to replace the dryer stacks and scrubber system because of the high cost of retrofitting the scrubber. The variance allowed Westar to exceed the permit objective of 5.5 mg/mole for a certain time period, after which the situation had to meet the standards. This problem was remedied in 1986, four years after the variance was granted. Increased technical Knowledge and experience permitted the Waste Management Branch to require more restrictive air emission standards of 2.75 mg/mole for Greenhills which the company consistently meets.

CGRP permitted early involvement of government agencies in the planning of the mine. As a result, the government could ensure that the best technology was employed and that the company was aware of standards it would be expected to

meet. Because of CGRP, government officials feel another incident similar to that of the Elkview Preparation Plant, where inadequate technology was used, would not be alloued to happen. However, it is also felt that changes in the permit conditions for air and water quality have resulted generally from a broader application of existins legislation and increased Knowledge, not necessarily from the existence of CORP.

RECLAMATION

Reclamation legislation was first enacted in 1969 based largely on work done at the Harmer Ridge mine (Mickelson 1984; Milligan 1984). A reclamation permit must be obtained from MEMPR and the Reclamation Advisory Committee, independent of CGRP, prior to commencing exploration on a coal property. An additional reclamation permit is required prior to mine production. Initially, reclamation plans did not consider forestry, water; or wildlife considerations (Mickelson 1984). Over time, southeast coal block reclamation has been increasingly oriented to wildlife, particularly elk. Westar has completed a number of studies and experiments regarding revegetation and wildlife habitat in an attempt to reclaim open pit areas for multiple species use. Forestry and ranching are still not considered as possible uses for reclaimed land, although tree cover for wildlife use is planned. Stream rehabilitation is also planned as well as a man-made lake on the old mine site <Fraser 1984).

Because reclamation remained outside of CGRP, the review process did not have an impact on how reclamation has been handled with respect to coal mine developments.

ENVIRONMENTAL HAZARDS

Land slides are the most common environmental hazards associated with mountainous coal mining. There have been three major slides on Westar properties: at Sparwood; and Thompson and 6-Mile creeks. All three were the result of improper ouerburden disposal , two from mine site overburden and one from maintenance complex construction. Not all of the slides could have been anticipated even with the use of CGRP. CGRP has resulted, howeuer, in better planning for hazards and this, along with greater Knowledge and reclamation techniques has significantly reduced the risk of future slides.

ENVIRONMENTAL ESTHETICS

Visual Impacts

Mining naturally detracts visually from the surrounding environment (Dominy 1984). However, Westar's mines have a relatively minor visual impact in the southeast area; the main landscape changes are only visible from the air (Witfield 1984). This is largely because open pits are located in the mountains east of the Elk Valley. The most visible aspect of the two operations is the Elkview preparation plant, dust which pours out of it, and company offices and some infrastructure in Natal Valley bottom. All of these examples were constructed pre-CORP. If CGRP had been in place, the infrastructure may have been located where it would have been less visible. CGRP permitted esthetical considerations to take place.

Heritage Resources

In the late 1960s, when Harmer Ridge was under construction, there were no gouernmental requirements

concerning heritage resources. Coal-related surveys were conducted in 1973 by private interests and in 1976 by the provincial government to assess the heritage resource potential in the southeast coal block. However, mining projects continued to be examined on an ad hoc basis until 1979, when the Heritage Conservation Branch (HCB) formally established its Guidelines for Heritage Resource Impact Assessment in British Columbia.

HCB involvement normally begins when a company submits its prospectus to CGSC. Unfortunately, much damage to heritage sites often occurs during exploration, so HCB has attempted to instill a sense of "corporate good citizenship" (Apland 1984) by having each company examine its property for potential heritage sites prior to full-scale exploration.

Historical Coal Mining

Coal mining has been occurring in the East Kootenay region without interruption since 1897, 24 years after it was first discovered in 1873 (BC MOE May 1984:21). Consequently, there are old buildings and coking ovens as well as old mining equipment which may be of historical interest to the public. HCB would like to see this displayed but company officials question the safety and tourism value of this equipment (Milligan 1984). There are several alternatives available, but the problem is unresolved.

Heritage resources and historical coal mining were not listed as an explicit concern in the Guidelines for Coal Development (BC ELUC 1976), however, CGRP afforded HCB, as a review agency, an opportunity to have its concerns met. This opportunity did not exist previous to CORP.

EVALUATION OF CGRP

me evaluation of CGRP is based Primarily upon articles by Munn (1982) and Whitney and McLaren(1985), and agency and company comments.

STRENGTHS

Assessment Structure

CGRP was the first attempt in British Columbia to coordinate all aspects of coal mine development into one formal process. From the governmental perspective, its primary strength was that CGRP allowed early agency inuolvement in the mine development so that preliminary environmental study needs could be identified (Davidson 1984), background monitoring could be undertaken, and potential mine problems could be identified and mitigated (Baillergeon 1984). CGRP allowed a wider range of government involvement in mine development. Previous only MEMPR was regularly consulted; MDE inuolvement was limited to issuing permits (Dick 1984). Government regulators were assigned to specific coal mine development tasks based upon experience, jurisdiction, and permitting authority. the process assured government officials that companies met at least a minimum standard of environmental protection. The end result was, they felt, a better quality mine (Cullum 1984).

From Westar's perspective, CGRP eliminated the "guesswork. which occurred when its Harmer Ridge mine was deueloped in the preguidelines era. General terms of reference and initial government contacts identified in the CGRP manual facilitated the company's planning and the process did not delay the mine opening (Mickelson 19841

Mill igan 1984).

CGRP uas a comprehensive assessment method, collect ins information on a wide range of env ironmental and social concerns and identifying many possible impacts. It was based on the bel ief that all impacts could be identified through the data collected. CGRP permitted the predict ion of interact ions such as tht construct ion of mine s ite infrastructure and the destruct ion of topsoil and, in turn, vegetat iue ind wild1 ife feeding areas. Thus a 1 inK between these elements was establ ished, although the magnitude of the effect was not ident if ied.

Eualuat ion of al ternat iues occurred insofar as development opt ions w ith in the mine site were considered. Each project was not eualuated, however, in terms of a with and without project comparison or a comparison between alternate projects, for example, forestry versus mining. The evaluation of opt ions such as road locat ion, mine s ite complexes, and waste dumps, was 1 iKely responsible, in part, for a less enuironrnentally-damaging mine deuelopment.

Monitoring and mitigation occurred largely as a result of CGRP. Both surveillance and effects monitor ing were undertaken by compan ies at the request of the government off ic ials involved in CGRP. These monitor ins programs have led to the implementat ion of mit igat iue measures which improved env ironmental protect ion. Government reu iew, required in stages I and II of CGRP, led to substantial changes in the design of the Greenhills preparation plant (Milligan 1984). These changes have resulted in Westar consistently meet ins ambient air quality standards which are stricter than the prov inc ial average at its Greenhills

operation (Baillargeon 1984). Monitoring also permits the company to act more quickly in the face of an accident or disaster by creating an awareness of environmental conditions and any changes occurring. Monitor ins and mit igat ion were integral components of CORP.

Whitncy and McLaren (1985) stressed the importance of public participation in EIA, particularly in sign if icance assessment, eual uat ion and mon itoring. However, public inuolvement was a d iscret ionary aspect of CGRP and, as a consequence, was 1 imited to lodging company submissions to CGSC with the town council and 1 ibrary (Dick 1985). The only public hearing held was for the proposed Quinsam coal development where a condition of stage II approval required a hearing under the ausp ices of the prov inc ial Environmental Management Act (1981). The hearing was 1 imited to environmental issues and its goal was to arrive at a consensus of how to mitigate impacts. Otherwise, publ ic involvement has consisted only of letter-writing by concerned res idents (Dick 1985).

Biophysical Regulation

The pr inc ipal strength of CGRP was that it provided a forum for deal ins with issues which otherwise would have been unregulated. In part icul ar, f ish, wild1 ife, and her itage resources were included in CGRP where previously there was no input from the ministry responsible for these sectors, Other better regulated resource sectors, such as forestry, agriculture, and uater quantity and qual ity, were also included in CGRP, making it the first attempt to include almost al 1 aspects of the environment into one development process. However, improvements in the management of some of

the environmental components could not be attributed to CGRP, but rather to better technology and greater Knowledge over time.

Early government involvement in the mine's development permitted better planning to occur. As a result, mitigative measures, such as relocation of infrastructure and dumps and monitor ins, could be adopted by the company. Sign if icant changes in Westar's initial approach to water and air qual ity management plans, wildl ife and htritape resources occurred because of the early government consultation required by CGRP. A more environmentally-sensit ive mine was the rerult.

WEAKNESSES

Assessment Structure

Several weaknesses of CGRP have been ident if ied by government and company representat ives involved in the Greenhills deve 1 opment process. The weaknesses include the lack of a mechanism to examine al 1 developments in one region together for aggregate impacts (Andrusak 1984; Croz i er 1984; Witf ield 1984). There was a lack of coordination with in and between agenc ies (Cullum 1984; Milligan 1984). Min istry jur isd ict ions were not clearly outl ined i n leg islat ion leading to confl icting demands on the company from MEMPR, and the water and waste management branches (Crook 1985; Lawrence 1984). Within each ministry no specific person was assigned the task of coordinating the minister ial comments to ensure the ir val id ity and cohesiveness. Often, the company would receive conf 1 ict ing opinions from the same ministry (Mill igan 1984). The CGRP structure was a rigid four stage process; even expansions to ex ist ins mines would have had to go through the entire g'uidel ines process (Crozier 1984; Strosher

1984).

CGRP was an inventory-style assessment method which did not distinguish between important and insignificant impacts. The process was not selective: attention was not focussed on important factors, instead all factors were treated equally. There was no facility for scoping which would have allowed companies to concentrate on significant impacts and the ir mitigation, after identifying all possible impacts. Better cnvironmental management at lower cost would have been the likely result of a scoping exercise.

CGRP was not mutually exclusive in the prediction of impacts or treatment of them. The overlap of agency jurisdictional boundaries contributed to this problem. CGRP did not attempt to indicate confidence limits for the impact predictions made by in company assessments. In fact, no attempt was made to establish the likelihood or probability of a particular impact occurring.

Significance assessment in the manner described by Whitney and McLaren did not occur in CGRP. Companies were not required to make without-project comparisons or examine or identify cumulative effects. The duration of impacts was only identified in passing, risk analysis did not occur, nor did an assessment of the stability and resilience of the environment and its components. Generally, Westar felt it was not responsible for carrying out such studies because the potential social and economic benefits of mining to the province outweigh its negative effects (Mickelson 1984; Milligan 1984).

Biophysical Regulation

Reclamation and exploration were not included in CORP.

Exploration remained fairly unregulated with the exception of the requirement for a reclamation permit. Fortunately, reclamation has been quite well-managed through the reclamation permitting process and corporate goodwill.

A further weakness of CGRP from the perspective of both the company and MEMPR was an overemphasis on uildlifc. Mine representatives felt the ualues placed on the environment were disproportionate% mines utilize one-half of 1 percent of British Columbia's land mass (Whale 1984). Other contributing factors to the destruction of wild1 ife habitat such as human settlement, forestry, and highways construction were not subject to the same scrutiny as mining. Had they been, perhaps the highway would not have been located the middle of a major migration corridor and Sparwood subdivisions would not have been allowed in an important winter range area or on the flood plain (Davidson 1984; Demarchi 1984). Since mining makes an important contribution to the provincial economy, it was argued that CGRP should have been trying to establish a balance between economic value to British Columbia and its limited destruction of landscape (Booth 1984). Mining officials felt that if the government wished to have .a greater emphasis on wildlife, they should have funded studies and management programs,

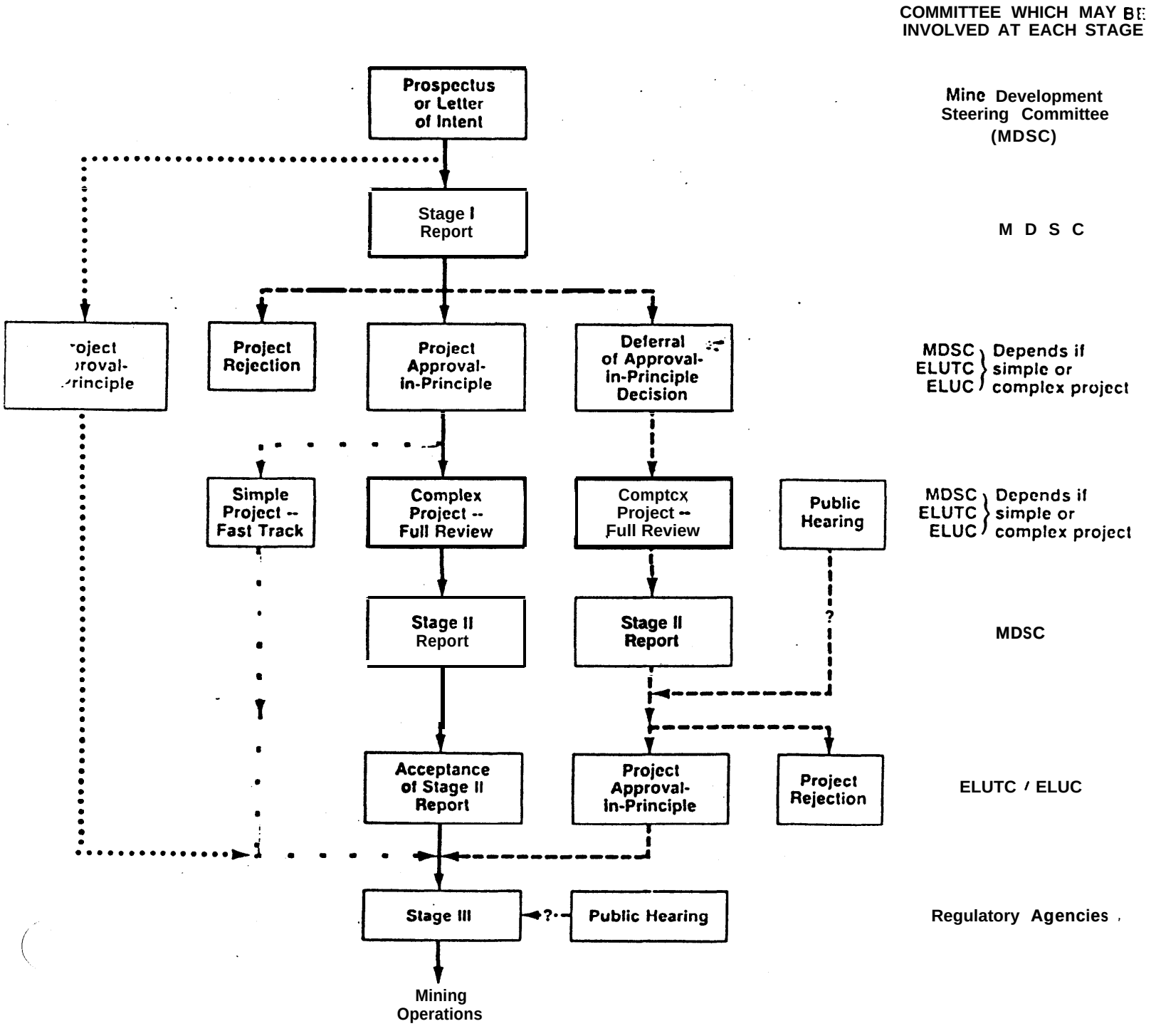
MINE DEVELOPMENT REVIEW PROCESS: THE NEW CGRP

The Mine Deve 1 opment Rev iew Process (MDRP) was implemented in 1984 after more than two years of review and consultat ion with min istr ies and industr ies. MDRP consolidated two d ist inct mine development processes, CGRP and the metal mine review process. me primary coal mine innouat ion was the introduct ion of a fast-tracking mechanism which permit5 approval-in-principle to be given at any stage in the review process (fig. 7), including the prospectus, thus simpl if ying and shortening the process for a project cons idercd to have minimal env ironmental and soc ioeconomic impacts. This screening mechan ism potentially reduces the amount of time and money required by companies and goverment to approve a proposed mine development.

An element of scop ing has been introduced into MDRP. Unnecessary data collect ion has been alleviated through sett ing of project-spec if ic terms of reference. Inf ormat ion requ irements are custom-des igned to increase the eff ic iency of stages I and II. Stage II sill calls for a detailed impact assessment, al though it may be scoped if a ministry ident if ies areas that it is spec if ically interested in protecting. Increased scop ing will al low compan ies to concentrate, more appropr ihtely , on significant impacts and their mit igat ion, after ident if y ing al 1 poss iblc impacts. Better environmental management at lower cost will be the 1 iKely result of the introduction of scoping into MDRP.

In add it ion to the fast-trackopt ion, an attempt has been made to clarify min istry jur isd ict ions and avoid overlaps in inf ormat ion and permitt ing requirements.

Figure 7.
BRITISH COLUMBIA MINE DEVELOPMENT REVIEW PROCESS



(After Canada, Federal Environmental Assessment Review Office 1985: 14.)

The number of agencies involved in submission reviews is limited to those with regulatory jurisdiction. Ministries are now required to screen all comments for relevance before they are forwarded to the company. Agency review deadlines have been established in order to further speed up the review process.

The public involvement policy has been more formalized in MDRP than it was in CGRP (Crook 1985). All formal submissions to the mine development steering committee (MDSC) will be public documents, although in their draft form, they Will remain confidential. The official compendium of agency comments for each review stage will also be available to the public on request. The government feels that it is the company's responsibility to provide and organize public information, most likely in the form of public meetings or forums, ELUC has reserved the right to arrange a hearing prior to or after giving approval -in-principle. If a hearing is held before, its focus would be "whether to "develop; after, it would be "how to" (Crook 1985). ELUC and MDSC generally have developed a *hands off" approach to public involvement, leaving it UP to the companies to manage. Without specific guidelines for its inclusion and focus, it seems likely that public participation will continue to be a marginal part of the review process.

While many of the weaknesses of CGRP have been overcome, some observers have expressed concerns related to new problems which MDRP may introduce. In particular, there appear to be no safeguards established which would prevent politically favorable projects from being fast-tracked

without adequate consideration or identification of their Potential environmental impacts (Crozier 1984; Davidson 1984; Demarchi 1984). Streamlining is seen as necessary, especially where mine expansions are concerned, but some MOE officials would like assurance that the environment ministry would not be bypassed completely in order to develop a project quickly (Crozier 1984; Laurence 1984). They would like to see a better interaction mechanism between the two lead agencies, MEMPR and MOE, stating that this would better serve the mining industry.

CONCLUSIONS

mere has been an improvement in the coal development process and environmental management in British Columbia over the past fifteen years. It is difficult, however to assess the degree that CGRP has effected improved environmental management and cond it ions. Historically, coal mine activities .were • nvironmentally detrimental. Early legislation, such as the provincial Pollution Control Act (1967) and Coal Mine Regulation Act (1969), was the first step towards 1essening environmental damage resulting from min ins act iv it ies. Since the late 1960s, improvements in technical Knowledge have occurred and these, combined with greater exper ience on the part of mine and govern ment off ic ials, have contributed s ign if icantly to the benef i cial changes in environmental regulation and qual ity. CGRP amalgamated governmental legislation, standards, 1 icences, inst itutions, and personal • *xper* ience into a comprehens ive, organ ized, easy-to-follow process. Better env ironmental man agement also resulted, although some government off ic ials still feel that company attitudes and corporate will have had a more pos it ive influence on improved environmental sens it iv ity of coal developments than have CGRP <Booth 1984; Grieve 19849 Whale 1984). This sentiment is based on the fact that there is no legislation in place which forces compan *ies* t o carry out government requests for particular fish or wildlife management studies or legislation requiring adherence to regu l at ions concerning run-off cond it ions (Baillargeon 1984). Companies have complied with these and other government requests as a gesture of good will and from

a desire to have good community relations (Mill igan 1984).

Many government officials feel there should be some means of assessing cumulative impacts of coal and all other developments within a region. Mining companies do not feel they should be respons ible for this aspect of development since they have already taken the responsibility for h inds ight evaluation at the project level (Milligan 1984). One recommendat ion would be to implement an overall prov inc ial or regional development plan for coal, other mining, or any other significant industrial or resource-based act iv ities. This would allow the government to qu ick l y assess whether a proposed project fit into a general area or reg ional development pol icy. Approval or rejection could be given to a company before significant time and money are wasted. The Mining Association of British Columbia (1983) recommends that mapping of resource use values and environmental sens it iv it ies by the government in potential min ing area5 would also contribute to more rapid assessment of project viability.

Overal 1, the CGRP was a socially useful assessment process. MDRP is an attempt to improve on CGRP and ensure even better environmental management and protection in the future. The process could be further improved if the above recommendat ions were also adopted.

SOURCES CONSULTED

Andrusak, Harvey. 20 July 1984. Interview with acting regional manager, Fish and Wildlife Branch, Ministry of Enuironrnent, Nelson, B.C.

B.C. Coal Act. RSBC 1879, c.51.

B.C. Coal Mine Regulation Act. RSBC 1979, c.52. (Repealed SBC 1980, c. 28).

B.C. Environmental Land Use Act. RSBC 1379, c. 110.

B.C. Environmental Management Act. SBC 1981, c. 14.

B.C. Environmental Land Use Committee. 1976. Guidelines for Coal Development. Victoria, B.C.

----------. 1977 Guidel ines for Linear Development. Victoria, B.C.

B.C. Mines Act. SBC 1980, c. 28.

B.C. Ministry of Energy, Mines and Petroleum Resources. 4 Sept 1984. Memorandum: "Rev is ions to Mine Development Review Process. . Victor ia, B.C.

----------. 3 May 1884. Memorandum: *Review Process Rev is ions." File: Government Rev iew Process. Victor ia, B.C.

----------. August 1981. Guide1 ines for Coal Exploration. Victoria, B.C.

----------. (undated). "Informat ion Summary: New Coal Mine Proposals and Submission of a Reclamat ion Program Pursu'ant to Sect ion 7 of the Mines Act." Victoria, B.C.

B.C. Ministry of Environment. Pl ann ing and Rssessment Branch, and Rag ional District of East Kootenays. May 1384. Elk-Flathead Strateg ic Env ironmental Management Plan. Victoria, B.C. <unpublished).

B.C. Ministry of Env ironment . Waste Management Branch, Jan 1984. A Trend Study of Water Qual ity in British Columbia. by M. J.R. Clark and P.A.Peppin. Victoria, B.C.

B.C. Ministry of Env ironment . Fish and Wildlife Branch. 1984. Fisheries Management Implications of Creel Surveys Conducted at the Elk River Kootenay Region 1982-1983. by Alan Mart in. Cranbrook, B.C.

B.C. Ministry of Environment and Ministry of Lands, Parks and Housing. 1382. Outdoor Recreat ion Part ic ipat ion: Southeast Coal Block 1980. Victoria, B.C.

B.C. Ministry of Environment. 1979. Pollution Control Objectives for the Mining, Smelting and Related Industries of British Columbia. Victoria, B.C.

B.C. Ministry of Environment. Water Investigations Branch. October 1978. Kootenay Air and Water Quality Study. Phase II: Water quality in the Elk and Flathead River Basins. Victoria, B.C.

---------. Feb 1976. Kootenay Air and Water Quality Study. Phase I: Water quality in Region 2, the Elk River Basin. Victoria, B.C.

B.C. Minister of Finance. <annual>. Financial and Economic Review. B.C.: Queen's Printer.

B.C. Pollution Control Act. RSBC 1979, c. 332. <Repealed SBC 1982, c.41>.

B.C. Waste Management Act. SBC 1982, c. 41.

B.C. Wildlife Act. RSBC 1979, c. 433.

Baillargeon, M. 18 July 1984. Interview with mines inspector, Mineral Resources Branch, Ministry of Energy, Mines and Petroleum Resources, Fernie, B.C.

Beanlands, G.E., and P.N. Duinker. 1983. An Ecological Framework for Environmental Impact Assessment in Canada. Dalhousie University, Halifax: Institute for Resource and Environmental, Studies and Hull, Quebec: Federal Environmental Assessment Review Office.

Boersma, Gus. 15 July 1984. Intervicu with former mayor of Fernie, Fernie, B.C.

Canadian Environmental Advisory Council (CEAC). Dec 1978. Annual Review 1977-1978: State of the Canadian Environment. Ottawa, Canada: Dept. of Environment.

Choquette, Wayne. 19 July 1984. Interview with archeologist Kootenay Cultural Heritage Center, Cranbrook, B.C.

Colton, Dale. 2 July 1985. Interview with director of planning, Regional district of East Kootenay, Cranbrook, B.C.

Crook, Ray. 29 April 1985. Interview with guidelines coordinator, Mineral Policy and Evaluation Branch, Ministry of Energy, Mines and Petroleum Resources, Victoria, B.C.

Crozier, Rick. 11 July 1984. Interview with head, Environmental Section, Waste Management Branch, Ministry of Environment, Nelson, B.C.

[illegible] Brian. [illegible] July [illegible]. Interview with resource assistant, Timber, Nelson Forest Rag ion, Ministry of Forests, Nelson, B.C.

Davidson, Peter. 18 July 1984. Interview with wildlife b iolog ist --Sheep Enhancement Project, Fish and Wild1 ife Branch, Min istry of Env ironment, CranbrooK, B.C.

Oemarchi, Ray. 11 July 1984. Interview with regional wild1 ife biologist, Fish and Wildlife Branch, Ministry of Environment, CranbrooK, B.C.

Dick, John. Apr-Aug 1985. Interviews with manager, Strategic and Operational Unit, Planning and assessment Branch, Planning and Resources Division, Ministry of Environment, Victoria, B.C.

Oominy, Richard. 18 July 1984. Interview with timber supply area planning forester, Nelson Forest Region, Ministry of Forests, CranbrooK, B.C.

Environment Canada. Lands Directorate, 1982. Mining Land Use and the Environment: I. A Canadian Overview. Land Use in Canada Series, no. 22. Ottawa, Canada.

----------. 1983. Mining Land Use and the Environment: I I. A Review of Mine Reclamation Act iv it ies in Canada. Land Use in Canada Series, no. 23. Ottawa, Canada.

Fellmnn, Y. 6 May 1985. Interview with engineer, Power and Special Projects, Water Management Branch, Ministry of Environment, Victoria, B.C.

Grieve, Dave. 18 July 1984. Interview with district geologist, Geological Branch, Mineral Resources Oiv is ion, Ministry of Energy, Mines and Petroleum Resources, Fernie, B.C.

Lawrence, Gary. 11 July 1984. Interv iew with mun ic ipal officer, Waste Management Branch, Ministry of Environment, CranbrooK, B.C.

Macaulay, Donald. 26 Jan 1937. Interview with senior v is itor programs off icer, Min istry of Environment and Parks, Victoria, B.C.

Malmberg, Michael. 11 July 1984. Interv iew with d istr ict agricultural ist, Ministry of Agriculture and Food, CranbrooK, B.C.

Martin, Alan. 19 July 1984. fnterv iew w ith fisher ies b iolog ist, Fish and Wild1 ife Branch, Ministry of Environment, CranbrooK, B.C.

MicKelson, Gene. 16 July 1984. Interv iew w ith supervisor, Environmental Serv ices, Westar Mining Ltd., Sparwood, B.C.

Environmental Services, Westar Mining Ltd., Sparwood, B.C.

Mining Association of British Columbia. 11 Aug 1983. "Recommendations for the Improvement of the Metal Mine Guidelines." Vancouver, B.C. Cunpublished).

Munn, R.E. cd. 1982. Enu ironmental Impact Assessment: Principles and Procedures. 2nd Edition. Toronto: Scope 5.

Murdoch, R. 18 May 1985. Correspondance with general manager, Provincial Agricultural Land Commission, Burnaby, B.C.

Musil, Phil1 ip. 16 July 1984. Telephone interview with Elk Valley rancher, Sparwood, B.C.

O'Riordan, Jon. Summer 1986. "Env ironmental Assessment in British Columbia." The Northwest Env ironmental Journal 2:2.

Phipps, Tom. 1987. Socioeconomic Regulation of the Coal Industry in British Columbia: The Kaiser Experience. <Master's thesis). Burnaby: Simon Fraser University.

Sasaki, Harvey. 6 May 1985. Interview with land use analyst, Farm1 and Resources Branch, Ministry of Agriculture and Food, Victoria, B.C.

Smith, Andrew. 17 July 1984. Interview with reclamation officer, Greenhills, Westar Mining Ltd., Sparwood, B.C.

Strosher, Mark. 11 July 1984. fnterview with industrial waste management officer, Waste Management Branch, Ministry of Environment, Cranbrook, B.C.

Switzer, B.C. Aug 1983. "'Guidelines for Coal Development' Recommendations for Revision; Denison Mines Limited." Proposal submitted by enu ironmental coordinator, Denison Mines Limited to J.D. McDonald, Chairman, Coal Guidelines Steering Committee.

Thorner, Jim. 17 July 1984. Telephone interview with lands manager, She 11 - Crow's Nest Resources, Elkford, B.C.

Tomlinson, Paul. 1984. "The Use of Methods in Screening and Scoping.' Perspectives on Enu ironmental Impact Assessment. Scotland: D. Reidel Publishing Co.

Westar Mining Ltd. Enu ironmental Services. Feb 1985. Annual Report of Sampling and Monitoring Program in Conjunction with Pollution Control Permit PE-6248 - 1984. Sparwood, B.C.

----------. Feb 1984. Annual Report of Sampling and Monitoring Program in Conjunction with Pollution Control Permit PE-425. Sparwood, B.C.

Mineral Resources Branch, Ministry of Energy, Mines and Petroleum Resources, Fcrnie, B.C.

Whitney, J.B.R. and McLaren, V.W. 1985. "A Framework for the Assessment of EIA Methodologies." Environmental Impact Assessment: Current Approaches in the Canadian Context. Toronto, Ontario: Institute for Environmental Studies, University of Toronto.

Witfield, Phil. 9 July 1984. Interview with manager, Planning, Parks and Outdoor Recreation Division, Ministry of Lands, Parks and Housing, Kamloops, B.C.