

# Report of the Environmental Assessment Panel

Roberts Bank  
Port Expansion



March 1979

PANEL REPORTS

TO THE **MINISTER** OF THE ENVIRONMENT

ON THE PANEL PROJECTS

1. Nuclear Power Station at Point Lepreau, New Brunswick.  
(**May** 1975)
2. Hydro **Electric** Power Project, Wreck Cove, Cape Breton Island,  
**Nova** Scotia. (August 1976)
3. Alaska Highway Gas Pipeline Project, Yukon Territory.  
(Interim report, August 1977)
4. Eldorado Uranium Refinery Proposal, Port Granby, Ontario.  
(**May** 1978)
5. Shawkak Highway Project, Yukon Territory - British Columbia.  
(June 1978)
6. Eastern **Arctic** Offshore Drilling - South Davis Strait Project.  
(November 1978)
7. Lancaster Sound Offshore Drilling Project  
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8. Eldorado Hexafluoride Uranium Refinery, Ontario (February, 1979)

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**The Honourable Len Marchand, P.C., M.P.**  
Minister of Environment  
House of Commons  
**OTTAWA, Ontario**  
K1A 0A6

**Dear Sir:**

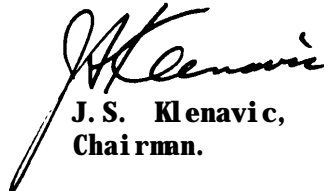
**The Environmental Assessment Panel for the Roberts Bank Port Expansion proposal is pleased to submit its report for your consideration. This is in accordance with the Federal Environmental Assessment and Review Process.**

**The proposal by the National Harbours Board is to increase the size of bulk loading facilities at Roberts Bank from 20 hectares to as much as 130 hectares to facilitate the export of commodities such as coal, sulphur, potash, grain and bulk liquids.**

**The Panel has considered in depth the environmental implications of the proposal and has concluded that significant environmental damage and risk would result from the proposal. The Panel recommends that the expansion as proposed not be permitted to proceed. However, the Panel notes that there is an area where reduced expansion could be tolerated with minimal environmental impact.**

**The Roberts Bank Port is in the estuary of the Fraser River which is one of the most ecologically important estuaries in North America. The Panel considers that the area merits special attention and stringent conservation measures. The Panel supports current government initiatives in these directions and believes that a decision on the port expansion proposal should reflect the spirit of these initiatives.**

**Respectfully yours,**



**J.S. Klenavic,  
Chairman.**

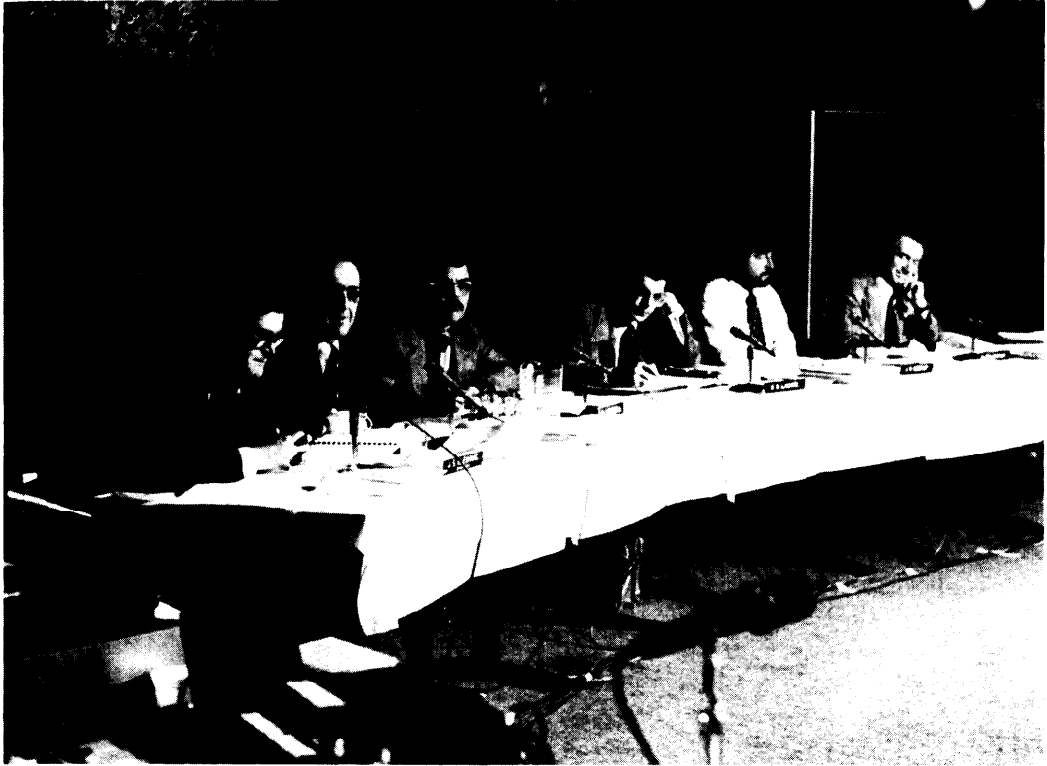


## TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY .....	1
INTRODUCTION .....	5
ISSUES AND IMPACTS .....	13
1. INTRODUCTION .....	15
2. PROJECT JUSTIFICATION AND ALTERNATE SITES .....	15
3. THE FRASER RIVER ESTUARY SYSTEM 16	
4. ESTUARINE ECOLOGY .....	18
(a) Introduction .....	18
(b) The Physical Environment .....	18
(c) Aquatic Vegetation .....	21
(d) Benthos .....	22
(e) Plankton and Fish .....	22
(f) Migratory Birds .....	24
5. ESTUARINE POLLUTION AND WATER QUALITY .....	25
(a) Construction Phase .....	25
(b) Operational Phase .....	26
6. AIR QUALITY AND EMISSION OF PARTICULATES .....	28
7. NOISE .....	29
8. SOCIAL / COMMUNITY / ECONOMIC IMPACTS .....	30
(a) Setting .....	30
(b) General Deficiencies in Social Impact Analysis .....	31
(c) Delta and Surrey .....	32
(d) Tsawwassen Indian Band .....	33
(e) The Farming Community .....	35
(f) North Vancouver .....	36
(g) East Kootenay Communities .....	36
(h) Fishing Interests .....	37
(i) Other Concerns .....	37
9. RESPONSIBILITY FOR IMPLEMENTING MITIGATING MEASURES .....	38
10. SUMMARY OF MAJOR CONCLUSIONS .....	39
OVERALL CONCLUSION .....	45

	Page
<b>RECOMMENDATIONS</b> .....	<b>49</b>
<b>A. PROPOSED EXPANSION</b> .....	<b>51</b>
<b>B. REDUCED EXPANSION</b> .....	<b>51</b>
<b>C. GENERAL RECOMMENDATIONS</b> .....	<b>53</b>
<b>APPENDICES</b> .....	<b>55</b>
APPENDIX A-Participants in Public Review .....	57
APPENDIX B-List of <b>Panel</b> Documents .....	60
APPENDIX <b>C</b> — <b>Panel</b> Member Biographies .....	61
APPENDIX D-Review Process Considerations .....	65
APPENDIX E-Glossary of Terms .....	68

## EXECUTIVE SUMMARY





"Something else to be considered is the beating of one locomotive against another. If you've got one locomotive producing a sound of 80 hertz and another one producing one of 78 hertz, you've got a beautiful sound that goes 'bubba, bubba, bubba, bubba, bubba, bubba', now if you think a pure note is going to keep you awake, can you imagine what that's going to do to you? I don't think there's any probability of being able to tune these things so that they're going to be musical so the only thing you can do is to attenuate them."

*Mr. Harry Bergenstein, Delta Resident.*

"So, if we're wrong about eelgrass colonization, what does this mean to the present commercial and sports fishery? The Salmon Enhancement Program anticipates a more than doubling of the production of salmon and steelhead from the Fraser River. We must assume the Fisheries Service is confident there is sufficient rearing habitat in the estuary to accommodate these animals or it would not have embarked on the program. Therefore, the only real effect likely from our most pessimistic prediction of habitat loss is a nominal reduction in the future growth of fish production."

*Mr. Rick Hinton, Beak Hinton Consultants Ltd.*

"The waterfowl of three continents converge at the Fraser wetlands on the way to and from breeding and wintering areas that extend from Eastern Russia to South America. The result is a dazzling array of wildlife made available not only to the people of British Columbia, but also the countless others who must rely on the Fraser wetlands to ensure the survival of birds. Proper wintering and staging areas are critical to the survival of migratory as well as resident bird populations. Therefore, the security of the Fraser wetlands will determine the fate of a variety of birds over an enormous area of North America, South America and North-eastern Asia."

*Mr. G. A. West, Regional Director,  
B. C. Fish and Wildlife Branch,  
Ministry of Recreation and Conservation.*

## EXECUTIVE SUMMARY

The present port facilities at Roberts Bank, constructed in the late 1960's, consist of a 20 hectare coal port terminal at the end of a 5 km causeway. The National Harbours Board proposes to construct an additional 80 to 110 hectares of storage area adjacent to the present terminal for the export of such commodities as coal, sulphur, potash, grain and bulk liquids according to projected requirements over the next 15 to 20 years. The construction is proposed to be a balanced dredging and filling operation. The material excavated from an enlarged ship channel and turning basin would be used to create the required additional terminal space.

An Environmental Impact Statement (EIS) for the project was prepared in 1977 by the National Harbours Board, in accordance with the Federal Environmental Assessment and Review Process. Since November 1977, the Environmental Assessment Panel has been conducting a review of the EIS in cooperation with the public and agencies of all levels of government. This review culminated in public

hearings held by the Panel in the vicinity of the project in late October and early November 1978. This report conveys the deliberations, conclusions and recommendations of the Panel to the federal Minister of Environment.

The Panel carefully reviewed the National Harbours Board's EIS and the environmental design incorporated into the proposal, and considered representations and technical advice from over 90 agencies, groups and individuals.

From the point of view of estuarine ecology, the Panel has concluded that the potential impacts on the Fraser River estuary, of which Roberts Bank is a part, are too great to recommend that the port expansion be approved as proposed. The extent and ecological significance of the Fraser River estuary, particularly its use by fish and wildlife, make it unique in North America. A major salmon fishery depends on its preservation as do hundreds of thousands of migratory birds.

In addition to ecological concerns, potential social impacts exist from the proposed scale of development. These include effects from blowing coal dust, train traffic, noise and increased local services requirements.

The Panel acknowledges the need for additional coal port facilities. However, the National Harbours Board has not demonstrated the need for new port facilities at Roberts Bank for sulphur, potash, grain or bulk liquids.

The Panel has concluded that the ecological damage would be minimal and other adverse impacts could be reasonably mitigated if port expansion were limited. If it is decided that a reduced expansion is feasible, the Panel recommends that it be limited to the area of the proposed Terminals 2 and 3 and that the ship channel not be enlarged significantly beyond the existing channel. The recommended limits of expansion are shown in Figure 3. (p. 50)

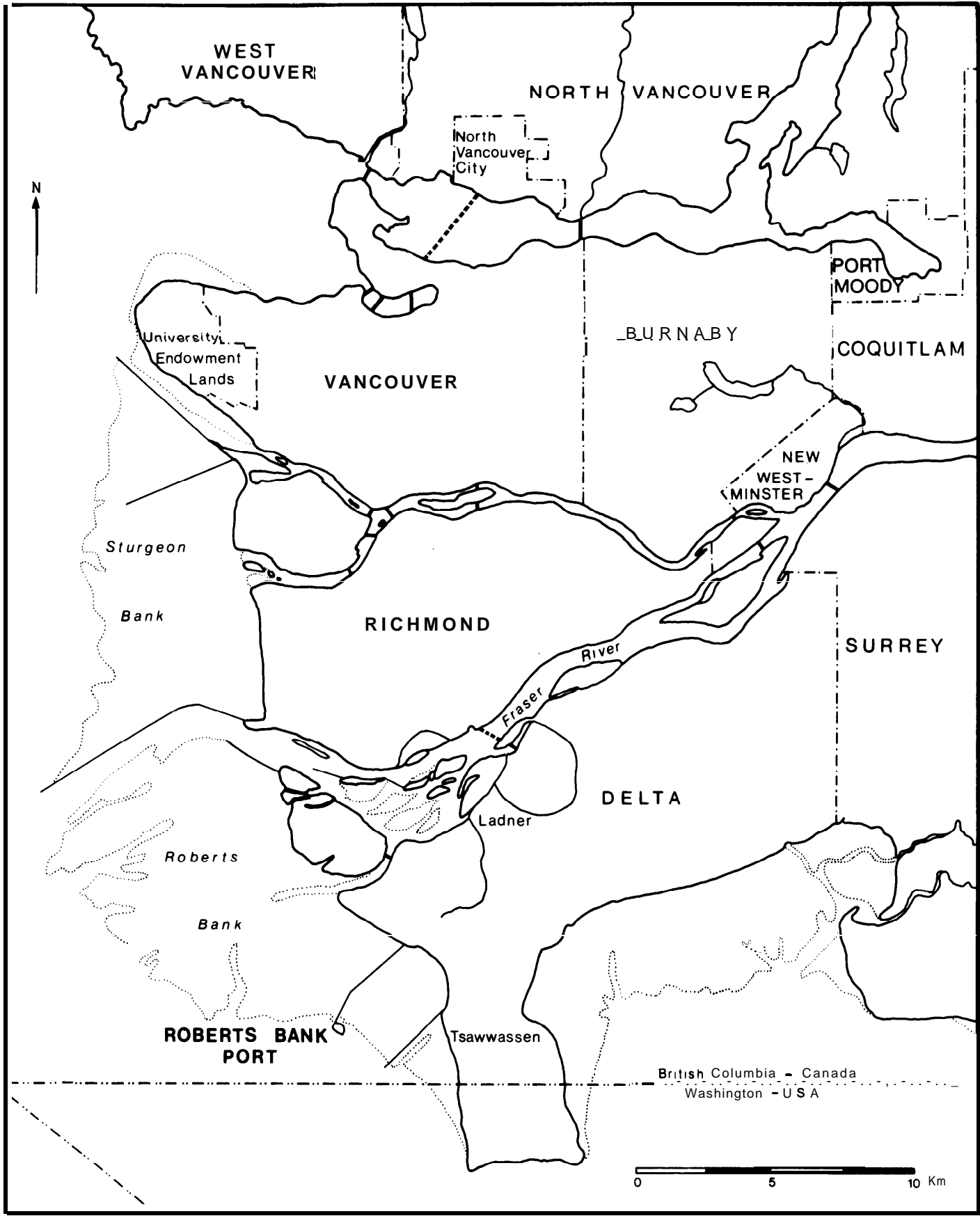
The Panel believes that there would be little further value in the National Harbours Board preparing and submitting a new EIS for a reduced expansion. However, further work is required with respect to an acceptable environmental design for a reduced expansion.

If it is decided to proceed with a reduced expansion, the Panel recommends that the National Harbours Board prepare and make public reports, for the

concurrence of the federal and British Columbia Ministers of the Environment, on the following matters:

- (a) design details of a reduced development
- (b) an assessment of the social/community impacts of a reduced development and an evaluation of the mitigation measures required to minimize these impacts.
- (c) a description of how all recommended mitigation measures are to be implemented.
- (d) a description of how the Panel's recommendations will be incorporated into the design and implementation of the project.

The Panel has made ten detailed recommendations relative to a reduced scale of expansion, as well as nine recommendations for actions that should be carried out whether or not any expansion proceeds.



Project location

## INTRODUCTION



"If we are to avoid con-  
straining development in  
western Canada, this expansion  
at Roberts Bank must be pro-  
ceeded with. . .new port  
terminals are obviously not  
created overnight. They must  
be available when needed. The  
economic future of this country  
depends on our ability to  
increase our exports and to do  
that, we must expand internally.  
If we don't, we shall, in  
addition to picking up no new  
customers abroad, be in great  
danger of losing some of those  
that we have served for years."

*Mr. F. J. N. Spoke, General  
Manager, Port of Vancouver.*

"We are concerned that the  
rail line to Roberts Bank will,  
in the future, encourage and  
serve as a main artery to an  
industrial area, particularly,  
if rail storage facilities,  
marshalling yards, etc., are  
available at the causeway head-  
lands. All future development  
in this area will encroach upon  
either valuable farmland, near-  
shore marshland habitat, or  
estuary foreshores."

*Mrs. J. Cromarty, Citizens'  
Association of Delta.*

"...whether there's bunker-  
ing or not, if two ships run into  
each other, there's going to be a  
good chance of an oil spill and  
that does happen and it happens  
often and I expect there's nobody  
here willing to guarantee that it  
won't happen in the Roberts Bank  
port and it is an issue that  
should be considered seriously by  
the proponent and examined..."

*Mr. Cliff Stainsby, Society for  
Pollution and Environmental  
Control.*

"Our idea is to keep the  
present work force working through  
a continued period of time rather  
than have the immediate boom with  
six mines coming on stream and the  
social unrest and the havoc that  
that causes in the area. We've  
been through one of these now and  
I can assure you, it just isn't a  
pleasant place to live in while  
this expansion is going on."

*Mr. James Patterson, East Kootenay  
Labour Council.*

## INTRODUCTION

The existing Roberts Bank port facility consists of a 20 hectare man-made terminal connected to the mainland by a causeway 5 kilometres long and 30 metres wide.

The port expansion project is a proposal by the National Harbours Board (Port of Vancouver) to add up to 110 hectares to the existing facility through the addition of four new terminal areas and an administrative area. There would also be a widening of the causeway and an increase in the size of the present ship berthing channel, including the addition of a ship turning basin. The project is being proposed as a means of meeting projections of future west coast bulk terminal requirements.

The project was referred to the Federal Environmental Assessment Review Office in early 1975 by the proponent, the National Harbours Board. This was in accordance with the 1973 Cabinet decision establishing the Federal Environmental Assessment and Review Process, which directs all federal agencies to undertake an environmental assessment for projects discerned to possibly

have an adverse impact on the natural or social environment. For projects with a potentially major impact, an Environmental Assessment Panel is established to review the environmental consequences of the project and to evaluate the significance of the environmental impacts that might result from implementing the project. Such a Panel was established for the Roberts Bank proposal. This report, directed to the Minister of the Environment, is the result of the Panel's review. It contains a discussion of the significant environmental and social issues relating to the project and the Panel's conclusions and recommendations.

### Project Setting

Roberts Bank is located south of Vancouver in the municipality of Delta, and is within the ecologically important Fraser River estuary. The Bank extends along the delta front south from the main arm of the Fraser River to the Canada-U.S. boundary. It slopes gently from the dyked delta lowlands out to deep water. In the vicinity of the existing causeway, the intertidal area from high water to low water is approximately 3000 metres wide.

**Located about 3 kilometres south and parallel to the port causeway, is a similar man-made causeway, 3 kilometres in length, serving the Tsawwassen Ferry Terminal.**

**The Roberts Bank ecosystem is characterized by a variety of ecologically important habitat types. Notable among these are extensive beds of eelgrass. These habitats form the basis for populations of varied estuarine life forms including fish, crabs and birds.**

**Roberts Bank is situated along the seaward fringes of the municipality of Delta. Although Delta is fast becoming urbanized and to a large extent is a residential suburb of Vancouver, it still contains extensive areas of farmland. The two major urban centres of Delta likely to be directly affected by the port expansion are the communities of Ladner and Tsawwassen (South Delta). Tsawwassen is a relatively young community with considerable new residential growth. Ladner is an older centre which in the past has been primarily a fishing community surrounded by several farms. Although the character of Ladner still reflects its past, it is today primarily suburban in nature. The 1976 population of Tsawwassen was 15,000 and that of Ladner, 12,000. The rural segment of Delta's population is concentrated**

**in the area from East Ladner to Roberts Bank. Although much of the farmland is owned privately, a significant portion of the farmers are resident on land held by others for speculative purposes.**

**In addition to the communities of Tsawwassen and Ladner, the Tsawwassen Indian Band occupies about 280 hectares of land fronting on the shore between the two causeways. The present Band population is approximately 60, with about 40 people now living on the Reserve. The Band has been associated with the Roberts Bank and Fraser estuary area throughout its history, and in the past has relied heavily upon the area's natural resources for its livelihood.**

### **General Project Description**

**The existing Roberts Bank port, opened in 1970, is one of the largest single berth terminals in Canada. The port consists of a 20 hectare man-made island created from dredged material. It accommodates coal train unloading and ship loading equipment, storage stockpiles for coal, a single ship berth and offices. A causeway, 5 kilometres in length, providing rail and road access, joins the terminal with the mainland.**



It should be noted that no environmental assessment was carried out during the design of the existing terminal facility. However, the engineering consultants did conduct some interviews with relevant federal government departments to determine the ecological impact that might be expected.

The existing terminal is operated by Westshore Terminals Ltd., a subsidiary of Kaiser Resources Ltd., and is used for handling coal and coal products primarily from the Kaiser Resources mine and Fording Coal mines in south-eastern British Columbia. Westshore Terminals Ltd. operates the terminal under a lease from the National Harbours Board (Port of Vancouver).

The proposed expansion calls for the addition of four new terminal areas (each 20 hectares), an administrative area (of size yet to be determined), an increase in the size of the ship berthing channel and the addition of a ship turning basin. The causeway would be widened to accommodate the additional rail trackage and roads required for the new terminals. The project has been designed to balance the amount of fill required to construct the new terminal areas with the amount of dredging necessary to create the expanded

ship berthing area and turning basin. Details of the expansion proposal are shown on Figure 1.

In terms of the commodities to be handled through the expanded facilities, the proponent anticipates that the most probable use of the terminals will be two terminals for coal, one terminal for grain and one terminal for potash or potash and sulphur. In addition, it is proposed to make room available for the possible future handling of some bulk liquids using a pipeline connection between one of the berths and a tank farm in an industrial area to be located on the north-west side of the causeway.

#### Environmental Review Process

In accordance with the federal government's Environmental Assessment and Review Process, an Environmental Assessment Panel was formed in 1975 to review the environmental and social consequences of the project.

The Panel's first task was to develop guidelines for the preparation of the Environmental Impact Statement (EIS) by the proponent. These were published in March, 1976. In March, 1977, the

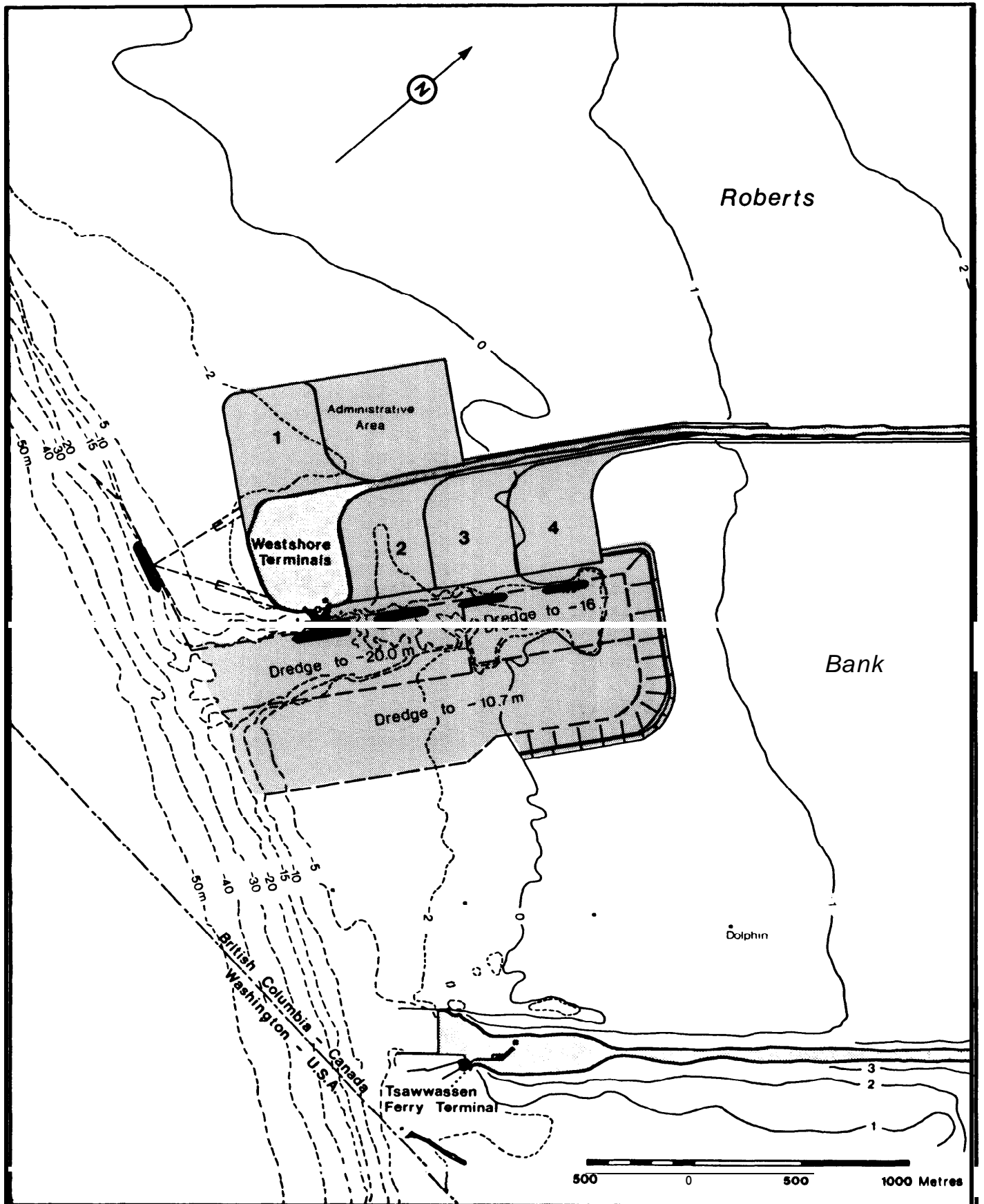


Figure 1. Proposed port expansion. (shaded )

proponent commissioned the firm of Beak Hinton Consultants Ltd. to undertake an environmental assessment of the project based on these guidelines. The six volume EIS was completed and submitted to the Panel in October, 1977.

Public participation in the review of the EIS was invited through media advertisements and direct mailings. A complete set of the EIS documents was made available to all those wishing to participate in this review. This resulted in the receipt of 46 written submissions commenting on the EIS and the project. Following receipt of comments from the public, the Panel, in February, 1978, issued to the proponent a statement outlining what it considered to be areas of deficiency in the EIS. In June, 1978, the Panel received from the proponent their reply entitled "Response to a Statement of Deficiencies in the Environmental Impact Assessment of Roberts Bank Port Expansion". This document was given wide public distribution by the Panel.

The Panel subsequently identified major issues that it considered important for further discussion at public hearings. This stage of the Panel process involved a public review of the major aspects of the project

proposal and culminated in six days of public hearings held in Delta and Richmond in late October and early November, 1978. All sessions of the hearings were attended by representatives from the proponent and its consultants. In addition, a number of Panel advisors who had expertise in specific areas of concern were in attendance at the hearings. During the course of the hearings, approximately 50 oral presentations by individuals, agencies and groups were made to the Panel.

The hearings were recorded and a complete transcript of the proceedings is available from the Federal Environmental Assessment Review Offices in Vancouver and Hull. Sixty-three written briefs were received by the Panel during the course of the final review, with many of these briefs being addressed at the hearings. A 463 page compendium of these briefs is also available at the Federal Environmental Assessment Review Offices.

A listing of individuals, groups and agencies who submitted briefs to the Panel may be found in Appendix A. A list of all documents associated with the review is found in Appendix B.

Since referral of the project to a Panel review, the Panel membership has changed. The Panel members that prepared this report are:

**Mr. John S Klenavic (Chairman)**  
**Federal Environmental**  
**Assessment Review Office**  
**Hull, P. Q.**

**Mr. M Bruce Pepper**  
**The Vancouver Board of Trade**  
**Vancouver, B. C.**

**Dr. Doug S. Lacate**  
**Lands Directorate**  
**Environment Canada**  
**Vancouver, B. C.**

**Mr. Jonathan P. Sexter**  
**B. C. Ministry of the**  
**Environment**  
**Victoria, B. C.**

**Mr. W J. (Bill) Musse11**  
**National Parole Board**  
**Burnaby, B. C.**

**Dr. Michael Waldichuk**  
**Pacific Environment Institute**  
**Fisheries and Oceans Canada**  
**West Vancouver, B. C.**

ISSUES AND  
IMPACTS



"Until recently, the port (Vancouver Harbour) had been developed mainly by private enterprise and a healthy spirit of competition. When concentrates started to move through the port, it was private enterprise which provided the facilities and took the risk of installing a special dock. It was the same story for potash, sulphur, the initial coal, methanol, pulp and paper. Private enterprise provided the money, the engineering, the marketing which has served the export industry so well."

*Mr. Gordon Hutchison, Manager,  
Vancouver Wharves Ltd.*

"Existing knowledge is adequate to recognize the importance, sensitivity and interdependence of ecological resources within the Fraser River Estuary. The same data base unfortunately is not adequate enough to provide a clear and detailed understanding of biophysical processes, food chain inter-relationships and species dependency for precise specific areas. Hence, the determination of environmental impacts resulting from man-made developments requires considerably more detailed study than has been provided."

*Mr. Mike Romine, Environment  
Canada.*

## **ISSUES AND IMPACTS**

### **1. Introduction**

Throughout the public review of the port expansion proposal, especially at the hearings, the Panel heard concerns expressed by many individuals, groups and agencies (Appendix A) on a wide variety of issues and impacts.

Many participants at the hearings argued that the EIS was inadequate and did not enable a proper assessment to be made of the environmental consequences of proceeding with the proposed project. In particular, the short time frame for the study, the lack of quantitative information upon which to base an assessment and the lack of social impact assessment, were criticized.

The main ecological concerns expressed were directed towards the impacts of the port expansion on the habitats of salmonids, crabs and waterfowl. Arguments were also put forward that impacts on the ecology of the Roberts Bank area should be considered in the broader context of the Fraser River estuary ecosystem because of the interdependence of its components.

The major social/community issues raised were impacts of train

noise and the possible use of B.C. Harbours Board lands behind the dykes for port related industrial development.

Support for the port expansion proposal came from some East Kootenay communities, some labour organizations, most segments of the coal industry and some segments of the sulphur industry. However, not all industry segments were in favour of the port expansion and some argued that there was no demonstrated need for expansion at Roberts Bank other than for the shipment of more coal. The question of project justification was the subject of much discussion at the hearings.

There was also criticism of the Environmental Assessment and Review Process and of Panel reviews in particular. The Panel considered that many of the concerns expressed were relevant, and the Panel's views on these issues form Appendix D of this report.

### **2. Project Justification and Alternate Sites**

Major disparities concerning project need exist between the proponent's projections and the opinions expressed by many of the participants.

Information was presented to the Panel indicating that existing terminal facilities in Burrard Inlet are adequate to service present and anticipated future requirements for sulphur and potash. In addition, conflicting information was presented regarding the expected growth in several commodity areas, including sulphur shipments. The Panel considers that the need for new facilities for sulphur and potash to supplement existing facilities was not convincingly demonstrated. Nor does it consider that a case was made for the desirability of a grain handling terminal at the Roberts Bank port.

Objections were raised in connection with the handling of bulk liquids at Roberts Bank. While this issue is dealt with more fully in terms of environmental impact in another section of this report, no rationale for a facility to accommodate bulk liquids at Roberts Bank was presented.

There was no consensus among the various industry representatives as to the absolute magnitude of the future requirements for coal port facilities. It is the Panel's opinion that existing south coast coal port facilities are likely to be inadequate to handle projected growth in terms of both size and customer acceptability.

Projections presented by coal authorities indicate a substantial growth in expected Canadian shipments which will need to be served by a south coast port. All of this product will be transported on the CP Rail line. Attempts were made by the proponent and others to assess the relative merits of Roberts Bank and other port sites, including northern locations. The Panel believes that a port facility on the south coast is largely independent of any port development on the north coast. The Panel also doubts that the inner harbour of Vancouver could fully accommodate projected increases in south coast coal shipments, and that it was not unreasonable for the proponent to concentrate on the Roberts Bank site for detailed analysis.

### 3. The Fraser River Estuary System

The Fraser River estuary and associated transitional wetlands comprise one of the most dynamic and productive ecosystems in Canada. This ecosystem supports a large and diverse community of organisms. All links of the food chain are present from the simple life forms such as plankton, benthic invertebrates and estuarine vegetation, through to the more complex life forms such as fish, birds and mammals. The Panel recognizes the commercial and recreational importance of this



ecosystem and is aware of the considerable intrusion that has occurred within the system since the arrival of European man. This intrusion has reduced the inland extent of the system and has influenced its overall ability to function to its full capacity in an ecological sense.

The Panel recognizes the joint federal/provincial Fraser River Estuary Study which is under way and is in full agreement with the principle, as outlined in the Phase 1 report of the Study Steering Committee, that management of the Fraser River estuary ecosystem should be applied in a holistic manner.

The Panel also recognizes the provincial requirement, as incorporated in provincial Order-in-Council 908, that the Roberts Bank proposal be subject to a provincial environmental review. The Panel was informed that its report will form the basis for the provincial review.

There was considerable concern expressed that, while enough basic qualitative information is available to allow recognition of the overall importance of the Fraser estuary ecosystem, there is not enough quantitative data to allow for a comprehensive assessment to be made of the impacts of specific development projects. The port

expansion project is no exception, especially since the proponent gathered little new information during the course of its assessment. The Panel agrees with this concern in a general sense.

However, it believes that, given the conditions around the present development, certain predictions can be made with a reasonable degree of confidence about the impact on areas of apparent high habitat quality, as well as on areas of low habitat quality. The Panel also believes that some judgement can be made on the impact of utilizing such areas as the disturbed sand flat zone near the present terminal and outer section of the causeway.

It was also recommended to the Panel that the Roberts Bank project not be viewed in isolation from other existing and proposed developments in the system and should be considered with these in an integrative, cumulative sense. The Panel is in agreement that careful study should be done on the system as a whole, but questions whether this kind of analysis should be the sole responsibility of a single development proponent. The Panel believes that such a study is more properly the responsibility of governments and is very concerned that such important work has not been completed.

The proponent has suggested that the Roberts Bank inter-causeway area is largely separate from the rest of the delta ecologically. In terms of features such as eelgrass habitat, herring spawning, salinity, water quality, wave climate and shelter value, it is evident that the intercauseway area is different. This is largely due to physical barriers that have been created on Roberts Bank by the two causeways. However, the Panel does not agree that the area is a separate entity in the broad ecological sense.

#### 4. Estuarine Ecology

##### (a) Introduction

The Fraser River estuary is a vital ecological resource on the Pacific Coast of Canada, not only as a habitat for fish and other aquatic organisms but also for birds. The Fraser continues to be a major Pacific salmon river of great commercial and recreational value. The salmon of this river also support a native food fishery of considerable importance. The Panel recognizes that protection of the valuable Fraser River salmon fishery must be considered as the principal element in

evaluating ecological impact of the proposed port expansion. This is not to say that the Fraser River estuary is less vital for aquatic birds. However, the Panel believes that birds can adapt more easily than fish to altered habitats.

The Panel is dismayed that more quantitative ecological information was not available to evaluate the impacts of the proposed project. This is particularly disappointing when it is considered that the initial phase of the Roberts Bank port development was begun more than 10 years ago. The need to conduct environmental investigations on the developed port, in relation to potential future expansion, should have been obvious and of high priority.

##### (b) The Physical Environment

Roberts Bank is largely intertidal, with the Strait of Georgia waters extending to the nearshore marshes and dykes at high tide and receding to a zero tide line about 1 km north-east of the outer edge of the existing port at low tide. The Fraser River water washes over the bank during the ebbing tide, with the largest proportion of the river water moving north-westward along the delta. The average net current

over a tidal day sets to the north-west. The net littoral drift of sediments is also in that direction.

It should be noted that the Tsawwassen Ferry Terminal and the Roberts Bank Port causeways create physical obstructions to the natural flow of water and sediments across Roberts Bank. That portion of the proposed expansion located to the north-west of the causeway (Terminal 1 and the Administrative Area), if constructed, could lead to additional obstructions. The northwest-southeast component of the tidal current is totally blocked by these causeways shoreward of the Roberts Bank terminal and ferry terminal. The tidal current must flow into and out of the intercauseway area along an axis parallel to the two causeways, setting north-east on the flood and south-west on the ebb.

The flow of Fraser River water in a south-easterly direction shoreward of the two terminals is obstructed and this would be accentuated by any new port development north-west of the present terminal (proposed Terminal 1 and the Administrative Area). The

obstruction of river flow can be seen in aerial photographs, where water north of the Roberts Bank Port causeway is turbid and the water in the intercauseway area is comparatively clear (Figure 2). Thus the amount and distribution of river sediments in the intercauseway area has been greatly modified by the causeways. Moreover, the littoral transport of sediments in a direction parallel to the shore and shoreward of the Roberts Bank port and ferry terminal has been virtually stopped. Instead of the net littoral drift of sediments being to the north-west from the Point Roberts area, sediments are deposited south of the junction of the Tsawwassen Ferry Terminal causeway and the shore.

Aside from the impediment to currents that the two causeways create, they have also provided shelter from waves. There is now effective protection in the intercauseway area from waves generated by north-west and south-east winds.

Because of the importance of currents and wave action on the deltaic environment in the intercauseway area, the Panel concludes that any changes planned in this area should first be tested on a hydraulic model where current and wave action can be properly measured.



Figure 2. Aerial photograph of intercauseway area. Photo: BC 5725 -12 , July 1976.

### (c) Aquatic Vegetation

Studies on Roberts Bank have identified three vegetative zones: (1) Saltmarsh, in wetlands, adjacent to the shore; (2) algal mat, in the intertidal zone, seaward of the upper beach; and (3) eelgrass beds, from about 1 metre above to 1 metre below lower low water. All the aquatic vegetation contributes to the estuarine aquatic food chain and to the food supply and bird and fish habitats. However, it is generally agreed that the eelgrass is the most important plant habitat for the valuable fish resources on Roberts Bank. This rooted aquatic plant is also a food source for aquatic birds.

It is reported that the change in certain conditions within the intercauseway area has led to increases in extent and density of eelgrass distribution. There are indications also that erosion of the eelgrass beds has occurred in sections of the entrance to this area where currents have increased as a result of dredging. Because the proponent's conclusions regarding the increased eelgrass beds are based only on black and white aerial photographs as baseline information, without actual sampling, prior to installation of the Roberts Bank port and

causeway, some doubt remains about the actual extent of the eelgrass beds at that time. Unfortunately, there has been no study to evaluate the environmental changes that could be related to alterations in the eelgrass beds since the installation of the Roberts Bank terminal and causeway.

The importance of eelgrass as a habitat for juvenile salmonids and crabs is generally accepted without much scientific support. However, it is an hypothesis that is difficult to refute. Certainly juvenile salmonids and crabs have been found feeding in eelgrass. Herring spawn on eelgrass as a preferred substrate. Various organisms living in the eelgrass serve as food for fish and birds, and the eelgrass itself provides food for aquatic organisms and birds. Although no study has been conducted to verify the degree of eelgrass importance ecologically, the Panel concludes that the health and extent of the eelgrass beds are good indices of habitat quality. However, there is insufficient evidence for the Panel to conclude that the addition or deletion of a given amount of eelgrass is directly proportional to the increase or decrease in the salmon fisheries resource.

#### (d) Benthos

The benthos is composed of organisms dwelling on the sea bottom and in sediments. These organisms receive the greatest impact from disturbance of the bottom in any type of development. In the case of the Roberts Bank proposal, this can range from total elimination of habitat in the filled area of the proposed port expansion, to an alteration of habitat through dredging required to increase the size of the ship berthing channel and to create a ship turning basin. Sedentary organisms such as mussels and barnacles are generally eliminated in areas of dredge and fill operation. Some benthic organisms, such as crabs, have the capability of moving out of an area when disruption occurs. However, with elimination of habitat, it can be anticipated that the populations of such species will be reduced accordingly.

On Roberts Bank, the Dungeness crab is the only bottom species that is exploited commercially and recreationally. Of far greater ecological significance, from the fisheries point of view, is the contribution that bottom organisms make as food for juvenile salmonids.

Some of the microinvertebrates may be eaten directly by the fish. Other larger species, such as clams, mussels, barnacles and crabs, contribute larvae which are part of the drifting organisms of the sea. Such larvae may constitute a substantial proportion of the seasonal food of juvenile salmon and herring. However, no quantitative evaluation of their contribution to the food supply of fish has been made. The Panel can only accept a reasonable assertion that the benthos are important as a food source for both fish and wildlife on the delta, and concludes that these species and their habitats should be protected.

#### (e) Plankton and Fish

Phytoplankton are comparatively sparse in the Fraser River estuary because of the high turbidity and, therefore, plant carbon production by these organisms as a food source for higher organisms is relatively small. Zooplankton, the animal drifting organisms which normally graze on the phytoplankton, may consist of tiny crustaceans, jellyfish and other species normally found in the water column. Zooplankton may also consist of the larvae of both fish and invertebrates. In the delta of the

Fraser River, certain small benthic organisms are brought into the water column during the rising tide and become part of the zooplankton. It is the zooplankton, particularly the nutritious, high-protein forms, that are likely to provide the major food supply for salmonids.

While there is a wide variety of fish species in the Fraser River estuary, there are essentially two groups that have commercial importance, salmonids (all anadromous species) and herring (a pelagic species). The importance of the estuary to these two groups lies in the fact that juvenile salmonids utilize the estuary as a nursery area for feeding before proceeding to sea, and herring spawn on near-shore vegetation. Herring eggs and larvae may also serve as food for salmonids. The Panel appreciated that eelgrass contributes substantially to the food and habitats of fish, but found it difficult to obtain a concrete measure of the value of eelgrass beds for these species, because of the lack of quantitative information on their interrelationships.

There is a possibility that the present causeway may have significant interruptive effect on the orientation of juvenile salmonids in their utilization of Roberts Bank and the intercauseway area. Indeed, it is possible that losses of young salmon, especially chums, could occur owing to an inability to enter the intercauseway area directly, in which case the fish could be exposed to higher mortality in the Strait of Georgia as they follow the plume of the Fraser River seaward. For those salmon that follow the edge of the causeway as an orienting feature, higher than normal mortality may occur from capture by predatory fish such as rockfish, which are present along the outer portions of the terminal and causeway. The Panel suggests that this major interruptive configuration in an essentially uniform environment could be a salmon mortality factor, and this question warrants investigation by the Fisheries and Marine Service.

The Panel is not convinced that there is any estuarine area surplus to the needs of juvenile salmonids for nursery grounds. This is the consensus in spite of the plans of the Salmonid Enhancement Programme to eventually double the current

production of salmon on the B. C. coast. It is acknowledged that a large proportion of the potential salmonid rearing grounds in the Fraser River estuary has been alienated in the past, particularly by the dyking that took place around the turn of the Century. Therefore, the Panel concludes that any further losses of salmonid rearing grounds should be kept to an absolute minimum. The Panel also concludes that certain mitigation measures, such as eelgrass transplants and provision of new habitat, have not been proven in practice on a large scale and, therefore, cannot be accepted as compensation for existing fisheries habitat. Such practices cannot be relied upon as mitigation measures until there is evidence to indicate they will work.

The Panel notes that there are areas south-east of the Roberts Bank port causeway, and immediately adjacent to the existing terminal, that have rather minimal eelgrass and other living resources. If development were to be limited to these areas, impacts would be less than for the full scale port expansion, with comparatively small disruption of and reduction in available habitat.

It should be noted that this reduction of impact, with limited development, applies to both the additional reclaimed terminal land and to the proposed ship berthing and turning basin, even though the latter does not eliminate habitat as much as the former.

#### (f) Migratory Birds

The Fraser River estuary is a key staging and wintering ground for migratory bird species using the Pacific Flyway. The protected nature of the intercauseway area, its habitat features and its attractiveness to staging migratory bird flocks during both fall and spring migrations are well known. Furthermore, the use of the intercauseway area as a storm haven for late and wintering flocks of migratory birds is recognized. It is the Panel's opinion that the season during which bird observations were made for the EIS was not appropriate either to discern key migratory bird use of the Roberts Bank area or to establish any valid indication of population size in relation to habitat use. It is the opinion of the Panel that data on migratory bird populations and habitat utilization should have been available by area of utilization both between



**the causeways and on Roberts Bank in general, in the interests of informed decision-making and continuing resource protection.**

**On the basis of available information embracing factors of shelter, food sources, habitat quality, and human activity, all reinforced by general observation, the Panel concludes that the area immediately adjacent to the coal terminal is not one of primary utilization by major flocks of staging and wintering birds.**

**The Panel agrees that increased night illumination will have some effect on migratory birds, and concludes that specific mitigating measures, as proposed by the proponent, could reduce the potential hazard to flocking birds.**

**The Panel considers the potential mortality of birds due to collision with wires and stanchions to be a concern and concludes that this can be mitigated.**

## **5. Estuarine Pollution and Water Quality**

### **(a) Construction Phase**

**During the construction phase, the main effect on water quality would be from the dredging and filling operation. Benthic habitats, and non-swimming organisms therein, are destroyed by being either dredged out of existence or by suffocation and obliteration with dredged fill being dumped over them. Moreover, a greater than usual turbidity is introduced into local waters. Bearing in mind the permanent alteration of ecosystem character, this kind of disruption is transient. Experience in other areas has shown that recolonization of disrupted coastal areas, depending on the nature of the substrate, occurs during the first year when spawning by barnacles, mussels and other invertebrates results in larvae of these organisms settling on the disturbed substrate.**

**The other noteworthy environmental pollution problem that can affect water quality during the construction phase is the introduction of pollutants from construction materials or from equipment. There is usually good**

control to prevent pollution by construction materials, except for accidental spills. There is more likely to be some chronic pollution from construction equipment, such as leaks and spills of fuel and lubricating oils. Effective measures are available to control water pollution by construction equipment.

Providing construction timing restrictions to protect vital life stages of fish and crabs are adhered to, the Panel concludes that water pollution during the construction phase would not be a significant environmental problem

#### (b) Operational Phase

Water pollution during the port operation can be controlled but not eliminated. Run-off from the storage areas and the disposal of sanitary wastes will contribute to the general water pollution problem. The Panel believes that stringent pollution control measures must be enforced to prevent any unwarranted degradation of the water quality of this sensitive area.

The proponent has stated that the increased risk of oil spills at the port area resulting from an expanded port will be very small. Risk from increased number of ship movements is assumed by the proponent to be largely offset by having tugs permanently stationed at the port and by increasing the size of the ship berthing area. The proponent also concluded that there would be a small increase in the risk of spills in the southern Strait of Georgia as a result of increased traffic to and from the port. As there are no plans for handling bulk oil shipments through an expanded Roberts Bank port, oil spill concerns are related mainly to the deliberate discharge of oily ballast water, which is prohibited by Canada Shipping Act regulations, and to spills or leaks of bunker oil or lubricants.

The proponent has stated that it is unlikely that there would be any bunkering (fuelling) of vessels at Roberts Bank, and, therefore, this source of spills may not exist.

Illegal discharge of oily ballast water is frequently a source of minor spills. The proponent has stated that this

problem is closely monitored in Vancouver. Ships entering the port are regularly inspected and any found to have dirty ballast water have their tanks sealed. There are no large scale ballast treatment facilities anywhere in the Port of Vancouver. The proponent has noted that if sufficient ship traffic developed at Roberts Bank, ballast treatment facilities could be provided. However, none is planned at this time.

To date, there has been no environmental emergency contingency plan developed for handling spills at Roberts Bank. However, the proponent has recommended that such a plan be developed as part of the design phase of the project.

Even with strict controls, there will be unavoidable small leaks and spills of various petroleum hydrocarbons during normal operations. These may go largely unnoticed but can have a cumulative effect on the sediments as plankton and other particulate materials adsorb the oil and settle to the bottom. The main potential impacts of oil on waterfowl would be habitat destruction or degradation, or direct oiling of the birds themselves. Added

ship traffic can be expected to increase the risk of these impacts.

The loss of product during loading sometimes cannot be avoided even under the best controlled conditions. Existing operations both at Westshore Terminals and at bulk loading terminals in the inner Vancouver Harbour have shown that losses cannot be eliminated during periods of strong winds. Provided that the materials being loaded are comparatively non-toxic, e.g., coal and sulphur, the effect on water quality may not be too serious. However, the Panel believes that even with such inert and comparatively insoluble materials as coal and sulphur, the substrate can be adversely modified in a halo around a loading terminal. Larvae of invertebrates may not settle in such contaminated areas and crabs may avoid them partly because of a lack of food there. On the other hand, if highly noxious and soluble materials are being loaded in bulk, the ecological damage could be more serious.

Bulk liquids, such as petroleum hydrocarbons present a more serious problem than bulk solids at a terminal on an estuary. The bulk liquids can be

readily distributed by currents over the whole delta. An oil spill of moderate size (1000 tonnes or more) could, under certain conditions, put the intercauseway area out of biological production for some months or more. It could also affect other parts of the delta. In spite of the most stringent controls, spills of bulk liquids inevitably occur at terminals handling such liquids.

The Panel concludes that the shipment of bulk liquids, the bunkering of ships and the discharge of ship ballast water all represent unacceptable risks to the Roberts Bank ecosystem. The Panel also believes that an environmental emergency contingency plan is needed for Roberts Bank, whether or not the port is expanded.

#### 6. Air Quality and Emission of Particulates

The Panel was informed that blowing coal dust was more than an occasional event. The problem arises from incoming loaded trains

storage piles at the existing terminal, and returning empty trains. Conflicting evidence has been presented, and the estimates of the extent of the coal dust emissions are uncertain and unresolved. Moreover, there is not enough predictive information to say that future problems will not arise, especially when it is considered that the proposed project may include new terminals for coal, sulphur and potash.

While there was some difference of opinion between the proponent and others regarding the degree of impact of blowing coal dust, there was insufficient evidence to cause the Panel to believe that the problem was unsolvable or of chronic significance. The Panel concludes that mitigating measures could be implemented to minimize the extent of blowing coal dust before any expansion of the port facility takes place.

The proponent's EIS did not consider and evaluate other potential sources of air pollutants, such as photo-chemical oxidants, that might result from marine operations and the operation of diesel locomotives at the port site. However, the Panel does not believe that this will present serious pollution problems at the site.

## 7. Noise

The existing Roberts Bank Port receives an average of three unit coal trains per day. The proposed expanded facility could handle up to 11.3 incoming trains per day. There may be five trains unloading and a further five waiting at any one time. Concerns regarding noise impact focussed on an increase in this nuisance, in terms of levels and duration, associated with activities at the terminal site and along the railway right-of-way. The proponent states that the transit time is 2 minutes per train, or a total noise duration of 45 minutes per day past any one point. However, at the terminal, the trains stop for lengthy unloading procedures, at which time all engines (up to 5 per train) are idling for long periods.

In terms of mitigation, the proponent suggests that by altering idle patterns or placing noise shields around the engines, it may be possible to reduce noise to acceptable levels. It was also suggested that it might be possible to shut down the main engines and use a single, well-muffled engine on-site to shuttle trains around the terminal during unloading. More effective silencers and noise reducing engine casings or body panels might also be installed on

locomotives using the Roberts Bank Port. It was pointed out that this would involve considerable design effort and is outside the jurisdiction of both the proponent and the port operators.

Noise along the rail lines will increase with the anticipated increase in traffic. Although this issue was discussed, the Panel could not determine the potential magnitude of impact on those living along the right-of-way. The proponent suggests that it would be less intense if noise buffering berms were constructed. The design and location of these berms has not been evaluated in the EIS and the proponent has not indicated any responsibility for this mitigation measure.

The great variability in transmitted noise is also related to climatic conditions of the area, which are not going to change. The presence of these climatic variables will complicate the design of noise control measures.

The Panel concludes that noise annoyance problems associated with the proposed expansion could cause undesirable impacts on some residents. Mechanisms to minimize and control noise impact are not in place. The Panel has doubts that those methods suggested by the proponent, short of shutting down the engines during unloading, have demonstrated

effectiveness. The Panel has similar doubts about the effectiveness of measures to control the noise from passing trains.

8. Social / Community / Economic Impacts

(a) Setting

The Panel considers that the major social/community impacts associated with the port expansion proposal will affect the communities of South Delta (Tsawwassen) and Ladner, the Delta farming community, commercial fishermen and the Tsawwassen Indian Band.

Delta is a District Municipality situated south of Vancouver. It has three distinct urban areas separated by large tracts of rural land, much of which is in agricultural use. Although North Delta contains over half of Delta's population, it is largely isolated from the Roberts Bank Port. The other two urban centres of Delta (Ladner and Tsawwassen) are close to Roberts Bank and will be impacted directly by any port expansion.

Over the last 20 years, both the communities of Ladner and Tsawwassen have undergone

dramatic changes in character and have experienced very large population growths. Until the 1950's, Tsawwassen was a rural area with a few large farms and a number of small summer home communities. Today, it is a relatively affluent suburban community with a population of over 16,000. Ladner, which is situated on the Fraser River, was historically a fishing community and farming settlement. It still retains some of this character but, like Tsawwassen, it is today primarily a suburban community with a large proportion of its labour force commuting to jobs outside of the community. The 1976 population of Ladner was about 12,000. Ladner is still the centre for a number of commercial fishermen, including crab fishermen who regularly take crabs from the vicinity of the Roberts Bank Port.

Most economic activity in the western portion of Delta is limited to farming and commercial services, with no large industrial development to be found. The two largest commercial operations in western Delta are the existing Roberts Bank Port and B. C. Ferry Corporation? Tsawwassen terminal. In addition to the Roberts Bank port expansion proposal, a

second large development is being proposed for this area. This is the Ministry of Transport? proposal to reactivate the now abandoned Boundary Bay Airport for light aircraft use. This proposal is the subject of a separate Environmental Assessment Panel review.

At the present time, most of the industrial development in Delta is located along the Fraser River in North Delta.

The farming community of Delta is concentrated largely in western Delta. Although the agricultural land forming the basis for this community is highly productive, pressures resulting from such factors as urban encroachment, rising land values, dissection of farm lands by utility and road corridors, and the purchase of farm lands for speculative purposes have all eroded the continued economic viability of farming.

The Tsawwassen Indian Reserve occupies approximately 280 hectares of land fronting on the shore between the Roberts Bank Port and ferry terminal causeways. The Tsawwassen Band has been associated with the Roberts Bank and Fraser River estuary

area throughout its history and in the past has relied heavily upon the resources of the area for its livelihood. Since the arrival of European man, over 200 years ago, the Band's life-style has been altered drastically and its population has decreased from over 2000 to its present level of approximately 60. The Band, currently is attempting to broaden its economic base through commercial enterprise. In particular, it would like to develop a marina on the foreshore fronting the Reserve. The original proposal for this marina has been reviewed pursuant to Provincial Order-in-Council 908 and has been rejected by the provincial Ministry of the Environment on environmental grounds.

(b) General Deficiencies in Social Impact Analysis

The public review of the EIS clearly indicated a significant level of interest and concern about the project from some people. In attempting to understand the potential social impacts of the project, the Panel's efforts were limited by a lack of reliable information.

There is no analytical framework given in the EIS to assist the decision makers in

following the logic of the analysis. It appears that the proponent selected the data it thought relevant, predicted impacts on the basis of these data and made value judgements about the significance of these impacts. How the data were collected, organized and evaluated is not clear.

It is against this unsatisfactory background that the Panel will, in the following sections, attempt to provide an understanding of the social consequences of the project and of the significance of the many unknown factors. Social impacts will be discussed in terms of the communities affected. These include the municipalities of Delta, Surrey and North Vancouver, the East Kootenay communities, the Tsawwassen Indian Band, fishermen and farmers.

#### (c) Delta and Surrey

Delta and Surrey share a number of potential impacts from the project. These include the possible need to separate rail and road traffic, as well as dust and noise from passing trains.

Train traffic will increase for the project as proposed from 3 to 11 unit trains per day in each direction, each train being about one mile long. At several level crossings in Surrey and Delta, this increase may warrant grade separations. Traffic congestion can be mitigated by this procedure. The residual impact is financial. Inter-governmental cost sharing mechanisms exist for this type of work and negotiations must take place in order to equitably apportion the financial burden. What must be considered is that, because of increased rail traffic, there will be a financial burden to taxpayers in general (not only to the rail users or Delta residents). This fact should be worked into the cost-benefit equations for the overall port expansion project.

The Panel was informed that there will continue to be coal dust blowing from passing trains. This has already been discussed in this report under the heading Air Quality and Emission of Particulates (p. 28). Control measures have been proposed by the proponent to alleviate this problem but



**responsibility for implementing these measures has not been identified.**

**Noise impacts are discussed in this report under the previous heading Noise (p. 29).**

**The Corporation of Delta presumes that there will be a net financial benefit to the community with the proposed expansion, as there has been with the present operation. The main points to consider in this regard are the demands on municipal services. In some cases, such as water supply, the capability of the municipality may be at its limit. An increase in demand from the port expansion could result in a need for major capital expenditures to upgrade the entire water system in order to serve the incremental need. Port expansion will also place substantial additional demands on municipal fire services, particularly if commodities such as grain and flammable bulk liquids are to be handled.**

**It is generally accepted that incremental municipal service costs that can be attributed to the project**

**should be treated as project costs. The Panel sees nothing significant to prevent equitable financial arrangements being reached through negotiation. As most of these services will be supplied by the Corporation of Delta, they should be in an excellent bargaining position to ensure that they are adequately compensated if a decision is made to proceed.**

**It was brought to the attention of the Panel that Delta's zoning designation of the proposed development area, "14 Development Zone 1", clearly limits the use of this area to fishing and recreation. There is an obvious inconsistency between the title and the definition of this zoning. It appears that the present title of such a non-development oriented zoning has generated conflicting expectations. Port development will have to be accommodated by a conscious act of municipal government if a decision is made to proceed.**

#### **(d) Tsawwassen Indian Band**

**As the community in closest proximity to the proposed development, the Tsawwassen Indian Band is most likely to receive the**

greatest impact from it. Communication between the Band and the proponent during preparation of the EIS was negligible. Consequently, an adequate understanding of the Band's interests and problems was never obtained. It is stated in the EIS that the Band members feel an adverse effect from the present development and that this would be increased by any expansion. It appears to the Panel that neither the Band nor the proponent understands the potential impact on this community from the proposed expansion.

When assessing the social impacts of a proposed development upon a community, there may be a tendency to overlook the accumulated history of previous impacts to which the community already may have been subjected. If one wishes to measure the community's ability to withstand and accept impacts, or to understand its unwillingness to accept a particular project, a systematic examination of

its past experience and responses should be the analyst's initial task. An historical perspective is essential. The Panel wishes to draw attention to an example of this done on the Tsawwassen Band. This is contained in the paper entitled "Social Impact Analysis in Perspective: The Tsawwassen People as an Example". \*

There is little doubt that the Band is offended by the project proposal and appears to consider it with feelings of cynical resignation. Possible mitigation and compensation measures which would result in the Band experiencing some gains or positive impacts from the project have not been seriously explored.

In addition to the quantifiable impacts such as the effects of noise and blowing coal dust, the intangibles such as reduction in quality of life and difficulty in preserving traditions are important considerations which have to be made before the project could be considered socially acceptable.

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\* Report prepared by Mr. Bill Horswill. Copies are available from the Vancouver Panel Office.

**(e) The Farming Community**

Farming in Delta is in danger of becoming a marginal enterprise financially in spite of the good soil and moderate climate. Past encroachments include rapidly expanding residential and commercial development facilitated by easy access through the George Massey Tunnel and pressures from increasing land prices. In any farm community, there is a critical point of attrition at which the community could start to rapidly disintegrate. Concern has been expressed that farming in Delta may be approaching this point.

Impacts on farming that could result from the project include noise and dust from passing trains, reduced access for farm vehicles across the rail line and further alienation of farm land.

The basic problems with noise and blowing coal or sulphur dust have been discussed elsewhere in this report. One aspect of this, which could be of special concern to farmers and consumers of farm products, is the effect of coal or sulphur dust on crops adjacent to the rail line. Little

information is available on this subject. Control measures have been recommended to cope with the general problem. However, while the application of dust suppressing binders to the coal trains may be technically possible, and in fact such binders are being used at the present time, there is some question as to whether it is economically feasible in the quantities and number of applications which may be necessary.

Farm vehicle access will be further impaired by a four-fold increase in the number of trains serving the port. Each train takes about two minutes to pass a given point, which means that tracks would be blocked for about 45 minutes each day instead of the present 12 minutes. If this became an unacceptable problem, mitigation would consist of special farm crossings. The burden of cost of such crossings has not been explored. It is beyond the jurisdictional responsibilities of the proponent and has not been addressed by the rail operators.

Concern was expressed to the Panel about the possible alienation of agricultural land by industrial development induced by the port expansion. The proponent

and others associated with the project stated repeatedly that port expansion would not create any inducement for development on adjacent property, as this is not a characteristic of bulk loading terminals.

A major problem related to this concern is that the prime agricultural land in question, a part of the provincial Agricultural Land Reserve, is owned and controlled by the British Columbia Harbours Board. This ownership gives rise to much wider speculation about the future of the land than would be the case if its title were held by an agency with a clearly visible mandate for the administration and protection of agricultural lands. In either situation, any change in land status will take a conscious decision of the provincial government. According to information provided at the hearings, no such change is contemplated.

**(f) North Vancouver**

Concern has been expressed that the provision of excess capacity at Roberts Bank for the shipment of commodities, such as

sulphur and potash, would seriously impair the viability of present North Vancouver operations dealing in those commodities. Claims were made that sufficient capacity exists in Burrard Inlet (North Vancouver and Port Moody) for these commodities for the foreseeable future. It was generally acknowledged that this does not hold true for coal, and that additional capacity is required at Roberts Bank for that commodity.

Concerns were also expressed that competition between Roberts Bank and North Vancouver for the sulphur and potash business would be unfair owing to the heavy government involvement in expanding the Roberts Bank facility.

**(g) East Kootenay Communities**

The favourable economic impact that new coal development, facilitated by expansion of the port, would have on East Kootenay communities was supported by representations to the Panel from a number of those communities. These representations largely confirmed the proponent's view that further mining development in this region is dependent upon the project proceeding.

A cautionary note was expressed by the East Kootenay

**Labour Council. This related to the potential for boom and bust economic and social impacts resulting from improperly planned and phased mining developments. The ramifications of planning a project, such as the Roberts Bank Port expansion, without considering long range strategies were also noted.**

#### **(h) Fishing Interests**

**Conflicting limited data on the potential value of possible fishery losses due to the proposed port expansion were presented to the Panel. Estimates of future losses to commercial and recreational interests range from \$10,000 per year by the proponent to \$3 million per year by the federal Fisheries and Marine Service. These estimates were compared with the potential market value of the new product handled through the expanded facility of \$1,200 million per year. The comparisons are not entirely appropriate because fishery losses should be considered in perpetuity while the shipment of bulk commodities has a finite, though perhaps not measurable, life.**

**The data are further limited by the absence of tangible recognition for the social value of the recreational fishery, a popular activity with both residents and visitors, and the cultural importance and value of the fishery to native people of tribes dependent upon the Fraser and its tributaries. Although the Panel acknowledges that it is difficult to assess the material value of these significant interests, they are too important to neglect in the assessment.**

**If full expansion takes place, the reduction in habitat will eventually result in some loss to the commercial, recreational and native fishery. Consideration of conventional mitigation measures for such losses failed to produce any specific recommendations due to problems associated with placing a dollar value on something essentially cultural. The provision of compensatory habitat was proposed but there are serious questions about its feasibility.**

#### **(i) Other Concerns**

**The Panel has found it difficult to draw the line between**

project economics and social impact. As has been indicated elsewhere in this report, indirect project costs relate not as much to the proponent as to the various levels of government and therefore to taxpayers generally, often resulting from project related mitigation measures. These should realistically be built into the cost-benefit analysis of the project.

A related concern of the Panel is in the level of activity at the expanded port required for the port to be self-supporting. Data have not been made available to the Panel on this subject. If the level of port activity entered into, considering all infrastructure costs, is such that the port is not financially self-sustaining, there may be an inducement to add more facilities to a point where the operation is made self-sustaining. Additional facilities combined with an expanded port could result in overall impacts which might have resulted in the expansion not being supported.

#### 9. Responsibility for Implementing Mitigating Measures

A major deficiency in the project proposal is the absence of assurances that the recommended mitigation measures described in the EIS and at the hearings will be implemented by the proponent. The Panel noted that some of the areas requiring mitigation, e.g., railway engine noise, traffic overpasses and municipal services enhancement, are outside the control of the proponent. The proponent did not provide any firm indications as to how mitigation measures outside of its control would be effected. This is of particular concern because of the fragmented responsibilities that appear to be associated with the project proposal. The proponent, for example, states that its primary responsibility is the construction of the terminal pads and access, and that the operations of the terminal facilities will be the responsibility of private operators.

Recognizing that some of the mitigation measures are beyond the direct responsibility of the proponent, the Panel, nevertheless, concluded that it should be incumbent on the proponent to carry out those measures directly within its control and to ensure that recommended measures

**outside its jurisdiction also are implemented.**

#### 10. Summary of Major Conclusions

**The following conclusions have been either explicitly stated or implied in the discussion of issues and impacts in the previous section.**

##### **Project Justification**

**(1) The need for new port facilities at Roberts Bank for sulphur and potash was not adequately demonstrated. Burrard Inlet facilities for shipping potash and sulphur appear to have sufficient capacity for the foreseeable future, and could be adversely affected by expansion at Roberts Bank for these commodities. (Sections 2 & 8f)**

**(2) The need for a grain handling terminal and the rationale for a bulk liquids terminal at Roberts Bank were not adequately demonstrated. (Section 2)**

**(3) Existing south coast coal port facilities do not appear to be adequate to handle projected growth in coal shipments, in terms of**

**both size and customer acceptability. (Section 2)**

##### **The Project in Relation to the Fraser River Estuary**

**(4) The Fraser River estuary, including Roberts Bank and the intercauseway area, is a vital ecological resource in terms of providing habitat for fish, other aquatic organisms and birds. (Section 3)**

**(5) More quantitative ecological information should have been available to evaluate the impacts of the proposal. The need to conduct environmental investigations on the developed port, in relation to potential future expansion, should have been obvious and of high priority, particularly considering that the initial phase of the Roberts Bank port was begun more than 10 years ago. (Section 4a)**

**(6) Because of the importance of currents and wave action on the environment in the intercauseway area, any physical changes planned in this area should first be tested on a hydraulic model. (Section 4b)**

**Fish and Wildlife  
Considerations**

(7) Although no study has been conducted to verify the degree of eelgrass importance ecologically, the health and extent of eelgrass beds on Roberts Bank are considered good indices of overall habitat quality. (Section 4c)

(8) There is insufficient evidence to directly relate the deletion or addition of a given amount of eelgrass to a decrease or increase in the salmon fisheries resource. (Section 4c)

(9) The benthos on Roberts Bank are a food source for both fish and wildlife on the delta and as such should be protected. (Section 4d)

(10) The existing Roberts Bank Port and ferry terminal causeways could represent a significant interruptive effect on the orientation of juvenile salmonids in their utilization of Roberts Bank and the intercauseway area, and this question warrants investigation. (Section 4e)

(11) There is no evidence to conclude that there is any Fraser River estuary area

surplus to the needs of juvenile salmonids for nursery grounds and, therefore, any further loss of salmonid rearing grounds should be kept to an absolute minimum (Section 4e)

(12) Mitigation measures such as eelgrass transplants and provision of new habitat have not been proven in practice on a large scale and, therefore, cannot be accepted as compensation for existing fisheries habitat. (Section 4e)

(13) The area south-east of the port causeway and immediately adjacent to the existing terminal has minimal eelgrass and other living resources. If port expansion were to be strictly limited to this area, impacts would be substantially less than for the full-scale port expansion, with comparatively small disruption of, and reduction in, available habitat. (Section 4e)

(14) The area immediately adjacent to the coal terminal is not one of primary utilization by major flocks of staging and wintering birds. (Section 4f)

(15) Increased night illumination will have some effect on migratory birds. Specific mitigating



measures, as proposed by the proponent, could reduce the potential hazard to flocking birds. (Section 4f)

(16) Collisions with wires and stanchions could result in some bird mortalities. This impact can be mitigated. (Section 4f)

#### Water Quality Considerations

(17) Provided that construction timing restrictions to protect vital life stages of fish and crabs are adhered to, water pollution during the construction of a port expansion would not be a significant environmental problem (Section 5a)

(18) The shipment of bulk liquids from an expanded port facility, the bunkering of ships at Roberts Bank, and the discharge of dirty ballast water, all represent unacceptable risks to the Fraser River estuary ecosystem (Section 5b)

(19) An environmental emergency contingency plan is needed for Roberts Bank. (Section 5b)

#### Atmospheric Pollution and Noise Considerations

(20) There is insufficient evidence to conclude that the problem of blowing coal dust is unsolvable or of chronic significance. Mitigating measures can be implemented to minimize the extent of blowing coal dust. (Section 6)

(21) Other sources of air pollutants, such as photochemical oxidants, that might result from marine operations and the operation of diesel locomotives at the port site, have not been fully evaluated. However, this is not expected to be a significant problem at this site. (Section 6)

(22) Noise annoyance problems resulting from train activity at the terminal and associated with the proposed expansion could cause undesirable impacts on some residents. Noise mitigating measures suggested by the proponent, with the exception of shutting down the engines during unloading, might not achieve the desired results. (Section 7)

(23) Noise along the rail lines will increase with the anticipated growth in traffic. In selected locations, noise mitigation may be necessary, but there is presently no commitment to undertake such

**measures and no indication of who will assume responsibility. (Section 7)**

### **Social Impact Considerations**

**(24) The analysis of social impact carried out by the proponent was inadequate to give a thorough understanding of the possible effects of the project on people. (Section 8b)**

**(25) Grade separations may be required in several locations in Surrey and Delta. Inter-governmental cost sharing mechanisms exist to deal with this. (Section 8c)**

**(26) Mining development in the East Kootenay area of British Columbia and in south-western Alberta will likely result from expansion at Roberts Bank for coal export. The social and economic impacts of this have not been accounted for in an overall planning framework related to the proposed port expansion. (Section 8g)**

**(27) The potential social impact from the project on the Tsawwassen Indian Band is not well understood.**

**There has been inadequate communication with the Band in relation to past incursions into their way of life and in relation to mitigation measures which may now be appropriate. (Section 8d)**

**(28) Access by farm vehicles to property on both sides of the rail line will not likely be a significant issue, but requires surveillance. (Section 8e)**

**(29) Agricultural land being controlled by the B.C. Harbours Board is somewhat anomalous and causes apprehension among those concerned with the preservation of agricultural land. (Section 8e)**

**(30) If the level of port activity entered into, considering all infrastructure costs, is such that the port is not financially self-sustaining, there may be an inducement to add more facilities. (Section 8i)**

**(31) The proposed port expansion will result in some losses to the commercial, recreational and native fishery. (Section 8h)**

**(32) Tangible costs of mitigation measures and special services occasioned by the project should**

**be components of the cost-benefit analysis conducted for the overall project. (Section 8i)**

**(33) Commitments have not been forthcoming from the various agencies under whose jurisdiction mitigation measures fall. Such commitment is required, not only from the proponent but also from other responsibility centres such as the port operators and rail companies. (Section 9)**

**"The flow of energy through the various food webs in the Fraser River delta and estuary is dependent on the availability of certain essential elements in required minimum quantities. The perturbation to these elements by developments on a scale of the proposed Roberts Bank superport expansion may cause any one of these essential factors to be limiting to the fisheries resources of the area."**

*Mr. Bill Schouwenburg, Fisheries & Marine Service.*

**"What basically happens now is, because of this destruction that has taken place in the past, now people have become very conscious of the need to preserve what is still left behind for the preservation of sea life and the waterfowl. When they look around and they do studies, whose lands do they look at as the remaining lands to act as the feed areas for salmon, to act as the homes for wild waterfowl? Very necessarily, they have to look at the Indian lands."**

*Mr. Delbert Guerin, Chief, Musqueam Indian Band.*

**"Because data are lacking, we took a conservative approach and assumed an area was heavily utilized if it had any potential for such utilization. Any subsequent sampling programme could prove us correct, and the impacts as we describe them would be correct. On the other hand, it could prove us wrong and prove that the area is not heavily utilized by fish. In which case the impacts would be less than we described. In this way our assessment and subsequent design erred on the side of environmental protection, as was stated in the report, and that's all we were trying to bring across."**

*Mr. Rick Hinton, Beak Hinton Consultants Ltd.*

OVERALL  
CONCLUSION



**"People came here to live and raise their families away from the problems, the pressures of city life. Homes reflect the pride of ownership and the community activities reflect deep involvement on the part of its residents."**

*Mrs. Mary Frith, University Women's Club of Delta.*

**"The United Mine Workers of America maintain that Canada has the technology and the expertise to expand the coal shipping facilities and to bring new mines into production. We further maintain that we have the technology and the expertise to progress without harming our environment as we have shown by some of our strip mine operations. Progress and the environment can move forward together to maintain our standard of living. All we really need is a commitment from all concerned to protect while we progress."**

*Mr. Mike Tamton, United Mine Workers of America.*

**"Although the Canadian Wildlife Service is responsible only for the migratory birds on behalf of the federal government, we tend to be viewing the whole problem as a biological unit of which the birds are but one feature, and in this sense the threats to the estuary should be viewed and not the threat to a number of birds or a number of fish or whatever other single organism you decide to pick on."**

*Mr. Lazlo I. Retfalvi, Canadian Wildlife Service.*

**"What you're doing right now is only stage two of probably many stages and if we look into the future for the next fifty years, this whole Roberts Bank is just going to be one huge port area and I don't think it's going to be a very nice place to live next to."**

*Mr. Harry Bergenstein, Delta Resident.*

## OVERALL CONCLUSION

**The Panel concludes that the expansion of Roberts Bank port, as proposed, should not be permitted to proceed.**

**The information presented to the Panel indicates that expansion as proposed would cause significant ecological disruption in an area that is part of one of the most important estuarine ecosystems in North America. In addition, the information on social impacts, while generally inadequate and inconclusive, gives rise to concerns related to a number of potentially affected groups if the full expansion were to proceed.**

**The Panel recognizes that the area of the proposed expansion is not of uniform ecological value or sensitivity and that there is a portion of this area where ecological values are minimal and where limited expansion could be tolerated. This is the area of the proposed Terminals 2 and 3.**

"I would like to state that we do not work in isolation three miles out on that little island. We are a part of the Delta community. We employ 85 people. We pay an annual payroll of two and a half million dollars approximately, and many of our people do live in the community. We are concerned about this community, and we try and be good citizens of the community."

*Mr. Hans Krutzen, Westshore Terminals.*

"Large acreages of Delta farmland are owned by government agencies and absentee owners. The agricultural community is angry and frustrated at governments in general, and I don't blame them. The objective of the Agricultural Land Commission in participating in this public hearing is not just to ensure that agricultural lands of Delta are protected, but also to publicly call for a start in the process of re-establishing the once prosperous agricultural industry in this area."

*Mr. Gary Runka, Chairman, B.C. Agricultural Land Commission.*

"We feel that little or no attempt has been made to contact the people who live in this municipality and assess their feelings."

*Mrs. Jennq Cromarty, Citizens' Association of Delta*



RECOMMENDATIONS



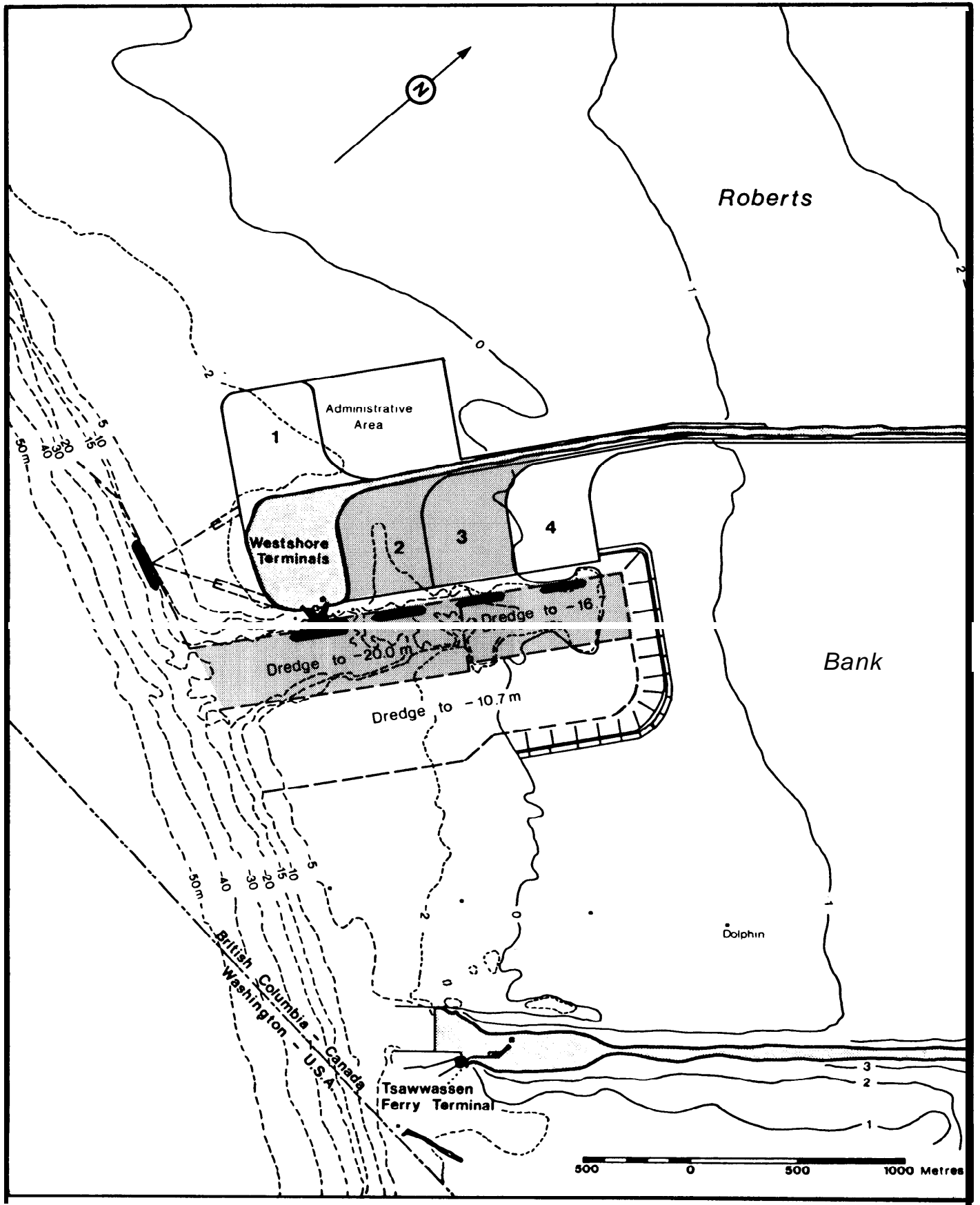


Figure 3. Recommended limits of expansion (shaded)

## RECOMMENDATIONS

### A. Proposed Expansion

**The Panel recommends that approval for the full expansion as proposed not be granted.**

### B. Reduced Expansion

**If it is decided that a reduced expansion is feasible, the Panel recommends that it be limited to the area of the proposed Terminals 2 and 3. It further recommends that the ship channel not be enlarged significantly beyond the existing channel. The recommended limits of expansion are shown in Figure 3. The Panel considers the ecological significance of the remaining area proposed for expansion (Terminals 1 and 4, the Administration Area, the widened causeway and the ship turning basin) to be such that these further incursions should not be permitted. The Panel believes that the adverse environmental impacts associated with a reduced expansion can be kept to tolerable levels if appropriate mitigation measures are implemented.**

**If it is decided to proceed with a reduced expansion, the Panel recommends the following actions:**

- 1. Any proposed expansion be tested on a hydraulic model, where currents and wave action can be measured in order to determine a suitable design to avoid excessive erosion of eel-grass beds and other benthic habitat.**
- 2. A schedule of construction operations involving any work in or disruption to the intertidal and subtidal areas of Roberts Bank be developed to minimize impacts on fish and crabs.**
- 3. Coal dust suppression from both loaded and empty rail cars be further investigated and additional application of binders or other dust control techniques along the rail route be considered.**
- 4. For any new coal terminal, an automated coal dust suppression system be installed, similar to that presently in use at the existing terminal, with**

- improved measures to deal with the effects of periodic occurrences of high winds.
5. **Effective noise mitigation for locomotives idling at the terminal be identified and implemented. This could involve shutting down engines during unloading operations.**
  6. **Site illumination be designed to minimize impacts on birds.**
  7. **Tangible costs of mitigation measures and special services occasioned by the project be included in the project cost-benefit analysis.**
  8. **A single agent be identified by the proponent to serve as a point of contact for the public and technical agencies with regard to environmental matters, during the design and construction phases of the project.**
  9. **The federal Department of the Environment take the initiative to organize the monitoring of the implementation of the recommendations of this Panel, and the requirements of the various levels of government.**
  10. **The Panel believes there would be little further value in the proponent preparing and submitting a new EIS for a reduced expansion. However, further work is required with respect to an acceptable environmental design for a reduced development. Related to this, there is a need for the proponent to prepare and make public reports on the following matters:**
    - (a) **The design of the reduced port expansion including the configuration of all dredge and fill areas and ship berthing locations. This design should reflect the physical limitations outlined above.**
    - (b) **An assessment of the social/community impacts of a reduced development and an evaluation of the mitigation measures which will be required to minimize the resultant negative impacts. For guidance, reference is made to Section 8, regarding negative social impacts and deficiencies in social impact information.**

(c) A description of who would be responsible for implementing all required mitigation measures and how they would be implemented. This is to include those measures outside the proponent's direct jurisdiction.

(d) A description of how the Panel's recommendations will be incorporated into the design and implementation of the project.

These reports should be submitted to both the federal and British Columbia Ministers of the Environment for concurrence prior to commencement of project construction.

### C. General Recommendations

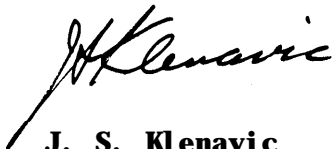
The Panel also recommends the following measures whether or not any further development takes place at the site:

1. Prevent further shoreward erosion of the existing berthing channel.
2. Do not ship bulk liquids from Roberts Bank Port.

3. Do not permit bunkering of ships at Roberts Bank Port.
4. Prohibit discharge of dirty ballast water from ships at Roberts Bank except to a holding or treatment facility.
5. Develop an environmental emergency contingency plan specific to Roberts Bank.
6. Further investigate and quantify impacts of air and water pollution due to coal dust.
7. Take measures to reduce the potential for bird mortality from overhead wires and stanchions.
8. To allay misgivings that agricultural lands adjacent to Roberts Bank are being held to support future port related development, consideration should be given by the appropriate provincial authorities to turning over control of these lands, now administered by the British Columbia Harbours Board, to an agency with a clear agricultural mandate.
9. Appropriate government agencies undertake additional studies on the following:

- (a) **Utilization by salmonids, herring and crabs of the intercausesay and other adjacent zones of Roberts Bank, including food chains and habitats on which these species depend.**
- (b) **Possible inter-ruptive effects of the existing Roberts Bank and ferry terminal causeways on the orientation of juvenile salmonids in their utilization of Roberts Bank and the inter-causeway area.**
- (c) **Migratory bird populations and habitat utilization by area, both between the causeways and on Roberts Bank in general.**

Environmental Assessment Panel  
Roberts Bank Port Expansion



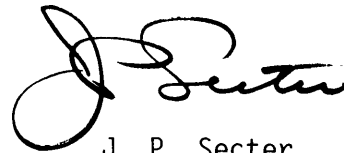
**J. S. Klenavic  
(Chairman)**



**M. B. Pepper**



**D. S. Lacate**



**J. P. Sectar**



**W. J. Misse11**



**M. Waldichuk**

## APPENDICES

APPENDIX A: PARTICIPANTS IN  
PUBLIC REVIEW

**A Groups**

- |  |  |
|--|--|
| 1. <b>Bayside Environmental Society</b>                                      | 13. <b>Misqueam Indian Band</b>                                |
| 2. <b>B. C. Coast Pilots Ltd.</b>  | 14. <b>North Delta Ratepayers' Association</b>                 |
| 3. <b>B. C. Wildlife Federation</b>  | 15. <b>North Vancouver Chamber of Commerce</b>                 |
| 4. <b>Canadian Union of Public Employees - East Kootenay Locals</b>          | 16. <b>Point Roberts Community Association</b>                 |
| 5. <b>Citizen's Association of Delta</b>                                     | 17. <b>Richmond Anti-Pollution Association</b>                 |
| 6. <b>Colebrook-Panorama Ridge Ratepayers Association</b>                    | 18. <b>Sierra Club, Western Canada Chapter</b>                 |
| 7. <b>Community Forum on Airport Development</b>                             | 19. <b>SPEC</b>  |
| 8. <b>Delta University Women's Club</b>                                      | 20. <b>South Tsawwassen Beach Property Owners' Association</b> |
| 9. <b>East Kootenay Labour Council</b>                                       | 21. <b>Tsawwassen Indian Band</b>                              |
| 10. <b>Fraser River Coalition</b>  | 22. <b>United Fishermen and Allied Workers' Union</b>          |
| 11. <b>International Longshoremen's and Warehousemen's Union - Local 502</b> | 23. <b>United Mine Workers of America</b>                      |
| 12. <b>Maple Beach Property Owners Association</b>                           | 24. <b>Vancouver Natural History Society</b>                   |



## B. Individuals

1. **Mr. H. L. Bergenstein**
2. **Mr. P. L. Birrell**
3. **Ms. S. Bourque**
4. **Mr. J. Brisebois**
5. **Mr. B. Gillies**
6. **Mr. W. A. Gohl**
7. **Mr. G. W. Haddad, M.L.A.**
8. **Dr. B. A. Leach**
9. **Mr. S. Leggatt, M.P.**
10. **Mr. J. Macgowan**
11. **Mr. P. Meindl**
12. **Mr. J. Millen**
13. **Mr. G. R. Peterson**
14. **Mr. G. Taverner**
15. **Dr. J. Tyhurst**
16. **Mr. and Mrs. Vick**
17. **Dr. R. G. Wilson**
18. **Mr. E. Wintemute**

## C. Federal Government Agencies

1. **Department of Environment**
2. **Department of Fisheries and Oceans**
3. **National Harbours Board**

## D. Provincial Government Agencies

1. **B. C. Agricultural Land Commission**
2. **B. C. Harbours Board**
3. **Ministry of Economic Development**
4. **Ministry of Energy, Transport and Communications**
5. **Ministry of the Environment**
6. **Fish and Wildlife Branch, Ministry of Recreation and Conservation**

E. Municipal and Regional  
Government Agencies

1. **Village of Bellevue**
2. **Town of Blairmore**
3. **Town of Coleman**
4. **City of Cranbrook**
5. **Corporation of Delta**
6. **Village of Elkford**
7. **City of Fernie**
8. **Greater Vancouver  
Regional District**
9. **Village of Frank**
10. **City of Kimberley**
11. **District of Kitimat**
12. **Regional District of  
Kitimat-Stikine**
13. **District of North  
Vancouver**
14. **City of Prince Rupert**
15. **District of Surrey**
16. **District of Sparwood**

F. Companies

1. **Beak-Hinton Consultants  
Ltd.**
2. **Denison Mines Limited**
3. **Fording Coal Limited**
4. **Greer Shipping Ltd.**
5. **ICL Engineering Ltd.**
6. **Neptune Bulk Terminals  
Ltd.**
7. **Petrosul International Ltd.**
8. **PV Container Systems Ltd.**
9. **Rescon Developments Co. Ltd.**
10. **Sultran Ltd.**
11. **Trans Mountain Pipe Line  
Company Ltd.**
12. **Vancouver Wharves Ltd.**
13. **Westshore Terminals Ltd.**

APPENDIX B: LIST OF PANEL  
DOCUMENTS

**Environmental Assessment Panel -  
Guidelines for an Environmental  
Impact Statement of the  
Expansion of the Roberts Bank  
Bulk Handling Facilities, March,  
1976**

**National Harbours Board - Environ-  
mental Impact Assessment of  
Roberts Bank Port Expansion,  
October, 1977 (as prepared by  
Beak-Hinton Consultants Ltd.):**

**Volume 1 - Summary**

**Volume 2 - Main Report**

**Volume 3 - Appendix A, The  
Existing Physical  
Environment**

**Volume 4 - Appendix B, The  
Existing Biological  
Environment**

**Volume 5 - Appendix C, The  
Existing Socio-Economic  
Environment**

**Volume 6 - Appendix D,  
Engineering and Commodity  
Projections**

**A Compendium of Written Sub-  
missions on Deficiencies in  
the Environmental Impact  
Statement, February 13, 1978**

**Environmental Assessment Panel - A  
Statement of Deficiencies in the  
Environmental Impact Assessment  
of the Roberts Bank Port Expansion,  
February, 1978.**

**National Harbours Board -  
Response to "A Statement of  
Deficiencies in the Environ-  
mental Impact Assessment of  
the Roberts Bank Port  
Expansion", June, 1978 (as  
prepared by Beak-Hinton Con-  
sultants Ltd.)**

**Roberts Bank Port Expansion -  
A Compendium of Written  
Submissions to the Environ-  
mental Assessment Panel,  
November 9, 1978**

**Transcripts of Public Meetings  
held in Delta and Richmond  
between October 24, 1978,  
and November 2, 1978, Volumes  
1 to 6 (\$5.00)**

**Social Impact Analysis in  
Perspective, The Tsawwassen  
Indian People as an Example,  
November 9, 1978 - A Paper  
Submitted to the Environ-  
mental Assessment Panel by  
Mr. Bill Horswill, Aspect  
Consultants Inc. (Copies  
available from the Vancouver  
Panel Office)**

APPENDIX C: PANEL MEMBER  
BIOGRAPHIES

John S. Klenavic  
(Panel Chairman)

**Mr. Klenavic attended schools in Ontario, British Columbia and Manitoba. He graduated from the Royal Military College, Kingston, and Queen's University with a degree in Chemical Engineering (B.Sc.).**

**He served in the Canadian and British Armies from 1960 to 1968 and subsequently worked as an industrial engineer and quality control chemist in the food processing industry in Toronto. In 1973 he was appointed Acting Director of the Environmental Emergency Branch, Environmental Protection Service of the Federal Department of the Environment. This Branch is concerned with the prevention of, and response to, spills of pollutants into the environment.**

**Mr. Klenavic was appointed to his present position of Director, Operations, Federal Environmental Assessment Review Office in mid-1977 and is currently chairman of sixteen Environmental Assessment Panels.**

**Mr. Klenavic is a member of the Association of Professional Engineers of Ontario.**

Doug S. Lacate

**Dr. Lacate received a BScF from University of New Brunswick in 1956 and an MSc from Cornell University in 1959.**

**He was employed as research scientist with Federal Forestry Branch, 1956-1960, working on forest land classification throughout eastern Canada. He transferred to British Columbia in 1960 and continued forest land classification research until 1964 at which time he was seconded to the Canada Land Inventory Program (ARDA) and served as Provincial Co-ordinator of the Forestry and Agriculture Capability program**

**Dr. Lacate completed his PhD in 1970 at Cornell University in the fields of natural resource management and environmental impact assessment of highway developments. He was associate professor at the University of British Columbia from 1970-1973, teaching airphoto interpretation and land classification and evaluation.**

**He worked on the evaluation of terrain in the Mackenzie Valley 1971-72 and returned to federal**

**public service as Regional Director of the Lands Directorate in the Pacific and Yukon region in 1974. Dr. Lacate still holds this position.**

W. J. (Bill) Mussell

**Mr. Mussell is a graduate of the University of British Columbia. He has a B.A. in the Social Sciences and has done specialized studies in social work, education and management. Following employment in British Columbia as a probation officer for the Attorney General's Department and then as a parole officer with the Solicitor General's Department, he worked in Ottawa as an assistant to the Minister of Indian Affairs. This job included intensive work on a variety of social and economic issues.**

**In 1971 Mr. Mussell returned to British Columbia and accepted employment as the Executive Director for the Union of B. C. Indian Chiefs, a provincial organization dealing with a variety of issues. In 1973 he returned to Chilliwack and following teaching and consulting jobs, he accepted an appointment as a member of the National Parole Board in the Pacific Region.**

**Mr. Mussell has served on various boards for social, cultural and educational centres. He was the founding Chairman for the Coqualeetza Education Training Centre, on the first council for the Fraser Valley College, and was a council member for the Union of B. C. Indian Chiefs. Besides being an advisor to his village's Band Council, he is currently the senior member for the Pacific Regional Division of the National Parole Board and a resident of Chilliwack.**

M. Bruce Pepper

**Mr. Pepper received a Bachelor of Commerce from the University of British Columbia and became a member of the Institute of Chartered Accountants of British Columbia in 1959.**

**His business career began as controller of a material handling equipment company in Vancouver and was followed by a similar position with an oil and gas company in Calgary.**

**Returning to British Columbia, Mr. Pepper joined Crows Nest Industries Limited in Fernie in 1967 and was appointed President in 1972. He was active as a Director in the Interior Lumber Manufacturers Association and as a Director and Vice-President of the Coal Association of Canada.**

In December 1976, Mr. Pepper became the Managing Director of The Vancouver Board of Trade which is involved extensively with trade and commerce within the City.

Jonathan P. Sector

Mr. Sector was raised in Winnipeg and Vancouver and received his higher education at the University of British Columbia in Agriculture (B.S.A. 1965) and at Utah State University in Wildlife Biology (M.S. 1970). Before returning to Canada, he furthered his studies at the doctoral level in systems ecology, resource management and environmental planning at Utah State University. He currently is a doctoral candidate in the College of Natural Resources at that institution.

Mr. Sector was employed by the Canadian Wildlife Service in Saskatoon from 1971-1973 as a Research Biologist specializing in the use of and demand for wildlife resources in Western Canada. He returned to British Columbia to serve as the Senior Ecologist and Coordinator of Environmental Services for the Land Management Branch of the B.C. Ministry of the Environment from 1973 through 1977.

Mr. Sector presently is Head of the Environmental Services Section of the B.C. Ministry of Environment's Environmental Studies Division with responsibilities for environmental services relating to land and resource development in British Columbia. These include administering B.C.'s two environmental assessment Orders-in-Council, serving on five Federal Environmental Assessment Panels for B.C. projects, coordinating B.C.'s shore management programs, and advising various B.C. ministries, Crown corporations and related agencies on environmental implications of proposed development projects.

Michael Waldichuk

Dr. Waldichuk is Senior Scientist, Pacific Environment Institute of the Fisheries and Marine Service of the Canada Department of Fisheries and Oceans, West Vancouver.

He received a B.A. in Honours Chemistry in 1948 and an M.A. in 1950 from the University of British Columbia, and a PhD in Oceanography in 1955 from the University of Washington. He joined Pacific Oceanographic Group at the Pacific Biological Station of the Fisheries Research Board of Canada in 1952, where he commenced his PhD thesis,

**"Physical Oceanography of the Strait of Georgia, British Columbia". From 1954 to 1966, he specialized in oceanographic studies related to marine pollution problems while with the Fisheries Research Board's Biological Station in Nanaimo and from 1966 to 1969, he was Oceanographer-in-Charge of the Pacific Oceanographic Group. During 1969-1970, he was on secondment to the Fisheries Research Board, Ottawa, as oceanographic consultant and Secretary of the Canadian Committee on Oceanography. In 1970, Dr. Waldichuk was appointed Program Head of the new Pacific Environment Institute in West Vancouver, B.C., in which position he served until 1977.**

**Dr. Waldichuk was a member of the IMCO/FAO/UNESCO/WMO/WHO/IAEA/UN Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP), 1969-1977, serving as its chairman from 1970-1973 and later chairing its Working Group on the Principles for Developing Coastal Water Quality Criteria. He continues as a member of two GESAMP Working Groups on: (1) Pollution Implications of Seabed Exploitation and Coastal Area Development; and (2) Interchange of Pollutants between the Atmosphere and the Oceans.**

**He was a UNESCO nominee to the Intergovernmental Oceanographic Commission's International Coordination Group on Global Investigation of Pollution in the Marine Environment, 1974-76, chairing its Second Session in New York, July 1974, and the Third Session in Paris, June 1975.**

**Dr. Waldichuk served as a member of the Pacific Coast Working Group on Low-Level Radioactive Waste Disposal of the U.S. National Academy of Sciences, Committee on Oceanography, 1958-62, and of the Panel on Marine Aquatic Life and Wildlife of the Committee on Water Quality Criteria, Environmental Studies Board, National Academy of Sciences - National Academy of Engineering, Washington, D.C., 1971-72.**

## APPENDIX D: REVIEW PROCESS CONSIDERATIONS

During the review of the Roberts Bank port expansion proposal, many representations were made to the Panel with respect to the review process itself. The Panel would like to address a number of these concerns and to offer some of its own observations.

### A. Preparation of Environmental Impact Statement

Considerable concern was expressed about inadequacies in the EIS. There is no doubt that there are inadequacies, but there is doubt about the reasons for them. Some possible reasons related to the process are:

#### 1. EIS Guidelines and Terms of Reference

Concern was expressed that the Guidelines issued by the Panel were not sufficiently explicit, that they were not properly interpreted into terms of reference by the proponent for their consultants, and that they were not subject to public examination prior to being issued.

The Panel believes that EIS Guidelines should be subject to

public review before being finalized, and notes that more recent panel projects in the lower mainland of British Columbia have followed this procedure. The proponents of projects should appoint an expert environmental steering committee, as outlined in Section A.4 of this Appendix, to assist in developing detailed terms of reference, based on the guidelines. These terms of reference would form the basis for consultants' proposals and should be made public by the proponent when finalized.

The original terms of reference should not be so rigid as to preclude adjustments to the work requirements owing to difficulties of predicting in advance the depth of study required for each of the areas of concern.

#### 2. Project Need

During the Roberts Bank hearings, the public questioned the basic need of the project. The Panel believes that it should be incumbent upon the proponent to publicly demonstrate this need prior to submission of the EIS.



### 3. EIS Presentation

The Panel believes that with respect to presentation to the Panel of all project documents (EIS, deficiency responses, project rationale and any supplementary reports) the authorship, ownership and responsibility should be clear.

In particular, the Environmental Impact Statement should be transmitted as a document of the proponent. Within it, should be a clear indication of the extent to which the proponent is committed to accept and implement the recommendations and required undertakings.

### 4. Environmental Steering Committee

The environmental steering committee proposed in Section A.1 of this Appendix should serve the following additional functions:

- (a) It should provide advice to the proponent on points of contact with environmental and other appropriate agencies.
- (b) As a group, the committee could also assist the proponent in consultant selection and in the preparation of terms of reference.

- (c) As the work on the EIS proceeds, the committee could help ensure that the appropriate levels of effort are being applied in the proper places by suggesting modifications to the terms of reference as appropriate.

## B. Hearings and Review Procedures

### 1. Hearing Structure

A complaint voiced by public interest groups related to the fact that the hearings were structured according to specific subjects on specific days. This was considered by some participants to be unduly restrictive and had the potential of minimizing the impact of briefs which covered a wide range of topics.

The Panel is convinced that a structured discussion of the various subjects is essential for an organized review of the proposal. However, by announcing the proposed structure at the earliest possible time in the review, so that participants can prepare accordingly, and by allowing a greater number of open sessions for general presentations during the hearings, participants would be better accommodated.

## 2. Late Briefs

The Panel considers it to be inappropriate to expect all participants in the hearings to responsibly discuss briefs presented at the very last moment. Every effort should be made to have participants submit their briefs in sufficient time for other participants to give them detailed consideration.

## 3. Others

Other noteworthy aspects of the hearings related to the time limits imposed on participants, the control of cross examination and the Panel's use of technical advisors. These aspects are all considered by the Panel to be necessary and worthwhile. Their continuance for other project reviews is encouraged.

## APPENDIX E: GLOSSARY OF TERMS

- Adsorb** - to take up and hold through adhesion, in a thin layer, to the surface of a body.
- Algae** - a group of mainly aquatic plants, variously one-celled, colonial or filamentous, containing chlorophyll and/or other pigments (especially reds and browns), and having no vascular system
- Algal Mat** - a covering of floating or attached algae in the upper intertidal zone.
- Anadromous** - a form of fish life cycle in which maturity is attained in salt water and the adults enter fresh water to spawn.
- Benthic Organisms or Benthos** - organisms that live on or in the bottom sediments of a body of water
- Chronic Pollution** - pollution that occurs on a frequent basis.
- Crustaceans** - any of a large class of mostly aquatic arthropods that have a chitinous or calcareous and chitinous exoskeleton, a pair of often much modified appendages on each segment and two pairs of antennae. These include crabs, shrimps, lobsters and barnacles.
- Ecology** - a branch of science concerned with the inter-relationships between living organisms and their environment.
- Ecosystem** - an ecological unit consisting of both the biotic and abiotic (non-living) environment, interacting to produce a stable system
- Eelgrass** - an aquatic rooted vascular plant that generally grows in the intertidal zone but may extend its habitat to 1 metre or more below low water level.
- EIS** - Environmental Impact Statement.

- Estuary** - the seaward end, or the widened funnel-shaped tidal mouth, of a river valley where fresh water mixes with, and measurably dilutes, sea water, and where tidal effects are evident.
- Grade Separation** - a highway or railroad crossing using an underpass or overpass.
- Habitat** - an area or a place where a plant or animal naturally or normally lives and grows.
- Hectare** - a unit of area equal to 10,000 sq. metres or 2.47 acres.
- Hydraulic Model** - a scaled representation of a prototype containing water.
- Impact** - alterations of environmental conditions that could either improve or degrade the conditions.
- Invertebrate** - an animal not having a backbone.
- Larvae** - the early forms of an animal that at birth or hatching are fundamentally unlike its parent and must metamorphose before assuming the adult characters.
- Littoral** - of, relating to, or situated near the sea shore.
- Microinvertebrate** - a microscopic animal not having a backbone.
- Mitigation** - a measure or action to avoid, or make less severe, an impact.
- Organism** - a living being.
- Pelagic** - of, relating to, or living or occurring in the open sea.
- Photo-Chemical Oxidant** - an oxidizing agent, either gas or aerosol, formed by photo-chemical action in the atmosphere, often from the products of combustion.
- Plankton** - plant and animal life, mostly microscopic, found floating or drifting in the oceans or large bodies of fresh water.
- Proponent** - any individual or organization that intends to undertake a project. In the case of the Roberts Bank Port expansion, the proponent is the National Harbours Board.
- Phytoplankton** - plant plankton.
- Salinity** - a measure of the quantity of dissolved salts in sea water.

- Salmonid** - any fish of the family salmonidae, e.g., salmon and steelhead.
- Saltmarsh** - a shallow water area that is normally inundated by sea water or brackish water and supports rooted plant life that is tolerant to salt contents of more than 1%.
- Substrate** - the base on which an organism lives.
- Vascular** - of or related to a channel for the conveyance of a body fluid (as blood of an animal or sap of a plant).
- Wetlands** - any lands or areas, such as tidal flats or swamps, containing much soil moisture.
- Zooplankton** - animal plankton.

- Pélagique - qui est relatif à la haute mer, qui vit dans les parties les plus profondes de la mer.
- Phytoplancton - plancton végétal, voir plancton.
- Plancton - ensemble d'organismes vivants (en général microscopiques), dépourvus de moyens de locomotion active et dont la densité est égale à celle de l'eau qui vivent en suspension dans les eaux des lacs et les océans où ils vont à la dérive. On distingue deux espèces de plancton: le **phytoplancton** et le zooplancton. Les cellules du phytoplancton contiennent de la **chlorophyle** celles du zooplancton n'en contiennent pas. Le **phytoplancton** est un utilisateur direct de l'énergie solaire et producteur d'énergie alors que le zooplancton qui se nourrit du phytoplancton est transformateur d'énergie. Le plancton est la nourriture de base de très nombreux animaux tels les planctonophages qui créent un courant dans lequel les proies sont entraînées. (Voir Benthos)
- Pollution - pollution qui s'observe chronique fréquemment.
- Salinité - mesure de la qualité des sels dissous dans l'eau de mer.
- Salmonidé - tout poisson du **sous-**ordre des Salmonidés, par exemple, le saumon et la truite **arc-en-ciel**.
- Substrat - base sur laquelle un organisme vit.
- Tapis d'algues - couverture d'algues flottantes ou attachées dans la zone intertidale supérieure.
- Terres humides - toutes terres ou régions, comme les battures ou les marécages où le sol est très humide.
- Vasculaire - qui appartient, qui est relatif à un vaisseau destiné à la circulation d'un fluide dans un corps (comme le sang d'un animal ou la sève d'une plante)
- Zooplancton - plancton animal, voir plancton.
- Zostère - plante vasculaire aquatique enracinée qui croît généralement dans la zone intertidale mais qui peut étendre son habitat à un mètre ou plus sous le niveau des eaux.