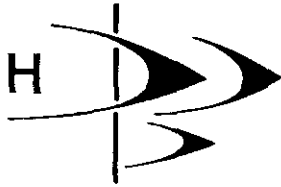


B.C. RESEARCH



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August 19, 1974

PROJECT PROPOSAL

To: B.C. Hydro and Power Authority,
970 Burrard Street,
Vancouver, B.C. V6Z 1Y3

Attention: Dr. H.M. Ellis,
Manager, Systems Engineering

Subject: ENVIRONMENTAL IMPACT (ECOLOGICAL, SOCIAL AND ECONOMIC)
OF A HAT CREEK THERMAL GENERATING STATION

SUMMARY

B.C. Hydro is considering construction and operation of a 2000 MW conventional thermal generating plant and associated coal mining operation located at Hat Creek. The ecological impact, including land use, water quality, air quality and solid waste disposal, is to be examined for the proposed generating plant and for the ultimate development which may be 4000 to 5000 MW in size. Methods and costs for mitigating any adverse impacts uncovered will be examined.

Installation of such a large generating station will also have significant social and economic impacts, particularly during construction and in view of the rural location and the relatively small size of the nearby communities, Lillooet, Cache Creek and Ashcroft. These impacts will be examined in detail and means of regulating them will be recommended where necessary and possible.

The extent of ecological and socio-economic impacts will be governed in part by the mining plan and the process design of the steam generating plant. Dolmage, Campbell and Associates,

who have been involved with the drilling program, have agreed to work with B.C. Research personnel to provide necessary inputs on the mining plan and assist in assessment of the impacts. We will expect the Systems Design Division of B.C. Hydro to provide parallel inputs with respect to the process design.

PROJECT PROPOSAL

Introduction

B.C. Hydro and Power Authority has responsibility to meet the needs for electricity by the residents, government agencies, commercial establishments and industrial plants in the Province. These needs have been growing at rates of up to 10% per year and, while efforts are underway to reduce the future growth rate, additional power generation will be required even if these efforts are successful. Among the various alternatives available for additional power is to utilize a lignite deposit at Hat Creek in a conventional generating station.

In the decision process of selecting the best of these alternatives the environmental impact is an important factor, and it is proposed that a study be undertaken of the ecological, social and economic impacts associated with the erection and operation of a generating station fired with Hat Creek coal. Terms of reference for the study have been developed by B.C. Hydro personnel and are included in Appendix I of this proposal. We have agreed to accept these terms and the proposal given below is aimed at meeting them. Briefly, the program is concerned with a) identifying the current situation at Hat Creek with respect to land use, water quality, air quality and the existing social, cultural and economic factors in the surrounding region, b) quantifying the changes, either enhancement or degradation, in these factors that would result from the construction and operation of the generating station and the associated mining operation, c) assessing the benefits resulting from the development and d) assessing methods and costs of mitigating those factors that are found to be adversely influenced by the development. It should be noted that, while physical factors, e.g., land use, air quality, are relatively easy to quantify, social and economic factors tend to be more elusive, particularly in rural areas because of the lack of data.

Resumés of the project personnel are presented in Appendix II.

Existing Situation

The physical characteristics of the site and its environs will be documented. This will include flora, fauna, aquatic life and land use for agriculture, forestry and recreation.

The topography and geology of the area will also be examined since they will influence drainage and groundwater usage. The climate and meteorological conditions will be studied because they will influence atmospheric dispersion. Water usage will also be documented. Field work will be an important part of this study; however, the majority of the information will be derived from data collected previously.

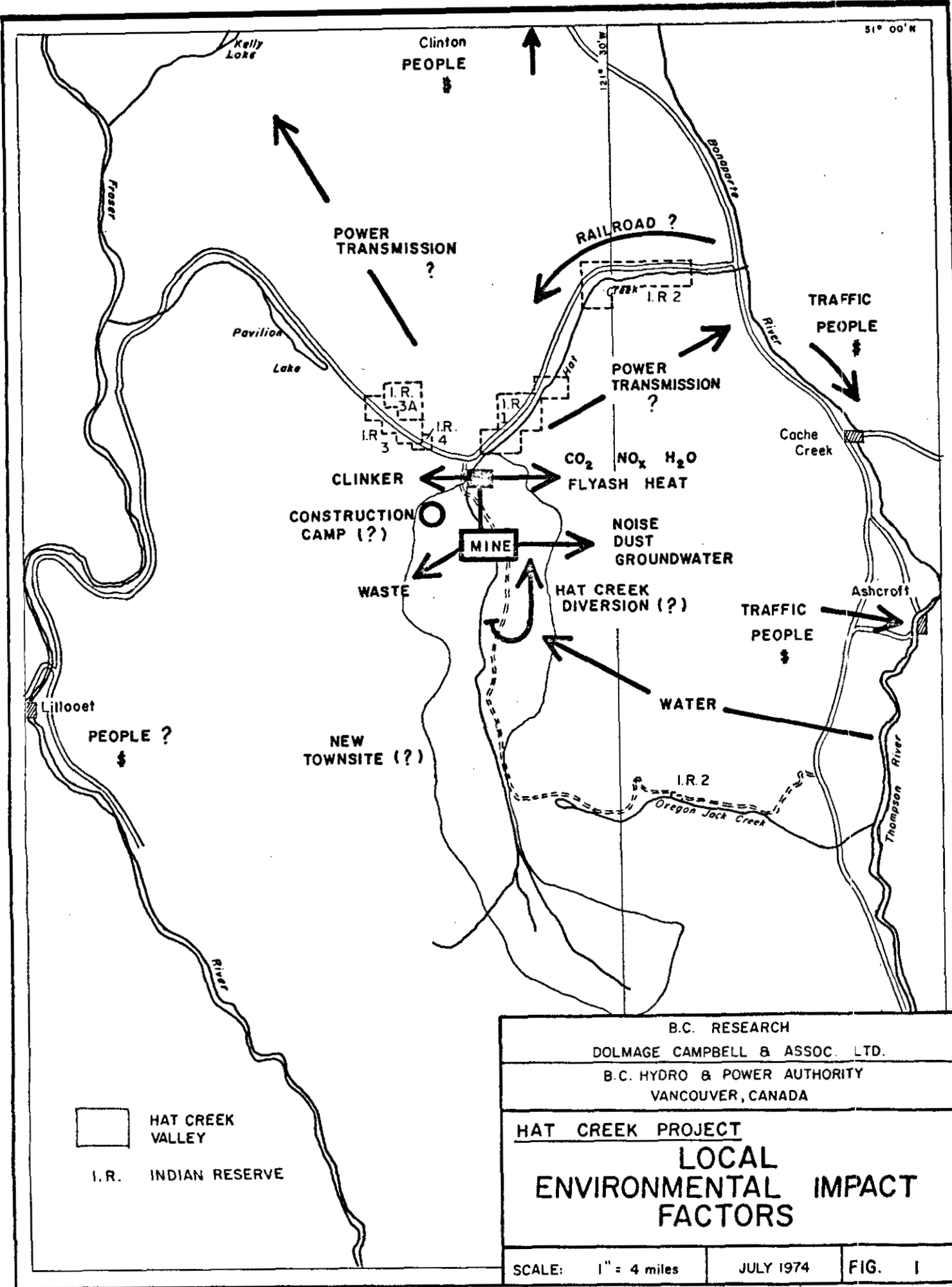
The social and economic situation in the area, which centers on Cache Creek, Ashcroft and Lillooet, will be studied. This will include the economic level and how it is derived, population growth and distribution, housing and community and municipal services. Existing literature and statistics, along with interviews with government agencies, trade and other associations and individuals, will be used to obtain the required inputs.

Expected Impacts

The major expected impacts are shown on the input-output diagram (Figure 1). Among the physical changes are land alienation for the generating plant, the mining operation (including placement of overburden and waste), transmission line(s) and a pipeline from the Thompson River. Realignment of Hat Creek may be necessary. Increased traffic, particularly during the construction phase will also create a physical change.

After the construction phase the major additional physical impacts will be disposal of seepage water from the mining operation, possible vapor plumes from the cooling tower and air emissions, solid wastes (flyash and/or grate ash) and water discharge from the generating plant.

The social and economic impacts in the surrounding area will depend upon the degree of change imposed upon the existing social and economic balances, initially by the construction activity and later during the operating phase. Among factors to be documented will be demands for housing, roads, water supply, sewers and electrical services. Changes in requirements for such social services as recreation facilities, schools and health care will also be examined, and both primary and secondary employment opportunities will be estimated. The impact of a modern industrial development on the existing rural and Native cultures will be assessed.



51° 00' N

Clinton
PEOPLE

POWER
TRANSMISSION
?

RAILROAD ?

TRAFFIC
PEOPLE

Pavilion
Lake

POWER
TRANSMISSION
?

I.R. 3A
I.R. 3
I.R. 4

CO₂ NO_x H₂O
FLYASH HEAT

CLINKER
CONSTRUCTION
CAMP (?)

NOISE
DUST
GROUNDWATER

MINE

WASTE

HAT CREEK
DIVERSION (?)

TRAFFIC
PEOPLE

Lillooet
PEOPLE ?

NEW
TOWNSITE (?)

WATER

I.R. 2



HAT CREEK
VALLEY

I.R. INDIAN RESERVE

B.C. RESEARCH

DOLMAGE CAMPBELL & ASSOC. LTD.

B.C. HYDRO & POWER AUTHORITY
VANCOUVER, CANADA

HAT CREEK PROJECT

LOCAL
ENVIRONMENTAL IMPACT
FACTORS

SCALE: 1" = 4 miles

JULY 1974

FIG. 1

The physical changes and the socio-economic impacts will, as noted earlier, depend upon the rate at which the development is staged and will therefore require inputs from the mining consultant and from B.C. Hydro personnel. The general impacts and time scale are shown in Figure 2 which is not intended to be all-inclusive.

There will no doubt be items in addition to those shown in the figure that will become apparent during the study. For example, it may be that Kamloops will play a more significant role than we currently visualize. A few comments on the figure should be made. An examination of current forecasts for growth in the area will indicate the future situation if the project does not proceed. We have not indicated a special study of the sample pit because the activity will largely be confined to the site. Since it is intended to use the pit also for experimental purposes, e.g., seepage, wall stability, reclamation of the pit will need to be studied only if the project does not proceed.

Although Figure 1 and 2 are aimed at the Hat Creek valley and its immediate neighbors, we will attempt to assess the effects of a "go or no-go" decision on a broader scale, e.g., for the Thompson-Nicola and Squamish-Lillooet Regional Districts and for the Province.

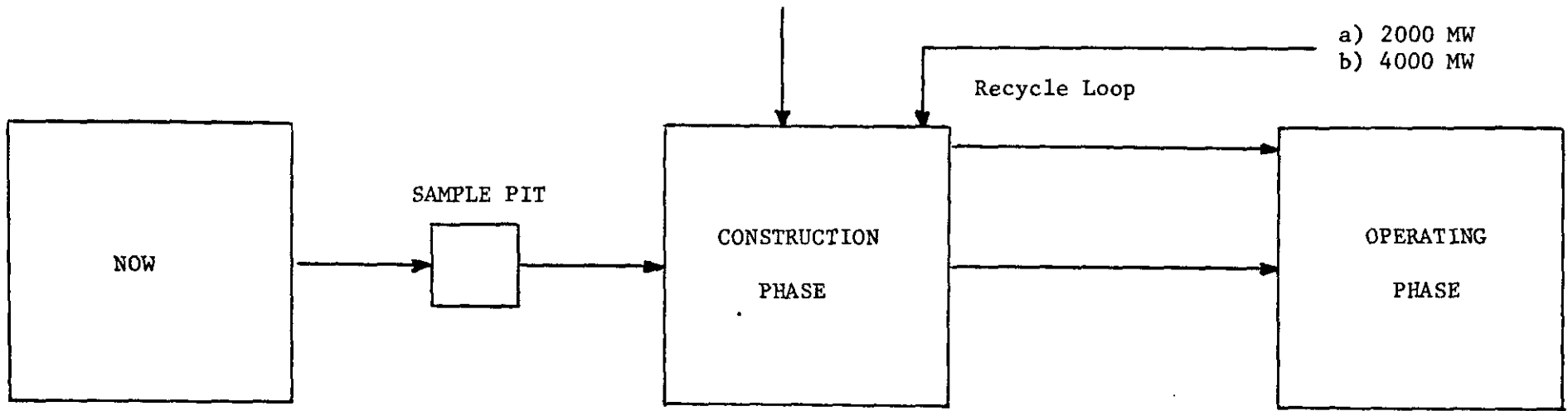
Enhancement/Mitigation of Changes

Of the physical changes the ones of a permanent nature are the transmission lines, impaired air quality and continuing land alienation and disruption at the site. The railroad, and the water line, if above ground, would also be permanent physical changes. Reclamation potential of disturbed land to meet Mines Branch requirements and to provide aesthetic screening will be investigated. It may be possible to develop a tourist attraction as is frequently done at such large utility developments. 11

During the construction period there will be highly visible activities at the site and elsewhere, e.g., housing, construction and traffic. In cooperation with local authorities and residents means would be sought to enhance the benefits and minimize the disruptive effects of construction activities.

With respect to socio-economic impacts the long term effects will include social and recreational amenities resulting from an increased population and economic base. The short term

Needs definition of mining plan(s), D-C
 Needs definition of power station alternatives, B.C.H.
 Needs definition of construction and operating activity, D-C and B.C.H.



- 1) Social, Economic and Cultural Factors in Valley and Surrounding Towns.
 - housing, employment, economy
 - social services, recreation
 - current forecasts for growth
- 2) Environmental Factors in Area.
 - land use, topography, geology
 - water use
 - air quality and climate
 - vegetation
 - fish and wildlife
- 3) Assess Local and Regional Opinions Regarding the Project.

- 1) Define and Quantify Impacts.
 - people, dollars, traffic
 - habitat removal
 - Hat Creek realignment
 - construction activity
 - aesthetics
- 2) Assess Impacts and Potential Mitigations.

- 1) Define and Quantify Impacts
 - people, dollars, traffic
 - continued habitat removal
 - air emissions, climate changes
 - ash and waste disposal
 - reclamation including legal requirements and recreation
 - water quality
- 2) Assess Impacts and Potential Mitigations.

Figure 2

impacts are expected to be substantial, particularly in the valley and nearby towns of Cache Creek, Ashcroft and Lillooet. The largest single impact is expected to be the provision of housing and other services for the construction workers and those employed in supporting activities. Because of the present high cost of developing residential property, consideration will be given to a program of land development by B.C. Hydro in one or more of the existing local towns or as part of a new community.

As noted earlier items not now identifiable may become apparent during the study and these will be dealt with as they arise. Throughout the study period these items as well as the others listed above will be handled in close cooperation with B.C. Hydro personnel. It is also proposed that visits be made to lignite-fire stations in Alberta, Saskatchewan and/or Washington State to uncover or confirm factors related to the Hat Creek program.

Ash Utilization

The high ash content of Hat Creek coal presents a rather unique situation and probably warrants an examination somewhat beyond the environmental aspect, i.e., its disposal as a solid waste. Because of its high alumina content the ash may be suitable for aluminum production and, in view of the recent five-fold increase in bauxite royalties by producing countries, this possible use should be explored with aluminum companies. Another possible use, again related to the high alumina content, would be as fire brick and this possibility should also be explored. In the event that neither of these potential uses are feasible, the value of the ash for land reclamation should be studied. At the present moment it is recommended that only the first of these uses be included as part of the project study and that Dr. H.N. Halvorson be retained to pursue the possibility with aluminum producers.

Another item not strictly related to an impact study is the desirability of using Hat Creek coal solely for power generation. We plan to examine available alternatives as part of the study.



for A.D. McIntyre
Head, Division of Applied Chemistry

APPENDIX I

HAT CREEK THERMAL GENERATING STATION

TERMS OF REFERENCE FOR ENVIRONMENTAL IMPACT
STUDIES - PHASE I

Abstract

To investigate, analyze, and evaluate in a single integrated study the combined environmental (ecological, social and economic) effects of the construction and operation of a 2000 MW conventional thermal generating plant and its associated coal mining operations located at or in the vicinity of B.C. Hydro's Hat Creek coal deposit. The earliest in-service date for a plant at this site would be October 1981.

Terms of Reference

1. The environmental study shall include identification and analysis of the construction and operational impacts of the proposed mining and power developments on existing and potential ecological, social, and economic conditions.
2. Identified impacts - beneficial and adverse - are to be evaluated both qualitatively and quantitatively wherever possible, including an assessment of the risk or probability of their occurrence, their extent (local, regional and provincial), and their duration.
3. The study shall identify and evaluate possible measures to enhance the potential benefits (apart from power production) of the developments and to avoid, reduce, or compensate for the associated losses.
4. The study shall identify the impacts of the construction phase separately from the longer term operating effects.
5. The study shall identify possible expansions and diversification of the mining and power development complex and indicate the nature of their probable impacts. This would include assessment of the impacts of expansion of the generating plant to 4000 to 5000 MW.

6. The Regional District, municipalities, and residents of the area are to be informed of this study. Participation by local and regional governments, provincial government departments, and other public organizations, as well as from B.C. Hydro operating and construction staff, shall be sought by the consultant. Initial contact with the government agencies and liaison with the public will be coordinated by B.C. Hydro.
7. At the onset of the study, consultation will be held with the appropriate departments of B.C. Hydro responsible for planning, design and construction of the project, land acquisition, and community relations.
8. The site location for the plant will be determined upon completion of concurrent studies by B.C. Hydro (engineering), Dolmage, Campbell and Associates (geological) and B.C. Research (environmental).
9. The consultant shall submit progress reports as appropriate, an interim report by October 31, 1974, and a Phase I report by December 31, 1974.
10. The study is to be controlled and coordinated on behalf of B.C. Hydro by Dr. H.M. Ellis, Manager of the System Engineering Division.

APPENDIX II

STAFF QUALIFICATIONS

The following personnel will be responsible for carrying out the major portion of the Hat Creek study. In addition individual consultants with highly specialized competence will be called upon as required.

John E. Roberts

1952	B.Sc. Bristol, Honors Mathematics
1952 - 1970	Cominco Ltd., Trail, B.C.
1970 - present	Head, Div. of Management Services, B.C. Research

Mr. Roberts joined Cominco as development engineer and later moved into operations research utilizing mathematical modeling for study of a broad range of projects. In 1967 he was appointed supervisor of the data processing services at Cominco with responsibility for data processing, operations research, technical computing services and computer process control.

In 1970 he joined B.C. Research as Head of the Management Services Division. In addition to overall responsibility for the Division's operations, he has been directly involved in several socio-economic studies; a few examples are:

- the social and economic impacts of the proposed Seven Mile hydro-electric project
- impact of the proposed expansion of Vancouver International Airport on "livability" in the area
- studies of citizen involvement in decision making on public projects
- organization of joint centers for community health delivery and human resource activities

George S. Crawford

1948	B.A., B.Sc. Saskatchewan, Economics and Engineering
1948 - 1953	Saskatchewan Department of Natural Resources
1953 - 1956	Research Council of Alberta
1956 - present	Head, Economics and Market Research, B.C. Research

Mr. Crawford is currently in charge of the economics and market research group of the Management Services Division. Since joining B.C. Research he has participated in and supervised a broad range of studies in the areas of economics, industrial market research and feasibility studies. Examples of social and economic studies related to the present proposal are:

- economic and population survey for the service area of Inland Natural Gas
- industrial development and population growth at Kitimat
- employment base and population forecast for the city and region of Prince George
- economic and trade study of the Port of Montreal
- Moran Dam impact study

David R.C. Wright

1959	B.A.Sc., Toronto, Engineering and Business
1959 - 1963	Northern Electric Co.
1963 - 1966	Sandwell and Company Ltd.
1966 - 1967	T. Eaton Company Ltd.
1967 - 1969	Unecon Engineering Consultants Ltd.
1969 - present	Economics and Market Research, B.C. Research

Mr. Wright is a member of the economics and market research group of the Management Services Division. Assignments related to the present proposal include:

- Seven Mile socio-economic impact study
- Moran Dam impact study
- Intercity consumer price differentials
- Benefit cost study of an enlarged navigation channel

Alan D. McIntyre

1950	B.A. Chemistry, British Columbia
1952	M.A. Chemistry, British Columbia
1955	Ph.D. Chemistry and Mathematics, Cornell
1956 - 1969	Shell Chemical Company, New York, N.Y.
1969 - present	Head, Division of Applied Chemistry, B.C. Research

From 1956 to 1965 Dr. McIntyre held various laboratory positions in Research and Development at several installations of Shell Chemical Co. in the United States. During this period he

carried out and later supervised a broad range of chemical process studies. From 1965 through 1968 he was Manager, Product Development of the Plastics and Resins Division situated in New York City. During this latter period, in addition to having overall responsibility for research and development programs of the Division's laboratories, he directly supervised specialists in the areas of industrial hygiene and toxicology, Food and Drug Administration requirements, and patent-licensing.

Since joining B.C. Research Dr. McIntyre has been responsible for the technical activities of the Division of Applied Chemistry which includes a wide range of air pollution studies for various industrial and government groups, as well as programs on new product and process developments. He has been directly involved in several environmental projects, a few of which are:

- an overview study of air quality in B.C.
- environmental impact of a proposed copper smelter
- environmental impact of a gas treatment plant
- effect of refinery expansion on air quality

R.S. Serenius

1948	B.A.Sc. Chemical Engineering, Abo Akademi
1951	M.A.Sc. Chemical Engineering, Abo Akademi
1954 - 1961	Various positions in pulp and paper industry in Canada and U.S.A.
1961 - 1968	MacMillan Bloedel Limited
1968 - 1969	Eurocan Pulp and Paper Co. Ltd.
1969 - present	Group Leader, Division of Applied Chemistry, B.C. Research

During his assignment with MacMillan Bloedel Limited (1967-1968) Mr. Serenius was Assistant Technical Superintendent directly supervising a group of nine engineers with work on air pollution, one of the prime functions of this group. In his position of Technical Superintendent with Eurocan Mr. Serenius was involved in the design stage of air and water pollution abatement facilities for the Eurocan kraft mill which went on stream during 1970 at Kitimat, B.C.

In his present assignment Mr. Serenius has supervised air pollution studies for Scott Paper (New Westminster), Vancouver Wharves (North Vancouver), Kaiser Resources (Roberts Bank, Delta), the City of North Vancouver, and Pacific Coast Terminals (Port Moody). He has also been involved in an air pollution source

inventory survey which has been carried out for the Government of B.C. In addition, Mr. Serenius has supervised work concerned with reduction of the color of kraft bleach plant effluent by various approaches.

G.J. Esplin

1965	B.Sc. Chemical Engineering, Alberta
1965 - 1967	Atomic Power Dept., Canadian General Electric
1967 - 1969	Post-Graduate Studies, Chemical Eng., Alberta
1969 - 1970	Process Engineering Dept., Chemcell Ltd., Edmonton
1970 - present	Research Officer, Division of Applied Chemistry, B.C. Research

Mr. Esplin, while working with Canadian General Electric, engaged in nuclear power plant design, hazards analysis and in commissioning of operating nuclear plants. Of major concern in this work was the physiological effects of nuclear radiation and radioactive isotopes, and the control of these hazards.

While at Chemcell (a large petrochemical complex) Mr. Esplin was a member of a pollution control task force where he investigated air, water, soil, and acoustic pollution and made recommendations on abating these through process changes or through the use of control equipment.

In his present position with B.C. Research Mr. Esplin is mainly involved in the monitoring and the control of air pollution. Major emphasis is on the control of particulate emissions in the kraft mill industry. Studies have also been done on such problems as odor abatement in fish meal and meat rendering plants, airport radiation fog control, and atmospheric pollutant diffusion. He is presently studying the effect of the Vancouver Airport on air quality in the area.

M.M. Papic

1960	B.Sc. Chemical Engineering, Zagreb
1966	M.Sc. Applied Chemistry, Zagreb
1970	Ph.D. Physical Chemistry, Ottawa
1970 - 1971	Research Associate, U. of British Columbia
1971 - present	Research Officer, Division of Applied Chemistry, B.C. Research

Prior to joining B.C. Research, Dr. Papic was involved in investigation and design of various operations in the sugar industry. These include extraction, filtration, evaporation and drying operations of sugar process industry.

Since joining B.C. Research Dr. Papic has been involved and acted as a project leader in several studies related to air pollution, waste water treatment and solid waste disposal. These include air pollution surveying, coal dust suppression, camp waste water recycle, pulp mill foul condensates stripping and solid waste pyrolysis. In addition, Dr. Papic has provided technical advice and guidance to a number of projects involving instrumental and trace analysis. He is presently working with Mr. Esplin on the airport study.

I.V.F. Allen

1950	B.A. Zoology and Botany, British Columbia
1951	Glacier National Park, Warden
1952 - 1953	Fisheries Research Board of Canada
1954 - present	Division of Applied Biology, B.C. Research

Mr. Allen is currently Group Leader in charge of ecological and marine borer studies. He has been directly involved in several environmental baseline and impact evaluations. A few examples are given below:

- baseline surveys for Fording Coal Co., Kaiser Resources, Utah International, Emkay Canada Natural Resources
- baseline surveys for five copper properties in B.C. and one in Greenland
- impact of surface mining of coal in Montana
- impact study of transmission lines
- impact of copper smelter
- impact of copper mine in Kamloops district

Douglas C. Morrison

1967	B.S.A. Range and Wildlife, British Columbia
1972	M.Sc. Wildlife Ecology, British Columbia
1972 - present	Research Officer, Division of Applied Biology, B.C. Research

Prior to joining B.C. Research Mr. Morrison completed three years of field work as part of his thesis projects at U.B.C. Since joining B.C. Research he has worked with Mr. Allen on a number of baseline and impact studies.

John C. Errington

1967	B.Sc. Botany and Biology, Victoria
1970	M.Phil. Plant Ecology, York
1974	Ph.D. Mine Reclamation, British Columbia
1974	Research Officer, Division of Applied Biology, B.C. Research

Prior to joining B.C. Research Dr. Errington worked for six months on plant ecology with a consulting firm and during the summer of 1973 examined potential ecological damage from road construction related to a coal property. His present activities include studies of land reclamation and the effects of industrial air emissions on vegetation.

Douglas D. Campbell

1946	B.A.Sc. Geological Engineering, British Columbia
1955	Ph.D. Economic Geology and Geophysics, Cal. Tech.
1945 - 1957	Various geological and mining companies
1957 - present	Dolmage, Campbell and Associates

During his career Dr. Campbell has carried out a wide variety of earth science studies including damsite investigations, foundation and rock stability for major structures and monitoring and control of groundwater and rock, land and snow slides. For the mineral industry he has been involved in exploration programs, property evaluations and feasibility studies including their marketing aspects. For this particular project the following experience is directly applicable:

- disposal and reclamation of mine wastes and tailings
- reclamation of burrow areas and open pits
- control and restoration of groundwater
- townsite and recreation planning

L.T. Jory

1950	B.A.Sc. Geological Engineering, British Columbia
1964	Ph.D. Economic Geology and Geochemistry, Cal. Tech.
1948 - 1966	Various geological and mining companies
1966 - present	Dolmage, Campbell and Associates

Prior to joining Dolmage, Campbell Dr. Jory worked on a number of geological and mining projects, including the Portage Mt.

dam project while with IPEC. Other projects involved rock mechanics and support in surface and underground excavations, property evaluation and economic feasibility studies and evaluation and development of industrial mineral deposits including coal. Specially related experience is:

- evaluation of by-product uses of mine waste, tailings and ash
- waste disposal and reclamation
- groundwater control

H.O. Howey

1938	B.Sc. Mining Engineering, Alberta
1936 - 1964	Various mining and large-scale engineering projects
1964 - present	Dolmage, Campbell and Associates

Mr. Howey has been involved in several underground mining operation in Canada, the U.S., Peru and Ceylon. He has also been involved in several major engineering projects including the demolition of Ripple Rock, the Highbury sewage tunnel and a railway tunnel beneath Vancouver. With respect to environmental engineering he has experience in the following:

- materials disposal, stabilization and reclamation
- town planning

Harry V. Warren

1927	B.A.Sc. Geological Engineering, British Columbia
1929	Ph.D. Natural Science, Oxford
1929 - 1932	Post Doctoral Research, Cal. Tech.
1973 - present	Honorary Professor, U.B.C., and associate consultant with Dolmage, Campbell and Associates

Dr. Warren is one of Canada's leading minerologists and has made many major contributions to mining in Canada. He is regarded as one of the founders of the science of geochemistry and has published over 150 papers on minerology, geochemistry and environmental impact. Through extensive work in biogeochemistry Dr. Warren has applied this science to environmental and population studies. Of

particular interest in this study are:

- trace elements and epidemiology
- medical geology and geography
- metal pollution as a problem in industrial areas

R.E. Foreman

1962	B.A., Botany, Zoology and Geology, Colorado
1970	Ph.D., Botany, Berkeley
1958 - 1964	Institute of Arctic and Alpine Research, U. of Colorado
1964 - 1970	Teaching Associate, Dept. of Botany, U. of California
1970 - present	Assistant Professor, Dept. of Botany, U.B.C. and associate consultant with Dolmage, Campbell and Associates

Dr. Foreman has participated in a broad range of ecological studies including floral mapping from aerial photos, plant and animal sampling and evaluating the effects of radiation fallout. In addition to teaching courses on plant ecology at U.B.C., he has carried out research projects in the following areas:

- evaluation of marine benthic communities
- study of waste discharges from chemical plants and refineries
- monitoring program for waste disposal in Rupert Inlet
- environmental baseline studies

J.F. McIntyre

1949	B.Sc. Mining Engineering, Alberta
1949 - 1959	Several mining and engineering companies
1959 - present	Project manager and associate consultant with Dolmage, Campbell and Associates

Mr. McIntyre has been involved in a variety of mining and major engineering projects, including the Hat Creek coal field, a copper mine in Formosa, a tin mine in Malaya, Portage Mountain dam, the Highbury sewer tunnel and the Iron Gates highway tunnel. He has carried out many studies in:

- land stabilization and reclamation
- coal ash utilization
- waste and by-product use and disposal

Harold N. Halvorson

1955 Honors Chemistry, British Columbia
1956 M.Sc. Metal Chemistry, British Columbia
1965 Ph.D. Metallurgical Engineering, British Columbia

During the period 1956 - 1963 Dr. Halvorson worked as research chemist with Alcan, Sherritt Gordon, Rayonier, and B.C. Research on a broad range of industrial research projects. After completing his Ph.D. in 1965 he joined Cominco as research metallurgist and then moved into the area of market research and development, including new ventures in the fields of non-ferrous metals, pollution by-products and chemical products.

He is now in the consulting field (as an individual) and has completed a feasibility study for B.C. Research on establishing an extractive metallurgy center there. He is currently serving on a copper advisory committee for the Provincial Government.