Federal Environmental Assessment and Review Process

28

Federal Environmental
Assessment Review Office

CN Rail
Twin Tracking Program
British Columbia

Report of the
Environmental
Assessment Panel

March, 1985

Canada

Panel Reports

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3. Alaska Highway Gas Pipeline Project, Yukon Territory. (Interim Report, August, 1977)
4. Eldorado Uranium Refinery Proposal, Port Granby, Ontario. (May 1978)
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14. Arctic Pilot Project (Northern Component). N.W.T. (October, 1980)
15. Lower Churchill Hydroelectric Project. (December, 1980)
16. Norman Wells Oilfield Development and Pipeline Project. N.W.T. (January, 1981)
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18. Banff Highway Project (km 13 to km 27). Alberta. (April, 1982)
19. Beaufort Sea Hydrocarbon Production Proposal. (Interim Report) (April, 1982)
20. CP Rail Rogers Pass Development, Alberta. (Preliminary Report) (April, 1982)
21. Alaska Highway Gas Pipeline, Yukon Territory. (Final Report) (October, 1982)
22. CP Rail Rogers Pass Development, Alberta. (Final Report) (August, 1983)
23. CN Rail Twin Tracking Program, British Columbia. (September, 1983)
24. Venture Development Project, Nova Scotia. (December, 1983)
25. Beaufort Sea Hydrocarbon Production and Transportation. (Final Report) (July, 1984)
26. Port of Quebec Expansion Project. (September, 1984)
27. Beaufort Sea Hydrocarbon Production and Transportation (Inuktituk Summary of Final Report) (July, 1984)

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CN RAIL TWIN TRACKING **PROGRAM**
ENVIRONMENTAL ASSESSMENT PANEL

The Honourable Suzanne Blais-Grenier
Minister of the Environment
House of Commons
Ottawa, Ontario

The Honourable Donald Frank Mazankowski
Minister of Transport
House of Commons
Ottawa, Ontario

Dear Ministers:

In **accordance with the terms of reference issued on April 19, 1983 the Environmental Assessment Panel has completed a review of the CN Rail twin** tracking **proqram in British Columbia.** We **are pleased to submit this report for your consideration.**

We **were also asked to review the lonq-term environmental implications of transportation related activities in the Fraser and Thompson River corridors. This review is ongoing and we will, be reportinq to you separately on this matter.**

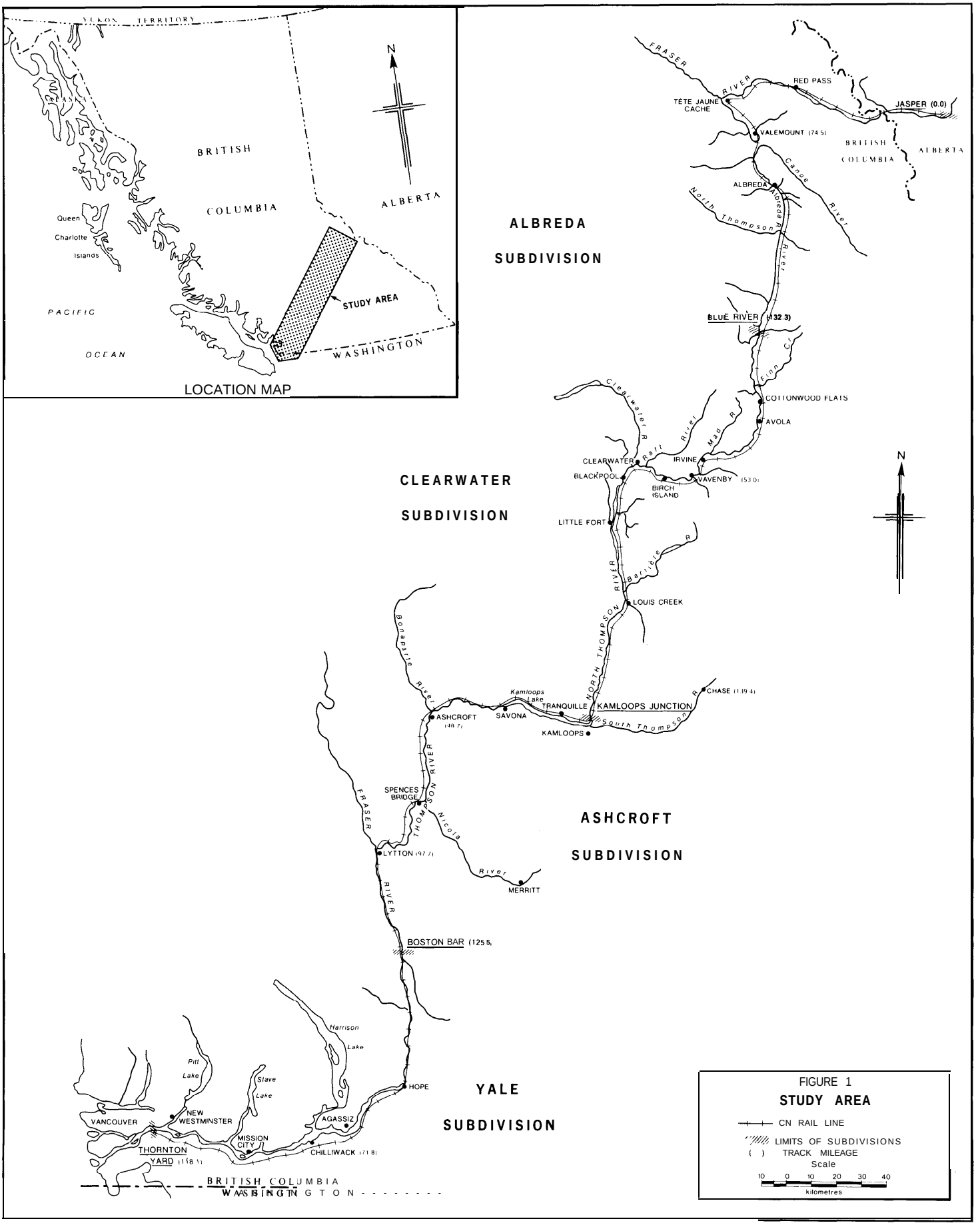
Yours sincerely,

Robert G. Connelly

Robert G. Connelly
Chairman
CN Rail Twin Trackinq
Environmental Assessment Panel

Canada

TABLE OF CONTENTS


YUKON TERRITORY
BRITISH COLUMBIA
ALBERTA
Queen Charlotte Islands
PACIFIC OCEAN
STUDY AREA
WASHINGTON
LOCATION MAP
N
ALBREDA SUBDIVISION
CLEARWATER SUBDIVISION
ASHCROFT SUBDIVISION
YALE SUBDIVISION
FRASER RIVER
TÊTE JAUNE CACHE
RED PASS
JASPER (0.0)
VALEMOUNT (74.5)
ALBREDA
Canoe River
North Thompson River
BLUE RIVER (432.3)
COTTONWOOD FLATS
AVOLA
Clearwater River
Raft River
Mad R.
CLEARWATER
IRVINE
BLACKPOOL
VAVENBY (530)
BIRCH ISLAND
LITTLE FORT
Barrière R.
LOUIS CREEK
NORTH THOMPSON RIVER
Bonaparte River
Kamloops Lake
TRANQUILLE
KAMLOOPS JUNCTION
CHASE (119.4)
ASHCROFT (386.7)
SAVONA
KAMLOOPS
South Thompson R.
SPENCES BRIDGE
THOMPSON RIVER
Nicola River
FRASER RIVER
LYTTON (97.7)
MERRITT
BOSTON BAR (125.5)
Harrison Lake
Pitt Lake
Slave Lake
HOPE
VANCOUVER
NEW WESTMINSTER
AGASSIZ
MISSION CITY
THORNTON YARD (118.1)
CHILLIWACK (71.8)
BRITISH COLUMBIA
WASHINGTON
FIGURE 1
STUDY AREA
CN RAIL LINE
LIMITS OF SUBDIVISIONS
( ) TRACK MILEAGE
Scale
10 0 10 20 30 40
kilometres

1. EXECUTIVE SUMMARY

The Environmental Assessment Panel was appointed in April, 1983 to conduct a public review of the environmental and related socio-economic effects of CN Rail's twin tracking program in British Columbia.

Before the Panel's appointment the federal government decided that it was in the national interest to expand the capacity of CN Rail's mainline in western Canada. The Panel's mandate required it to review CN Rail's ongoing program, examine and report on the adequacy of CN Rail's plans to minimize impacts and identify an appropriate mechanism to review and monitor CN Rail's future projects. The Panel was also requested to examine the long-term environmental implications of transportation related development in the Fraser and Thompson River corridors and will be reporting separately on this matter.

The program under review involves the completion of approximately 700 km of second track between Valemount and Vancouver. Over most of this length, the second track will be located parallel and immediately adjacent to the existing track. The program is a long-term one that is now underway and may not be completed before 2000. At the present time, there is approximately 230 km of second track in place (including operational sidings), with approximately 470 km still to be constructed. Projects are generally less than 10 km in length and are scheduled according to priorities based on rail capacity needs.

During the review, the Panel held two series of public meetings in a number of communities along the rail line. These included public information meetings in June, 1983, and final public meetings held in June, 1984 and September, 1984. Following the June, 1983 meetings, the Panel prepared an Interim Report which was released in September, 1983.

To advise CN Rail on ways to minimize the program's environmental impact, a two level system has been established consisting of a Steering Committee and a Technical Working Group. The Technical Working Group advises on the design process and presently consists of CN Rail representatives, its consultants and government agencies. The Steering Committee, consisting of CN Rail and government agency representatives, provides guidance on policy issues. The activities of both have focused on fisheries issues.

The most significant environmental issue is the potential impact on the fisheries resource. The Fraser and Thompson River watershed is one of the largest fish producing systems in North America. The CN Rail line follows these rivers, often through narrow canyons in rugged terrain. In many places constructing a second track requires cutting into steep, often unstable banks or placing fill in the river. Encroaching into the rivers can affect salmonid migration by altering river flow patterns and increasing velocities and can also affect spawning grounds, other fish habitat and fishing sites.

The Panel has reviewed the twin tracking program's impact on the fishery and has made a number of recommendations, some of which are about the design and the approvals processes. Provided these processes continue to function, environmental studies are completed as planned and recommendations regarding the protection of the fishery are followed, the Panel believes that the proposed twin tracking program should have little effect on the overall fish resources of the Thompson and Fraser river system.

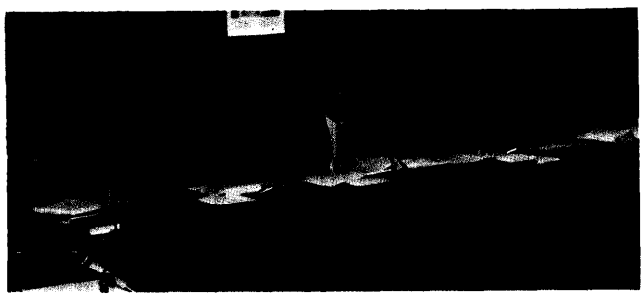
However, the Panel believes that the existing design and approvals process is not adequately dealing with all the environmental issues associated with the program, particularly those concerning the Indian food fishery and the protection of heritage resources. The Panel recommends expanding the representation on the Technical Working Group and Steering Committee and hence their responsibilities, to enable advice on all environmental issues of importance to be included in the design process. This will permit Indian environmental concerns and heritage issues to be considered early in the planning and design of future projects.

In addition to dealing with the key fisheries issues, the report also deals with vibrations and noise, toxic spills, heritage resources, wildlife, slope stability and disposal of eroded material, track and right-of-way maintenance and ancillary activities. The Panel has made recommendations on most of these issues.

The funding of environmental studies is currently a matter of dispute between CN Rail and Fisheries and Oceans. The report describes this issue, discusses the problems it presents to the successful completion of the environmental studies program and offers guidance in this matter.

The twin tracking program is long-term in nature and hence it is important that knowledge gained on the effects of early construction be applied to future projects. The Panel has made recommendations about environmental monitoring and believes that Environment Canada should become a repository for this information. In addition, the Panel believes that there is a need for an independent body to report on the implementation of the Panel's recommendations and recommends that the Federal Environmental Assessment Review Office be responsible for reporting periodically to the Ministers of Environment and Transport.

A list of all of the Panel's recommendations is provided in Section 9.



We're a little concerned about some of the things that are going to follow once the panel has dissolved, and we've relied to quite some extent on the panel throughout the last year or two.

Shiela Joseph,
Sto'lo Nation

The Fraser River is one of the few remaining rivers in the world to support major natural salmon runs. It contributes, on average, 35 per cent of the catch of salmon produced from B.C. Rivers, and thus, plays a significant role in the commercial, sport and Indian fisheries.

The importance of the Fraser River fishery resource demands that it be afforded the highest level of protection.

John Payne,
Fisheries and Oceans

Today over 7,000 Indian people from 70 bands along the Thompson and Fraser River get most of what they eat from the Fraser River salmon runs It has been this way for thousands of years Indians and fish are Inseparable

This has been so throughout history Skills have been passed down from generation to generation. Respect for the salmon is taught This ensures the preservation of the runs

From Sound Track of Alliance of Tribal Councils, Video Presentation to the Panel

I have shown that before one shovel full of dirt has been moved, or one rock turned over, the regulatory agencies concerned *with managing* the resource have an *opportunity to input their expert/se into the final design*

Lloyd Hostland,
CN Rail

2. THE PROJECT AND ITS REVIEW AND ASSESSMENT

2.1 Introduction

The Environmental Assessment Panel was appointed in April, 1983 by the Minister of the Environment to conduct a public review of the environmental and related socio-economic effects of CN Rail's plan to twin the track on its British Columbia main line from Valemount to Vancouver. The Panel appointment was made in response to a request from the Minister of Transport in accordance with the federal government's Environmental Assessment and Review Process.

At the time of its appointment, the Minister of the Environment issued the Panel with Terms of Reference which outline the scope and mandate for the review and set out the steps to be followed. The Terms of Reference are reproduced in Appendix A.

In addition to reviewing CN Rail's twin tracking plans, the Panel was asked to examine the long-term environmental implications of transportation related activities in the Fraser and Thompson River corridors. The Panel views this additional assignment to be separate from the review of CN Rail's plans and will be preparing another report on this. Section 8 of this report, however, briefly describes the activities to date and outlines the Panel's plans to complete the corridor review.

The Panel members are Robert Connelly (Chairman), Fraser MacLean, Norman McLeod, Ross Peterson and Denis Russell. Mr. Robert Pasco, who was a Panel member throughout most of the review, resigned from the Panel in January, 1985. His reason for resigning was to avoid a potential conflict of interest between his responsibilities as Chief of the Oregon Jack Indian Band and his duties as a Panel member. The conflict was brought to a focus by CN Rail's plans to construct the second track through the Oregon Jack Reserve in early 1985. Panel member biographies are included in Appendix B. The Executive Secretary to the Panel is Paul Scott.

2.2 Scope of Panel Review

The Panel's Terms of Reference direct it to assess the environmental and related socio-economic impacts of CN Rail's twin tracking program. The Panel was specifically asked to review CN Rail's ongoing program, examine and report on the adequacy of CN Rail's plans to minimize impacts and identify an appropriate mechanism to review and monitor CN Rail's future projects.

The examination of need for the twin tracking program and its economic viability as well as possible alternatives to twin tracking were not included in the Panel's mandate. Nevertheless, the Panel heard arguments that CN Rail had not adequately demonstrated the need for the twin tracking program and that there are viable alternatives to twin tracking such as joint track utilization (see Section 5.2).

The Panel believes that its review, in particular the public nature of the process, has influenced the way in which the environmental studies and the design program are now being undertaken. The Panel saw a number of examples of what it considers to be improvements to both the study and the design programs. At the same time, it also observed situations which are not compatible with an open and responsive program of good environmental design and recommends further changes.

2.3 CN Rail Twin Tracking Program

CN Rail's program involves constructing approximately 707 km (440 miles) of second track along the CN Rail British Columbia main line from a point near Valemount to the Thornton Yards in Port Mann near Vancouver. The program consists of a number of separate twin tracking projects. Some of these projects are already completed, others are now underway and still others are planned for the future. It is a long term program with no specific completion date. Construction scheduling has been altered during the period of the Panel review. Table 1 and Appendix C provide further details of the program and current scheduling of projects.

The second track will generally be placed approximately 4.5 metres (15 feet), centreline to centreline, from the existing track. In some cases, double tracking is accomplished by joining together existing sidings to form a second main line. The only locations where the second track is expected to be more than 4.5 metres (15 feet) from the existing track are major new river crossings, alignment improvements or diversions, and tunnels (plans call for 15 tunnels totalling approximately 27 km or 17 miles in length).

By late 1984, CN Rail had approximately 232 km (144 miles) of double track in place including about 114 km (71 miles) of operational sidings and 117 km (73 miles) of second track completed or under construction. The remaining 475 km (298 miles) will be constructed over a long period, with CN Rail's plans calling for 197 km (123 miles) to be completed by 1988.

2.4 Project Setting

The CN Rail line under review extends from Valemount near the B.C./Alberta border, to the Thornton Yards in Port Mann (see Fig. 1). It follows the North Thompson River to Kamloops and then parallels the Thompson River to Lytton and the Fraser River to Port Mann. The route crosses rugged, difficult terrain which poses many constraints to railway location and construction.

The corridor traversed by the CN Rail line is shared by other transportation users including CP Rail (Kamloops to Vancouver), highways, pipelines and transmission lines.

The physical environment of the corridor varies considerably over its length. The North Thompson River valley widens as it approaches Kamloops from North to South. The extensive river bottom soil deposits and moderate rainfall provide the basis for productive forest and agricultural resources. From Kamloops to Lytton, the corridor passes through an arid region. The landscape varies considerably, changing from a moderately rolling terrain near Kamloops to very steep sloped terrain near Lytton. The Fraser Canyon from Lytton to Hope is the most rugged portion of the corridor and there are many areas with slide hazards. The corridor changes from the rugged and precipitous terrain encountered around Hope to the broad flat bottomed estuary lands around Vancouver.

The biological environment of the corridor is both rich and diverse. Of particular importance to this review are the fisheries resources of the Fraser and Thompson River system. The river system provides excellent fish habitat and supports some of the most important runs on the Pacific Coast for all five salmon species as well as for sea run trout and resident game fish. Several of these runs spawn in and inhabit the streams along the corridor, while others pass through the region to reach spawning grounds elsewhere. There are also areas of valuable wildlife and waterfowl habitat to be found along the corridor.

The people in the corridor are widely dispersed in small communities with density greatest near Kamloops (population 70,000), the corridor's largest community. The corridor is home to approximately 4,500 Indians, many of whom live on a large number of small reserves.

Outside the larger communities, land use includes a mix of semi-rural settlement areas, small agricultural holdings and larger range areas concentrated in the valleys. At higher elevations, most land is allocated for range or forestry uses and some mining.

2.5 Panel Review Process

The Panel began its work in April, 1983 by reviewing available background reports. These reports provided information on the twin tracking program, some initial evaluation of environ-

Table 1

Twin Tracking Program — Valemount to Vancouver

CN Rail Subdivision	Total Length of Subdivision (Miles)	Operational Sidings (Miles)	Twin Tracking Projects (Miles)		Future Twin Tracking Projects (Miles)				
			Completed Pre 1983	Under Const. 1983184	1985	1986	1987	1988	Post 1988
Albreda (Valemount to Blue River)	59.00	7.73	3.50	10.39	8.85	—	—	7.67	20.86
Clearwater (Blue River to Kamloops)	139.40	23.83	6.78	17.18	8.95	6.13	9.89	11.75	54.89
Ashcroft (Kamloops to Boston Bar)	125.50	24.54		9.44	17.93	10.46	13.59	7.24	42.30
Yale (Boston Bar to Thornton Yards)	118.10	15.34	16.50	9.70	1.09	11.54	3.60	5.07	55.26
TOTAL	442.00	71.44	26.78	46.71	36.82	28.13	27.08	31.73	173.31

NOTES:

1. All lengths are given in miles to correspond to present railway practice.
2. Operational sidings are those sidings now in use that will be incorporated into the twin tracking program.
3. Lengths given above for future twin tracking projects are derived from the most recent CN Rail plans made available to the Panel. These plans are subject to change.
4. Thornton Yards are located in Port Mann (Surrey).
5. A more detailed listing of all twin tracking projects is provided in Appendix C.

mental effects, and an outline of CN Rail's environmental studies and design program.

In June, 1983 the Panel held a series of public information meetings in Clearwater, Kamloops, Lytton, Chilliwack and Surrey. The purpose of these meetings was to provide the public with information on the twin tracking program and on the Panel review process, and to receive an initial indication of public views and concerns. Following these meetings, the Panel prepared an Interim Report which was released by the Minister of the Environment in September, 1983.

The Interim Report set out the main issues that the Panel considered important to its review and contained requests for additional information from CN Rail. It also reported on a number of issues and concerns that were considered to be outside the Panel's mandate.

After reviewing CN Rail's response of March, 1984 to the Panel's request for additional information, the Panel requested more information and clarification on a number of issues dealt with in the initial response. The response to this additional request was received from CN Rail in May, 1984.

The final stage in the review process was a series of public meetings to receive submissions from review participants and to discuss the environmental and related socio-economic impacts of the twin tracking program.

The final public meetings were divided into General Sessions and Community Sessions. The General Sessions were held in the Vancouver area on June 19 and 20, 1984. All presentations received at the General Sessions were from government agencies and organized groups.

The Panel's Community Sessions were scheduled initially for June, 1984 but rescheduled in response to a request from Indian groups for more time to complete their investigations and finalize their presentations to the Panel. The Community Sessions were held from September 24 — 27, 1984 in Clearwater, Kamloops, Lytton and Chilliwack to provide an opportunity for people along the CN line to present their views to the Panel. Presentations at the Community Sessions were from native organizations, community groups, local and regional governments as well as individuals.

The Panel was pleased with the quality of public and government participation in the review. The meetings were well attended and the presentations and discussion contributed significantly to the Panel's understanding of the issues under review. In addition to input during the public meetings, a number of groups, government agencies and members of the public made their views known to the Panel through written submissions. Appendix D contains a list of all information received by the Panel. Appendix E lists the participants at the Panel's public meetings.

The Panel also appreciated CN Rail's input to the review. CN Rail supplied background information on the twin tracking program and its environmental effects, responded to the Panel's requests for additional information and participated fully in the Panel's public information meetings and final public meetings. CN Rail also organized railway inspection trips in May, 1983 and September, 1984 between Vancouver and Edmonton for the Panel and other groups and departments. On its own initiative, CN Rail held a number of public meetings in communities along the line in 1984 to explain the twin tracking program and respond to questions from the public.

The Panel believes that the review process gave the public the opportunity to state fully their views and concerns and become better informed about CN Rail's twin tracking program. It also enabled CN Rail to be more fully aware of and respond to these concerns. The Panel hopes that this dialogue and public consultation will be continued by CN Rail as the twin tracking program proceeds.

2.6 Design and Approvals Process

Prior to and during the Panel review, a number of changes occurred in the design and approvals process for specific projects within the twin tracking program, in CN Rail's site supervision plans and in CN Rail's public consultation program. This section describes these changes, outlines the present design and approvals process, and presents the Panel's assessment and recommendations.

2.6.1 History of the Approvals Process

CN Rail is a crown corporation established under the Canadian National Railway Act and operated under the authority and regulation of the Railway Act which is administered by the Canadian Transport Commission. Neither of these Acts makes provision for the consideration of environmental issues in the approval of construction projects or expansion of rail facilities. If rail construction impinges on navigable waters, then the Railway Act requires CN Rail to obtain approval under the Navigable Waters Protection Act administered by Transport Canada. Under the Fisheries Act, Fisheries and Oceans can request plans and specifications for review before construction but has no official approval authority. However, it has authority to prosecute after the fact for any damage done to fish resources. CN Rail is not required to apply for permits under provincial law but does require contractors to do so.

From the start of the twin tracking program, individual projects have been included in a referral process involving Environment Canada, Fisheries and Oceans and the B.C. Ministry of Environment. This process is coordinated through the regional office of Environment Canada and its application ensures that each twin tracking project is referred for review by all concerned agencies before construction starts.

A federal/provincial Task Force was established in 1980 to assist the agencies involved in the referral process in reviewing the large number of twin tracking projects. The Task Force included representatives from Environment Canada, Fisheries and Oceans, the International Pacific Salmon Fisheries Commission and the B.C. Ministry of Environment. Representatives from Indian and Northern Affairs Canada and the B.C. Heritage Conservation Branch also attended some Task Force meetings as observers. The Task Force provided a focal point for a coordinated federal/provincial environmental review of the twin tracking program and advised CN Rail on its environmental studies. Following review by the Task Force,

projects were still fed through the referral process for final approval.

Although the Task Force system appeared to work initially, technical issues became intermingled with policy matters at its meetings resulting in many issues being left unresolved. The Task Force review system and its problems were discussed during the Panel's public information meetings in June, 1983 and were reported in the Interim Report.

In late 1983, the Task Force system was replaced by a new two level system consisting of a Steering Committee and a Technical Working Group. The Technical Working Group is comprised of representatives from CN Rail, CN Rail's environmental consultants, Fisheries and Oceans, Environment Canada and the B.C. Ministry of Environment. The Technical Working Group was formed to advise CN Rail on environmental issues associated with the design and construction of the twin tracking program. Its discussions and activities are limited to the consideration of technical issues, with policy issues being the responsibility of the Steering Committee. The Steering Committee is comprised of senior representatives of CN Rail, Environment Canada, Fisheries and Oceans and the B.C. Ministry of Environment. In addition to dealing with policy issues, the Steering Committee oversees the activities of the Technical Working Group and resolves any technical issues when there is a disagreement. The Technical Working Group and Steering Committee activities do not replace the referral process, but rather are intended to resolve technical concerns so that the approvals granted through the referral system can be processed with a minimum of delay and a maximum of understanding and consensus.

2.6.2 Design Considerations

Design is a creative process, more of an art than a science. On a large project, many considerations must be taken into account, many alternatives must be examined, many objectives must be weighed and usually many trials and compromises must be made before a final design is selected. A good design almost always represents a creative compromise between many competing pressures. It is also dependent on the technical competence and the integrity of the professionals involved.

Given the complexity of modern projects, a design team is a necessity since no one individual could possibly handle a major design alone. It is often desirable to supplement the core design team with advice and assistance from outside the organization. The more closely integrated and the better the communications are among all members of what might be called this extended design group, the more generally acceptable the final design is likely to be.

Since personnel and organizations change, design teams should maintain good documentation so knowledge is accumulated and useful information is not lost. This is especially important with projects that take a long time to complete and where there is an opportunity to learn and profit from experience gained as the project proceeds.

Large projects typically require the approval of a number of regulatory agencies. It is often desirable to involve personnel from such agencies in the design process as members of the extended design team. Sometimes agency staff members will have expertise not readily available elsewhere. More often it is simply more efficient to have agency and proponent personnel cooperate in the search for good design solutions. Problems may be dealt with as they arise and adversarial positions avoided when final designs are formally submitted for approval. However, this carries the danger that agency staff members can get so deeply involved with the designers that they can compromise their independence and hence their impartiality when designs are eventually put forward for approval. Regulatory personnel need to maintain a careful balance between the extremes of too close integration into the design team and too great a distance from it.

Setting up an effective and responsive system for designing a large project and obtaining regulatory agency approvals is in itself a major task. It is important that the design team members have not only the necessary technical skills, but also the "people skills" that will enable them to cooperate and communicate effectively. An effective management structure is also essential because an inappropriate structure can frustrate and nullify the efforts of even the best of people. As with project design, setting up the management structure must be an iterative process involving trial and error, discussion and compromise. Once established, there is a need for continual adjustment and improvement in the structure to maintain flexibility and responsiveness.

2.6.3 Twin Tracking Design and Approvals Process

The CN Rail twin tracking program is unique in many ways. It is a very large program but, since construction will be spread over at least 20 years, the amount of construction planned for any one year is quite modest. The incremental nature of the program provides an opportunity to set up a process for the orderly development and approval of designs rather than having it done in "one shot" as must be done with most projects.

The range of design decisions possible for the twin tracking program is more circumscribed than for most projects. In effect, the key design decision is on which side of the existing track should the second track be laid. Other questions, such as whether to stay within or go outside the existing right-of-way and what type of slope or bank protection to provide, while important are secondary to the decisions about track location.

Although the range of choice would appear to be quite limited, there are approximately 700 km of track to be considered and many individual decisions to be made. Although CN Rail does not have to conform to all the requirements of the environmental regulatory agencies, it has chosen to do so and thus has to deal with the agencies in basically the same way as would any other developer.

The main steps in the design and approvals process as the Panel understood them to be in October, 1984 are:

1. CN Rail's environmental consultants initially examined the whole line from Valemount to Vancouver, noted areas where

double tracking could have environmental implications, provided CN Rail with advice on how to handle potential problem areas and outlined requirements for studies to obtain environmental information for design and approvals;

2. CN Rail's design group then prepared preliminary design plans for the entire route under the direction of location and geotechnical engineers, taking into account the environmental consultants' recommendations;

3. members of the Technical Working Group visit the site of twin tracking projects (many of these visits have already been completed), discuss the preliminary plans, and then try to reach agreement on the spot about what ought to be done;

4. after a site visit, the Technical Working Group members forward environmental design recommendations to CN Rail which are shown on environmental design drawings for use by CN Rail in the preparation of their final construction drawings:

5. CN Rail finalizes the design, prepares construction drawings and submits these to the regulatory agencies for approval through the referral system; and

6. when all approvals have been obtained for a section of track, CN Rail is free to call tenders and begin construction.

If the Technical Working Group recommendations (Step 4) are not accepted by CN Rail, then the disputed design is returned to the Technical Working Group for further discussion. If agreement cannot be obtained, then the matter is referred to the Steering Committee for resolution.

In practice, there are always a number of sections of twin tracking design working their way through these steps but not all at the same step at any one time. Thus, what is a relatively straightforward procedure can appear very confusing to anyone other than those actively participating in the process. The Panel itself had difficulty in understanding the process. It sympathizes with anyone not directly involved who wishes to understand what is going on and be assured that all factors are being considered fairly.

2.6.4 Design and Approvals Process Problems

Although the existing design and approvals process appears to be working reasonably well, it is not entirely free of problems. Some have to do with the present process and some with what might happen to the process in the future.

In the Panel's view, a major problem associated with the design and approvals process is its failure to deal satisfactorily with all areas of environmental concern. In particular, there are two important areas of concern which are presently not being addressed by this process. These are the protection of heritage resources along the railway right-of-way and the protection of Indian fishing sites and access to them. These important issues are described in Section 3.4 (Heritage Resources) and Section 4 (Indian Issues).

It should be noted that the Technical Working Group is an advisory body rather than a decision making or regulatory body. Hence, it should provide a forum for consultation, discussion and consideration of the trade-offs involved among the various environmental resources affected by the twin tracking program. The Panel believes that it will only be fully effective if all of the environmental resources are given due consideration.

In this regard, the Panel has recommended (see Section 3.4) that CN Rail follow provincial guidelines for the protection of heritage resources and that heritage values be included in the design and approvals process. In addition, the Panel believes that the B.C. Heritage Conservation Branch (the provincial agency responsible for heritage resources) should have the opportunity to become directly involved in the Technical Working Group. CN Rail presently discusses heritage matters directly with the B.C. Heritage Conservation Branch rather than in the Technical Working Group.

1 **The Panel recommends that the B.C. Heritage Conservation Branch be invited to become a member of the Technical Working Group, or if it chooses not to become a member, be allowed to attend Technical Working Group meetings, and be invited to participate in preliminary site visits.**

At present, there is no opportunity for Indians to have their concerns considered in the early stages of the planning and design process. This matter was the subject of considerable discussion during the Panel's final public meetings. To accommodate Indian concerns, consideration was given to having a representative of Indian and Northern Affairs Canada participate as an observer in Technical Working Group meetings. However, Indians were dissatisfied with this arrangement and indicated they wanted their own representatives on the Technical Working Group. The Panel believes this request is reasonable. In the Panel's opinion, Indians can contribute knowledge to the Technical Working Group on fishery and heritage matters.

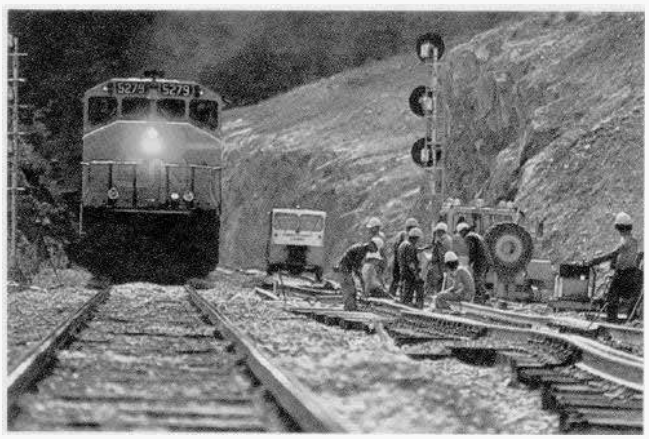
The Indians appear to have little confidence in the Technical Working Group's ability to deal with their concerns. Since access to information on twin tracking projects and the government approval process has at times been difficult to obtain, they have tended to suspect the worst. Consultation with Indians generally has been late in the design process and consequently has left them with the impression that they are being informed of the results rather than being offered an opportunity to make a meaningful input. This, in turn, has negatively affected cooperation between CN Rail and the Indians and, in the Panel's opinion, relations will deteriorate further if this situation is not corrected. The Panel believes that correcting these problems can only occur if Indians are permitted full participation on the Technical Working Group.

The Panel recommends that:

2 **An Indian representative be appointed to the Technical Working Group by Indian and Northern Affairs Canada in consultation with the Alliance of Tribal Councils.**

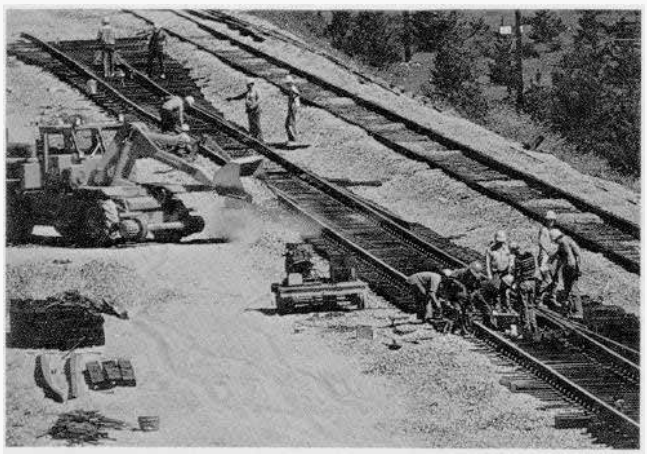
3 **The Indian representative arrange for participation on preliminary site visits of other Indians who live on reserves adjacent to the area being examined during the visits so that concerns relating to access trails, fishing sites, heritage sites and other sensitive environmental resources can be brought to the attention of the Technical Working Group.**

The Panel recognizes that the Technical Working Group will only be able to function effectively if participants are restricted



In this particular case what we are doing is trying to make sure that the bank that CN will be building is at least as rough, and in most cases, it will be considerably rougher, than the bank that is there now, to compensate for the Increased main velocity.

Dr. Rolf Kellerhals,
CN Rail Consultant

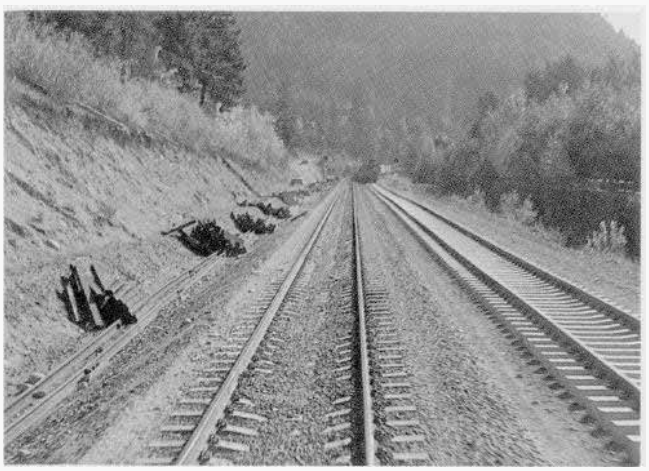


It's true at this point we don't have a measure of the productivity of that habitat that would be lost Some of it — my impressions are some of it would be rated as high and some of it would be rated as quite marginal But it's true at this point, we haven't addressed productivity of the existing habitat but just the quantity

Mr. Brent Lister
Fisheries Consultant to CN Rail

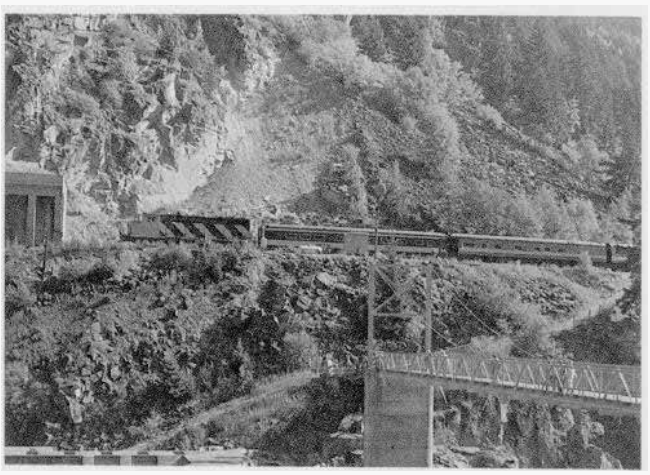
The whole purpose of the Indian people gaining representation or being observers on the Technical Working Group was to determine how decisions were arrived at, and to get some input info the process before the final design drawings are drawn up.

Mr John Sam,
NI'akapxm Nation Tribal Council



However, the risk of spills of dangerous goods continues to be a concern of my department We are not satisfied that the twin tracking proposal of the mainline will not Increase the risk of spills.

Dr. John Wiebe
Environment Canada



to the consideration of technical issues. The Technical Working Group cannot become a forum for the discussion of policy and political issues.

The Steering Committee, the more senior body, was formed to deal with policy issues as well as any technical disputes arising out of the Technical Working Group discussions. However, the present membership of the Steering Committee does not make provision for Indian concerns to be considered at this level.

4 The Panel recommends that a representative from Indian and Northern Affairs Canada be appointed to the Steering Committee to ensure that Indian environmental concerns are represented at the Steering Committee level.

As noted previously, the Panel believes that all areas of environmental concern associated with the construction of the twin tracking program should be considered by the Technical Working Group. The Panel believes that the Steering Committee is the appropriate body to coordinate this.

5 The Panel recommends that the Steering Committee be given the responsibility for ensuring that all areas of environmental concern, Including fish and fisheries, access to fishing sites, heritage resources and Indian environmental concerns, are dealt wlth properly.

One problem that has existed and is still of concern is the inadequate lead time for environmental studies and design prior to construction. The construction and environmental study schedule outlined by CN Rail at the September, 1984 public meetings shows a commitment to a one year lead time between environmental design studies and the start of construction. The Panel recognizes that this lead time has not always been available and consequently agencies have had to grant approval-in-principle before environmental studies were completed. Although this apparently has not led to any serious problems to date, the Panel believes that the lack of adequate lead time has the potential to seriously compromise the environmental design and approvals process.

6 The Panel recommends that in the future no construction activities should commence until at least 12 months after all environmental design studies are completed.

The Panel understands that the environmental studies program is progressing well. CN Rail expects to have all of the studies completed by the end of 1986 with the exception of those required for major bridges and tunnels. If this schedule is met, the Technical Working Group should be able to complete its environmental design recommendations for the entire line shortly thereafter. All that would then be left would be the agency review and approvals (through the referral system) of final drawings in advance of construction.

2.6.5 Site Supervision

CN Rail originally suggested that environmental requirements in each contract could be adequately supervised by the Construction Manager. However, after the public information meetings and the release of the Panel's Interim Report, CN Rail engaged an Environmental Field Officer in late 1983. The Environmental Field Officer reports to the Construction Manager for the sole purpose of environmental surveillance and monitoring of twin tracking projects. Duties include enforcing environmental specifications written into construction contract documents, liaising with federal and provincial environmental agencies and ensuring that construction personnel are aware of sensitive environmental areas and issues. The appointment of the Environmental Field Officer has been well received by government agencies.

2.6.6 Public Consultation

In its interim Report, the Panel pointed out that there was a lack of public understanding of the twin tracking program and suggested improvements. During the Panel's September, 1984 final public meetings, CN Rail announced that a Community Affairs Officer was to be appointed in Kamloops to deal with community and individual citizen's problems and complaints. The Panel views this as a positive step and hopes that the officer will have sufficient authority to respond meaningfully and promptly to the public. There still seems to be some misunderstanding by the public of the twin tracking program and its timing and some people are still concerned that work will be undertaken and completed before environmental and other concerns are given proper consideration. The fact that CN Rail is not required by law to obtain environmental approval heightens public concerns.

7 The Panel recommends that CN Rail's Community Affairs Off icer:

a) be appointed as soon as possible and the position be continued for the life of the twin tracking program,

b) maintains regular contact with the public to keep them informed of progress and activities associated with the twin tracking program, and

c) feeds back concerns to CN Rail at a level where prompt action can be initiated.

3. ENVIRONMENTAL AND SOCIAL ISSUES

3.1 Fisheries

3.1.1 Background

The Fraser and Thompson River watershed is one of the largest fish producing systems in North America, and one of the least affected by damming. This relatively natural system produces all Pacific salmon species and several species of game fish.

The most important fish in the system are the anadromous salmonids — the Pacific salmon and steelhead trout. The term anadromous refers to fish that live most of their lives in the ocean, returning to freshwater rivers and streams to lay their eggs (spawn). Young fish rear in freshwater for periods of weeks, months or years, depending on species, before migrating downstream to sea.

Anadromous fish are vulnerable to natural and development related impacts at every stage of their freshwater life. Upstream migrating adults (spawners) must ascend difficult rapids in the Fraser and Thompson Rivers to their spawning grounds, relying on back eddies and deep pools for needed rest and shelter. Because fish often congregate in large numbers in these resting habitats, these are sites for sport fishing and Indian food fishing.

Spawning habitats vary with species, but generally are clean gravel areas in fairly fast flowing sections of the mainstem rivers and tributaries where clean, well oxygenated water is assured. Newly hatched fish (fry) require a variety of habitats, again depending on species. Good fry habitat generally consists of quiet, protected waters sufficiently productive for feeding and growth. These habitats are found along the margins of mainstem rivers, in adjacent wetlands, in tributary streams and in lakes.

Young anadromous fish make their seaward migration at a variety of ages and require little in the way of special habitat along their route except in the lower Fraser River and estuary where adaptation to a salt water life and rapid growth demand shelter and highly productive conditions.

Although fish habitats are generally productive and healthy in the Fraser and Thompson River system, past events have led to serious declines in fish stocks, particularly salmon. The most serious were the effects of rock disposal and slides from earlier railway construction which prevented many salmon from reaching their spawning grounds. A fishway was installed in the 1940's at Hell's Gate, on the Fraser River, the site of the most significant migratory restriction. Since then, a gradual rebuilding of sockeye and pink salmon stocks has been taking place.

In recent years, long-term overfishing has become recognized as a cause of significant declines in salmon stocks. Stock rebuilding is planned through adjustments in catch quotas or regulations, as well as habitat enhancement.

At present, the Fraser and Thompson River system provides habitat for one-quarter of the provincial total spawning salmon, including over one-third of the province's chinook salmon, one-fifth of its chum salmon, one-tenth of its coho salmon and nearly one-half of its pink and sockeye salmon.

The portion of the river system along the CN Rail corridor, in particular the Fraser River from Lytton to Hope and the Thompson River from Kamloops to Lytton, is a vital part of the total habitat required by these stocks. It provides spawning and rearing grounds and migratory pathways (both upstream to spawning grounds and downstream to sea) for up to 85% of the salmon in the Fraser and Thompson River system.

Salmon produced from the Fraser and Thompson River system make up over one-third of the total tidal commercial, sports and non-tidal Indian food fishery catch. The commercial fishery benefits are divided between American and Canadian fishermen on a treaty basis with the joint American/Canadian catch of Fraser and Thompson River fish representing about 30% of the B.C. total wholesale fish value. The tidal sports fishery focusses on chinook and coho salmon and involves over one-quarter million fishermen whose chinook salmon catch is about 20% Fraser and Thompson River fish and whose coho salmon catch is about 5% Fraser and Thompson River fish. A river sport fishery for salmon, mainly in the lower Fraser River, takes several thousand chinook and coho salmon every year. The Indian food fishery currently harvests about 400,000 fish per year, mainly sockeye salmon, from the Fraser and Thompson River system. Of this, about 70% is taken from the Fraser-Thompson corridor between Kamloops and Mission. The Indian food fishery is discussed in more detail in Section 4.

The steelhead trout fishery is the most important of the river sport fisheries. The lower Fraser River "bar fishery" below Hope took up to 1,000 steelhead in 1984, many of which were Thompson River migrants. The Thompson River is rated as the best steelhead river in the province in terms of catch and second only to the Vedder River in terms of angler days. The Thompson River below Kamloops Lake is classed as a "Special River" for steelhead fishing, and in 1984 had an estimated 8,000 angler days resulting in a total catch of approximately 3,500 steelhead. This fishery is concentrated in well established pools and runs.

The sport fishery for resident trout, char and whitefish on the Thompson River is centred in the same area as the steelhead fishery from Kamloops Lake to Lytton. There are no records available on angler use or catch but it is known that several thousand angler days are spent each year on this sport and that catches can be good. Sport fishing on the rest of the Thompson and North Thompson Rivers is less intensive, but nonetheless is an important recreational activity in most of the system.

The fish resources of the Fraser and Thompson River system are managed jointly by the federal and provincial governments.

The management of salmon and their habitats is the responsibility of Fisheries and Oceans. Sockeye and pink salmon management is shared with the International Pacific Salmon Fisheries Commission which is a joint Canada/United States body established in 1937 for management and division of the catch between the two countries. Day to day habitat management of these and other salmon species is carried out by Fisheries and Oceans.

Overall salmon management goals include rebuilding stocks to historic levels through a combination of catch restrictions and enhancement. There is an emphasis on the maintenance of natural salmon runs and their habitats, with enhancement intended to augment, but not replace, these natural or wild salmon populations.

The management and protection of salmon habitats is based on Fisheries and Ocean's "no net loss" principle whereby the productive capacity of the river system is to be maintained through protection of even the underutilized habitats in order to retain opportunities for future expanded use with increased salmon populations. Avoiding habitat loss is the preferred strategy of Fisheries and Oceans in achieving the "no net loss" goal. However, in cases where development activities result in habitat losses that are considered unavoidable, suitable compensation may be acceptable in the form of constructed replacement habitats.

Steelhead trout and resident game fish and their habitats are managed by the B.C. Ministry of Environment. Steelhead management goals include increasing stocks through catch regulation, hatchery stocking and habitat protection and improvement. Habitat management is usually pursued in cooperation with Fisheries and Oceans in areas of common trout and salmon production.

Fisheries and Oceans and the B.C. Ministry of Environment cooperate in the federal-provincial Salmonid Enhancement Program established in 1976 to restore salmon and anadromous trout to historic levels of abundance through programs of habitat restoration and augmentation and through programs of artificial production such as hatcheries. Implementation of enhancement opportunities on the Fraser and Thompson River system has been delayed pending a satisfactory Canada-United States treaty on commercial salmon fishing. However, Fisheries and Oceans and the B.C. Ministry of Environment view the protection of such enhancement opportunities as part of their general habitat protection activities.

3.1.2 Encroachments Into Watercourses

3.1.2.1 Introduction

Encroachments are defined as the placement of fill material or structures within the wetted perimeter of the mainstem river, into tributary streams or into wetlands, either for the second track road bed or for slope protection.

Encroachments can have both direct and indirect effects on fish and fish habitat. Encroachments which displace significant proportions of the cross sectional areas of the mainstem river or tributary stream have the potential to alter water velocities and flow patterns to the point where they could cause delay or increased stress in upstream migrating fish. There is the potential for cumulative effects from a number of such large encroachments. The repeated stress could delay spawning or render fish unfit for successful spawning. The loss of a number of resting areas could also lead to higher stress on and mortality of migrants.

Throughout the Fraser and Thompson River system, there are many pools, eddies, and deep water runs that provide pre-spawning holding refuges for salmon, overwintering shelter for steelhead and permanent habitat for larger resident game fish. They are also sites for much of the river sport and Indian food fishing. Placement of fill into these habitats and fishing sites can affect both fish use and fishability of these waters.

Fill material can cover and thereby eliminate spawning, rearing, refuge, food producing or migratory habitats in the mainstem, side channels, tributary streams or wetlands. Fills which remove bank vegetation can also cause rearing habitat damage through reduction of protective cover and nutrient sources, through increased water temperatures due to loss of shade, and through loss of bank irregularity which could reduce habitat diversity. These effects would be more pronounced in smaller tributary streams and wetlands.

Encroachments can have adverse effects on fish and fish habitat, chiefly through sedimentation which by blanketing downstream habitats can destroy fish eggs and reduce food production and available living space for rearing fish. Encroachments into the river channel can in some cases lead to erosion of the opposite bank, with resulting downstream sedimentation.

3.1.2.2 Avoidance of Encroachments

Fisheries and Oceans stated that its first priority is to prevent loss or damage to habitat by requesting that the second track be placed to avoid encroachments. It also stated that encroachments should not be permitted in areas of difficult fish passage such as canyons and rapids.

The most obvious means of avoiding encroachments is to construct the second track on the upland side of the original track. The alternative is to use retaining structures on the river side to prevent fills from entering the wetted perimeter.

CN Rail stated that upland locations are not always practical and provided reasons for its preference for river side locations in its 1983 statement "Factors to be Considered in Selecting Location for the Second Main Track". This statement cites volume of excavation required for an upland location and resultant material disposal problems, upland bank stabilization problems, lost track capacity during construction, culvert elevation problems and conflict with other land uses (usually on the upland side) as major factors in its preference for river side locations. In areas where it is considered necessary to construct on the river side, retaining walls could be used, but CN Rail indicated such structures are generally more expensive than encroaching into the river.

CN Rail has responded to government agency concerns by modifying designs to reduce the number and length of encroachments, particularly in areas of difficult fish passage.

This has been accomplished by relocating to the upland side and through the use of retaining walls.

CN Rail's most recent plans available to the Panel (May, 1984) show approximately 54 km (33 miles) of encroachment planned for the North Thompson, Thompson and Fraser Rivers. This represents a reduction from the approximately 60 km (37 miles) of encroachments shown in May, 1983 plans. The 1984 total includes about 400 m of "large" encroachments (occupying over 10% of the cross sectional area of the river) and about 53.5 km (33 miles) of "small" encroachments (occupying less than 10 %). CN Rail believes that only the "large" encroachments could have any measurable effect on river behaviour and velocity, and, therefore, on fish migration. However, it is recognized that the "small" encroachments still have the potential to impact on fish habitat and on fishing.

Table 2 shows CN Rail encroachment lengths for each subdivision and how they have been changed between the 1983 and 1984 designs.

Table 2

River Encroachment Design Changes

CN Rail Subdivision	May 1983 Large/Small Encroachments (m)	May 1984 Large/Small Encroachments (m)	Change Large/Small Encroachments (m)
Albreda (Valemount to Blue River)	1,100/3,870	31115,043	– 789/+ 1,173
Clearwater (Blue River to Kamloops)	750116,970	75/ 18,920	– 675/+ 1,950
Ashcroft (Kamloops to Boston Bar)	294128,815	15119,157	– 279/ – 9,658
Yale (Boston Bar to Vancouver)	0/11,080	0110,295	0/ – 785
Total	2,144/60,735	401/53,415	– 1,743/ -7,320

The principal concerns about encroachments are the effects on delay, stress or blockage of migrating adults and, therefore, existing areas of difficult passage are of greatest importance. An examination of the three most important areas of difficult passage (Yale to Pitquah on the Fraser and lower Thompson Rivers, the Blank Canyon area of the Thompson River and the Porte D'Enfer Canyon area of the North Thompson River) shows a significant reduction in encroachment in these areas between the 1983 and 1984 designs. The Panel is encouraged by this trend.

The Fraser River and lower Thompson River section of twin tracking from Yale to Pitquah (above Lytton), a distance of approximately 95 km (59 miles), is undoubtedly the area of most difficult passage with several well-known rapids. As it must provide migratory access for all Fraser River spawning populations above Yale and for all Thompson River fish, it is the most important migratory habitat in the system and the most sensitive. CN Rail's plans have been changed from 1983 to 1984 to reduce the planned encroachment lengths in this section from 3,375 m to 190 m. Of the presently planned 190 m of encroachment, only one 10 m length is classified as "large". Fisheries and Oceans stated it was pleased to note the almost total elimination of fill into the wetted perimeter in this section. It cautioned, however, that careful design and supervision would be needed to ensure that fill does not enter the river during construction.

The Black Canyon area of the Thompson River is another short section of difficult passage. A tunnel is planned for the second track. However, some encroachment is planned immediately upstream of the tunnel. CN Rail's consultants recommended avoiding placement of fill into the active channel in this area to avoid alterations in currents and velocities.

The third section of difficult passage is the Porte D'Enfer Canyon area of the North Thompson River, extending for 11.2 km (between Miles 9 and 16 of the CN Rail's Clearwater Subdivision), and including Little Hells Gate and other rapids. Although the second track is planned to be on the upland side for most of the distance, a short section (within Mile 12.2 to Mile 12.6) has a proposed 488 m encroachment.

While the Panel is encouraged by the encroachment reductions, it observed an encroachment constructed in 1983 opposite Hellroar Creek near Blue River where the justification for placing the second track on the river side is not clear. Although CN Rail suggested that the highway proximity precluded an upland location, there is no evidence that location alternatives were fully considered. However, it should be noted that the effects of this encroachment will probably not be significant and will be monitored. The Panel recognizes that the Hellroar Creek encroachment was approved and constructed prior to the Technical Working Group being put in place. Now that the Technical Working Group is functioning, it is made aware of projects which could result in encroachments early in planning and should, therefore, have ample opportunity for ensuring that priority is given to avoiding encroachments wherever possible.

TO this point in the design process, there has been an emphasis by CN Rail and the Technical Working Group on encroachment effects on salmonid migration and the planning necessary to avoid, where possible, encroachments into areas of difficult fish passage. The Panel concurs with this priority. It also recognizes that concerns about fish migration can be dealt with in the early planning stages of projects because of prior knowledge of areas of difficult fish passage and the general similarities in effect from site to site along the rivers.

Encroachments into areas outside those of difficult passage for migratory fish are also of concern. Such encroachments could affect fish holding pools, sport and Indian food fishing sites, and rearing and spawning habitats. These effects can generally be dealt with on a site-specific basis during the environmental design and planning for each twin tracking

project. The Panel believes that, as with areas of difficult fish passage, encroachments into these areas should be avoided wherever feasible.

8 **The Panel recommends that CN Rail continue to avoid encroachments in areas of difficult passage for migratory fish and make every effort to avoid encroachments in other areas important for fish holding, sport and Indian food fishing, rearing and spawning.**

3.1.2.3 Unavoidable Encroachments

As an aid to assessing the effects of encroachments, CN Rail and its consultants conducted a series of technical workshops in 1982 and 1984 focusing on potential effects on salmonid migration. The three workshops were:

1. a Rivers Workshop held in 1982 to seek the views of several experts on the potential effects of encroachments, mainly on river behaviour;

2. a Fish Passage Workshop held in 1982 to review information on salmonid migration and swimming capability and to suggest a study program for environmental design; and

3. an Environmental Design Workshop held in 1984 to examine the effects that encroachments could have on fish resources (mainly salmonid migration) and suggest design recommendations for mitigation and compensation.

Arising from these workshops, CN Rail proposed several studies to improve the knowledge of swimming speed and migratory behaviour of sockeye and pink salmon. These studies were based on the assumption that encroachment designs which accommodate the weakest swimmers (pink and sockeye salmon) will protect the stronger coho and chinook salmon and steelhead trout. As well, studies were suggested to measure migratory fish velocity preferences, physical conditions influencing velocity preferences, and how fish respond to turbulent flow. Some of these studies were undertaken in 1983.

The potential cumulative effects of a series of encroachments are important but difficult to measure. CN Rail stated that a solution to this problem would be to ensure that no individual encroachment would affect fish migration through delay or stress.

Pre- and post-construction monitoring procedures are planned starting in 1984 at the "Gold Pan Test Site" on the Thompson River near Spences Bridge and at nearby undisturbed control sites to test predictions of the effects of encroachments on fish migration. By examining encroachments of various roughness or rip-rap size, CN Rail hopes to measure any resulting differences in nearbank river velocity that could affect fish migration. Observations of migrating fish behaviour at these encroachments would be used to indicate any delay or change in migration pattern attributable to encroachments.

CN Rail seems confident that the Gold Pan test results will be useful for designing other encroachment sites and that pre-and post-construction monitoring will demonstrate that migration delays do not occur. Fish behaviour observations are planned at other sites to confirm the transferability of the Gold Pan results.

There are no methods for directly predicting the effects of encroachments on fish migration, e.g. through the use of biological models. The design of encroachments and fish migration impact assessment procedures depend on predictions of river velocity and behaviour and knowledge of fish swimming capability and behaviour. This has in part resulted in the sequential planning process employed by CN Rail and endorsed by the Technical Working Group, whereby CN Rail and the agencies will attempt to "learn as they go" using knowledge and experience gained by monitoring earlier encroachments as a basis for designing subsequent encroachments The Panel believes this approach to be reasonable, providing provisions are made to change both the encroachments themselves and the designs of future similar encroachments if unacceptable impacts are found.

The report of the 1984 Environmental Design Workshop held by CN Rail provides a useful summary of views on potential encroachment impacts and CN Rail's commitments to mitigation and compensation measures. The Workshop report concluded that, since a majority of encroachments will be relatively small, most will have no significant impact on migration. For the few potentially sensitive sites, some options are still available to carry out specific mitigation measures to ensure that the encroachment does not hinder migration. CN Rail felt that the proposed Gold Pan Test Site program would provide necessary design recommendations for mitigation.

CN Rail stated that fish migration pathways would not be affected anywhere even by large encroachments. CN Rail believes that river regime changes due to encroachments would be unlikely. Through choice of rip-rap, the encroachment bank could be made as rough or rougher than the original bank, creating a similar or wider zone of low-velocity flow for adult fish migration. CN Rail also believes that the loss of migratory holding or resting sites along encroachments could be compensated by providing adequate bank roughness or spurs. Thus, for most sites, the potential for delays was considered to be nil by CN Rail. Although other Environmental Design Workshop participants agreed with this conclusion regarding individual encroachments, several expressed concern regarding long-term cumulative effects. The Panel is also concerned that the simple observations of fish behaviour at the encroachment sites to be monitored may not provide sufficient information to determine all the effects on migration. As well, the Panel is concerned with the effects of possible future encroachments by CN Rail and other corridor users resulting from maintenance, repair, or other construction or operational activities. The Panel believes that more long-term research and study is needed on encroachment impacts on fish migration.

Thus far in the twin tracking program, there has been little documented planning for the design and mitigation of unavoidable encroachments into fish holding habitat, sport and Indian food fishing sites, and rearing and spawning habitats. These are site-specific issues and will reportedly be dealt with during the design of individual projects. However, several general considerations are discussed below,

The B.C. Ministry of Environment has identified 62 steelhead and rainbow trout holding and fishing sites on the Thompson

River between Kamloops Lake and Lytton. Encroachments into these sites could not only reduce their usefulness as resting habitat, but also their value to sport fishing. Seventeen of these sites are at some risk. Of the remaining sites, 34 are on the opposite side of the river from the CN Rail track, and the remaining 11 are either far enough removed from the track or in areas where twin tracking is already completed. Today many anglers use the river because there are many separate pools and runs. Any loss of these sites would not only reduce overall fish holding capacity, but would also increase angler congestion at the remaining sites.

Besides the sport fishery concerns, there are similar concerns for the Indian food fishery and Indian fishing sites.

The Panel believes that the protection of holding and fishing waters is vital to both the continued production of salmon and trout and the maintenance of these valuable fisheries.

CN Rail has suggested that direct and indirect impacts on spawning areas due to encroachments would be minor and easily offset. Although the effect of encroachments on spawning habitat has thus far not been a major concern, the Panel believes it should not be dismissed as inconsequential.

During the construction of encroachments, short-term sedimentation problems may occur downstream. Although construction timing can overcome most of these effects on spawning, the Panel believes it would be worthwhile for CN Rail and Fisheries and Oceans to monitor turbidity and sedimentation on spawning grounds downstream from one or more encroachment sites to confirm the degree of impact and further mitigation that may be necessary.

CN Rail suggested that encroachment impacts on shallow-water salmonid-rearing areas could be important in the smaller tributary streams and wetlands, and that mitigation could involve, among other measures, the maintenance of existing stream conditions. To reduce impacts on fish rearing in rivers, large rip-rap on encroachment fills could be used. The Panel notes that, in some cases, compensation may be preferable to mitigation, particularly where there are opportunities to achieve net improvements.

As noted previously, there are many uncertainties associated with the impacts of unavoidable encroachments and the effectiveness of mitigation measures. In addition, the "learn as you go" approach adopted by CN Rail includes a commitment to the improvement of future designs through experience gained with earlier encroachments. In view of the above, the monitoring of encroachment effects is most important.

The Panel recommends that:

9 CN Rail and the Technical Working Group develop encroachment impact monitoring procedures for the approval of the regulatory agencies and that these procedures should include:

a) criteria for determining which encroachment sites should be monitored,

b) parameters to be monitored,

c) frequency and duration of monitoring, and

d) reporting and analysis of monitoring results.

10 CN Rail be given the prime responsibility for conducting monitoring programs in view of the importance of the monitoring results to impact assessment and future designs.

11 CN Rail apply monitoring results to the design of future encroachments and modify exlsting encroachments if monitoring results reveal unacceptable Impacts.

3.1.2.4 Habitat Compensation

Need for Compensation

Where encroachments are unavoidable and where mitigation measures are not feasible, lost natural habitats can be replaced with compensatory habitats. Habitat losses and the need for compensation will most often result from encroachments into rearing habitats in the smaller tributary streams and wetlands. However, some losses of rearing habitat, spawning grounds, holding pools, and fishing sites may also occur in the river mainstems.

To this point, the only identified sites requiring habitat compensation are the encroachments constructed in 1983 into coho salmon rearing wetlands adjacent to the North Thompson River in the Blue River area and the proposed encroachments into pink salmon spawning habitats on the Thompson River. The proposed replacement habitats include excavated rearing channels adjacent to Cook and Peddie Creeks near Blue River for coho salmon and excavated access to side channels suitable for pink salmon adjacent to the mainstem Thompson River near Savona.

Fisheries and Oceans and the Steering Committee believe that habitat compensation, where required, should fulfill their "no net loss" objective; specifically: "Encroachments which cause the loss of significant habitat required to maintain present and historic fish production based on the (collective) professional judgement and recommendations of the Technical Working Group will be compensated for by the creation of habitat equivalent in productive capacity on a river system basis."

Fisheries and Oceans stated that habitat compensation will be pursued only after every attempt has been made to prevent or mitigate loss of habitat, and thus habitat compensation will only be applied to habitats unavoidably lost by the construction of the second track.

An important consideration is the measurement of habitat compensation performance or success against the "no net loss" objective. To achieve "no net loss", CN Rail's compensation provisions would have to be over and above any habitat enhancement already proposed by Fisheries and Oceans and the B.C. Ministry of Environment through their joint Salmonid Enhancement Program or other enhancement and rehabilitation initiatives. The development of an effective yardstick against which to measure the achievement of "no net loss", therefore, depends on stated enhancement planning goals from fisheries agencies, as well as natural habitat management and fish production goals. These goals are required to understand first of all what resources may be lost to the twin tracking program and, therefore, what must be replaced to achieve "no net loss".

The Panel concurs in principle with the "no net loss" policy, but is concerned about the lack of clear habitat management goals (including enhancement goals) against which to judge the extent to which the "no net loss" objective is being met.

The Panel recommends that:

12 Fisheries and Oceans and the B.C. Ministry of Environment clarify their habitat management and enhancement goals for the Fraser and Thompson River system.

13 CN Rail and the Technical Working Group quantify the Impacts of encroachments into fish habitats and compare these figures with the habitat management and enhancement goals to determine the need for and design of compensatory habitats.

Design of Compensatory Habitats

Fisheries and Oceans is playing a central role in setting the general conditions and criteria for compensatory habitat planning and in the specific design of individual compensation habitats. It is expected that the B.C. Ministry of Environment will play a similar role later should lost trout habitat become an issue.

The design of compensatory habitats for lost salmon habitat has thus far been based on the principle of "replacement in kind", as endorsed by Fisheries and Oceans. The department's position is that compensation should be made by creation of equivalent habitat, if possible, where it would be of value to that same stock or race of fish. In addition, its preference is for the habitat to be created from existing terrestrial areas so that one form of existing fish habitat is not exchanged for another. Future design is expected to be improved by the experience gained through the monitoring of earlier constructed compensation habitats.

Fisheries and Oceans and CN Rail stated that, at the present time, the designs of replacement habitats do not include any calculation of the risk of failure and only involve a simple physical replacement of habitat, i.e. the loss of 1 hectare of habitat would be compensated by the creation of 1 hectare of similar habitat. However, both acknowledged that conscious overbuilding could compensate for any risk of design failure.

Written design criteria for planned coho habitats at Cook and Peddie Creeks near Blue River were developed jointly by CN Rail and Fisheries and Oceans and include general guidelines to conform to goals for compensatory habitats. These goals include ensuring access and year-round use by fish, ensuring that they are maintenance-free and as natural as possible and ensuring that they are in an area of secure tenure. More specific objectives have also been stated to ensure optimum utility and productivity. Construction criteria were also developed to minimize impacts on the surrounding area, and suggestions were made to prebuild habitat where possible. The guidelines state that the ultimate compensatory habitat should be undistinguishable from the very best adjacent natural habitat.

CN Rail's environmental consultants said that, since the Blue River area habitats affected are marginal in nature, planned replacements will provide adequate or even overcompensated habitats.

In the Panel's view, the principle of replacement of habitat in kind using only physical similarity seems adequate for the marginally important habitats, but may be too simplistic for more valuable habitats. The Panel believes that compensation for the more important habitat areas should be carried out on a production-oriented basis, i.e. the replacement habitat should be of a similar demonstrated productive capacity to that lost. The productive capacity of an area should be measured by the number of fish it supports, or could support, and the growth rate of these fish. The compensation habitat should also have a similar seasonal period of utilization as the habitat being replaced. To meet the above objectives, it would be necessary for Fisheries and Oceans and the B.C. Ministry of Environment to establish two categories of compensation need. The first would be for marginal habitats requiring replacement in kind based only on the physical characteristics of the habitat area, and the second would be for important habitats requiring replacement by habitats of equal productivity. It will also be necessary to determine in some quantitative manner which habitats will be included in the important habitat category and which will be left as marginal.

14 The Panel recommends that CN Rail and Fisheries and Oceans (and the B.C. Ministry of Environment, where appropriate) develop a new habitat compensation design process based on the principles of:

a) requiring replacement of marginal habitat areas with compensatory habitat having similar physical characteristics to that being lost, and

b) requiring replacement of important habitat areas with compensatory habitat of equal productivity to that being lost.

The Panel recognizes the difficulties in designing replacement habitat, given the lack of experience in habitat replacement in this area. It believes that the risk of failure can be at least partially compensated for by making the replacement habitat larger or more productive than the habitat being lost.

15 The Panel recommends that, wherever practical, CN Rail overbuild replacement habitat, so that a larger or more productive habitat would be created than is being replaced.

The Technical Working Group considered the usefulness of prebuilding compensatory habitat before the loss of natural habitat from a twin tracking project occurs. The pre-building of habitat would allow direct comparisons to be made between the compensatory habitat and the original habitat to ensure that the replacement is similar in type and effectiveness. It would also ensure that there would be no intermediate loss of habitat and fish production between construction and the effective operation of the replacement habitat. Some potential problems were cited by CN Rail concerning access to compensatory sites before construction of the second track. The Panel recognizes that the pre-building of habitat may present construction problems and may not be practical in all situations.

16 The Panel recommends that, wherever practical, replacement habitat be pre-built so that new habitat would be created In advance of the destruction of the old habitat.

Planning for spawning or rearing habitat replacement for fish species other than coho and pink salmon has not yet begun. However, CN Rail points out that the studies under way in 1984 on the utilization of a variety of river margin habitats by chinook salmon and steelhead and rainbow trout will provide the kind of information required to either mitigate impacts or design compensatory measures and habitats.

Monitoring of Compensatory Habitats

Monitoring of the compensatory habitats will be necessary to determine their success and to identify design and performance features that would improve future designs.

Evaluation of the success or effectiveness of compensatory habitats will require setting specific goals for compensation, against which monitoring results can be compared. Thus far, CN Rail and Fisheries and Oceans have restricted their goals to "replacement in kind" or equal habitat gained for that lost, and have not defined any numerical fish-use goals. The B.C. Ministry of Environment urged the Panel to recommend that management goals be stated as the basis for compensation planning and evaluation, but offered no specific goals. The Panel believes that there should be specific goals for what a replacement habitat should accomplish.

17 **The Panel recommends that Fisheries and Oceans (and, where appropriate, the B.C. Ministry of Environment) develop specific goals for what each replacement habitat should accomplish.**

The criteria for design of the Cook and Peddie Creek compensation habitats include the stipulation that the habitats be made as maintenance-free as possible. However, there was no mention of plans for maintenance or repair, should that be required, or mention of who would be responsible for periodic checks to determine if the habitats were functioning as designed. Since compensatory habitats are intended to be permanent or at least as long-lived as the habitats replaced, the Panel believes that the habitats must continue to function as planned beyond the normal monitoring period if the "no net loss" objective is to be achieved.

18 **The Panel recommends that the continued functioning and effectiveness of compensatory habitat should be monitored on a long-term basis by Fisheries and Oceans (and the B.C. Ministry of Environment where appropriate) and, should it be found that any compensatory habitat is no longer functioning, it should be repaired or replaced by CN Rail.**

Fisheries and Oceans stated that the provision of compensatory habitat provides a unique opportunity to carry out basic research on salmonid spawning and rearing needs, especially on the Thompson River system. It is considering means by which such work can be accommodated within the compensation planning and monitoring program, particularly on the Cook and Peddie Creek habitats.

19 **The Panel recommends that basic research be done by Fisheries and Oceans and the B.C. Ministry of Environment in conjunction with the compensatory habitat monitoring program to ensure, first of all, that the habitats are functioning in all respects and, secondly, that as much knowledge as possible be gained for the design, construction, and operation of future replacement habitats.**

The planning process, as stated, includes the application of experience from the first constructed habitat to the subsequent design of other compensation habitats, and the Panel urges that maximum benefit be gained from this learning experience.

3.1.3 River and Stream Crossings

Tributary stream crossings for the second track will involve additions to existing bridges, new bridges, new culverts, and culvert extensions. New or extended culverts can create migration problems for fish if the design or installation is inappropriate. The length and gradient of a culvert can result in high stream-flow velocities, creating barriers to fish, and improper inverts and plunge pool characteristics can impede the passage of fish through the culvert.

Bridges can also cause migration problems where abutments and piers constrict the stream width or where protective aprons hamper easy passage.

The construction of culverts and bridges can also result in fisheries impacts through temporary diversions, which may affect fish passage and spawning and rearing habitats, and through sedimentation, which may affect spawning.

Few of these structures have as yet been designed for the twin tracking program. Although potential effects could be significant, there are effective and relatively simple design and construction criteria, such as culvert sizing, gradient and invert configuration, that can avoid impacts in virtually all cases.

Construction scheduling is important in reducing the risk of impact. Construction in low-flow periods can reduce the time necessary for in-stream work and can reduce the overall physical disturbance. Construction in non-spawning and egg-incubation periods will preclude sedimentation effects on these sensitive phases. Fortunately, there are low-impact construction timing "windows" available that meet both low-flow and non-spawning conditions and can accommodate all needed in-stream work for CN Rail stream crossings.

CN Rail has agreed to design culverts to allow passage of adult salmonids where required by the Technical Working Group and to conform to construction timing windows. CN Rail has also acknowledged the need to employ mitigative measures to minimize bank erosion and sedimentation during construction.

The Panel is generally satisfied with the stream crossing design procedures. However, it believes that more attention should be given to the selection of streams where special designs are needed to allow adult fish passage, particularly for those streams where there has been little direct observation of spawner use but where the potential for such use exists. The Panel also believes that more attention should be given to the seasonal migratory needs of juvenile fish, which may move in and out of the tributaries from the mainstem river seasonally, and may therefore require easy access under the CN Rail tracks. As these are much smaller fish, their passage requirements will be different from those of the larger adults.

3.1.4 Long-term Monitoring

The Panel is generally satisfied with the procedure for using monitoring information during the remainder of the environmental study and design period. However, it is concerned that at the end of this period, when the Technical Working Group and Steering Committee may be dissolved, there may no longer be a body to examine monitoring information and ensure its application to the design of future projects. The Panel believes that throughout the twin tracking construction period, there will be a need to assess information from compensation habitat monitoring, encroachment impact monitoring, and mitigation monitoring programs and to ensure its application to future designs. The Panel also believes that it would be appropriate for Environment Canada to coordinate this activity since it has the ongoing responsibility for the coordination of project approvals.

The Panel recommends that:

20 Environment Canada be the repository for all monitoring Information collected throughout the twin tracking program.

21 Environment Canada be responsible for overseeing the assessment of monitoring information and its use in the development of future designs.

3.2 Slope Stability and Disposal of Eroded Material

Concerns associated with slope stability arise from the possibility of a massive slide of material into one of the rivers such as occurred at Hell's Gate in 1914 and the gradual sloughing of material into the rivers from slowly eroding slopes.

Over many thousands of years, natural forces have been shaping the topography in the canyons and valleys of the mountainous terrain encompassing the Fraser and Thompson Rivers. Wind, precipitation, and freezing temperatures contribute to the erosion of the steep terrain, altering river channels and mountain slopes. One hundred years ago, the first major construction undertaken by man began along these two river corridors. Since then, the construction and maintenance of two separate transcontinental railway systems along with a trans-Canada highway and other developments have had an influence on this sensitive environment. Natural mountain slopes and streams were disturbed, causing earth and rock slides to enter the rivers, resulting in channel restrictions and diversions. Many of these occurrences have, in turn, affected fish habitat and fish passage.

Slope stability problems exist at locations where the topography and geology are such that early construction designs were not adequate to ensure long-term slope stability. These circumstances will still present problems in terms of the design of the second track construction. At present, the solution to the stability problem involves regular scaling of the slopes or other methods of slope stabilization, such as rock bolting and shotcreting.

The possibility of a massive slide, similar to the 1914 Hell's Gate slide, was raised on a number of occasions. Fears were expressed that such a slide could be triggered by the construction of the second track or could be triggered after construction if an unstable situation were created. The Panel shares this concern, but acknowledges that the science of geotechnical design has advanced considerably since the time of the Hell's Gate slide. It believes that the likelihood of such a massive slide occurring because of the second track construction is remote. It is clearly in CN Rail's best interests to ensure that the second track construction in no way contributes to an unstable situation that could trigger slides, since such occurrences could jeopardize railway operations.

The disposal of eroded material sloughing off slopes is a problem, since there is generally insufficient storage space to accommodate this waste material above the high-water mark of the rivers. In many areas, construction of the second track will further diminish the space available for disposal of this material. Moreover, where the second track will require opening up of established back slopes, the total amount of eroded material that must be disposed of will be greater. The second track would be in tunnel through some of these critical areas. However, where it is unacceptable to encroach into the river and where tunnelling is not practical, the second track would be built into the toe of an upper slope above the existing roadbed. In these situations, increased erosion will likely occur. There are a number of locations where fill sections for the grade will be constructed adjacent to or above rivers and streams. Slope failure in these sections could result in slumping material entering the waterways and possibly interfering with fish passage or affecting fish habitat.

CN Rail stated that it avoids steep slopes in its construction designs wherever possible, since they are usually a source of costly and continuous maintenance. When these are impossible to avoid, the new slopes are designed for maximum stability. The Panel accepts that it is in CN Rail's interest to ensure that its designs minimize slope stability problems and believes this can be achieved with modern geotechnical design procedures.

CN Rail acknowledged that most of the eroding material entering the rivers comes mainly from ongoing regular ditch-cleaning procedures. The eroded material is removed from the uphill side ditch and disposed of on the downhill side of the track. Fisheries and Oceans expressed concern about the amount of eroded materials and the manner in which they are ultimately deposited into water courses. CN Rail believes that its ditching operation does not interfere with the natural deposition of this material, as it would eventually enter the waterway in any case, with no control over timing or location. Fisheries and Oceans, on the other hand, expressed concern that the increased rate of erosion and instability caused by new slopes would deposit additional material in the waterways. The Panel understands that CN Rail and Fisheries and Oceans are currently working together to develop procedures whereby the department would be notified before maintenance activities start, and work would not begin without departmental approval. At present, some of these maintenance activities take place without consultation with Fisheries and Oceans.

The Panel did not receive sufficient information to conclude that the disposal of eroded material from ditches into the rivers

is causing damage to fish resources. However, it believes that, if this is left uncontrolled, there is a potential for damage.

22 **The Panel recommends that CN Rail, Fisheries and Oceans, and the B.C. Ministry of Environment develop procedures to be implemented by CN Rail for the disposal of eroded material.**

CN Rail stated that the second track would provide greater flexibility of operations, facilitating the use of work trains in hauling out this material.

3.3 Ancillary Activities

The construction of twin tracking projects involves a number of activities off the CN Rail right-of-way. These may include small construction camps, equipment and fuel storage areas, access roads, temporary water and power lines, borrow pit areas, and spoil disposal sites.

CN Rail advised the Panel that the amount of spoil material (and therefore the requirement for spoil disposal sites) would be minimized, as its standard practice is to balance the cut-and-fill sections as far as practical. CN Rail also indicated that, when it must dispose of excess material, it would be taken to suitable disposal areas where runoff or sediment cannot be washed into fish-bearing water bodies.

23 The Panel recommends that, in order to ensure that spoil disposal practices are carried out in an environmentally appropriate manner, these activities be reviewed by and receive the approval of Fisheries and Oceans and the B.C. Ministry of Environment.

CN Rail stated that spoil disposal areas and borrow pit areas would be contoured and seeded. The Panel, in its Interim Report, stated that it was impressed with the borrow pit rehabilitation practices employed by CN Rail during its twin tracking work through Jasper National Park. CN Rail stated that in "high profile locations" similar rehabilitation standards would be used, but in other areas these standards may be relaxed, though all spoil and disposal areas would be contoured and seeded.

Many construction activities, both on and off the CN Rail right-of-way, will be carried out by private contractors. CN Rail advised that the contract documents for this work require the contractor to "comply with all applicable laws and regulations." CN Rail also pointed out that its Environmental Field Officer's duties include checking the work of contractors and ensuring that all "government agency guidelines and recommendations, as agreed to in the Technical Working Group, are being incorporated into construction procedures." The Panel agrees with these practices and encourages CN Rail to continue them.

3.4 Heritage Resources

The Fraser and Thompson River corridor has provided a home for Indians for thousands of years. A rich and diverse culture developed and thrived, drawing heavily upon the resources of the corridor and the transportation links it provides. The extensive period of occupation and use along with the culture that flourished here has left the corridor with many areas and sites of heritage and archaeological importance. The more recent European settlement added its share of heritage resources to the area.

During the Panel's public information meetings in June 1983, concerns were brought to the Panel's attention regarding the effects of the twin tracking program on the corridor's heritage resources. The B.C. Heritage Conservation Branch pointed out that the CN Rail line runs through some of the province's most sensitive areas for possible significant heritage sites. To that time, little had been done to identify these sites or assess possible impacts. CN Rail subsequently commissioned a firm of consultants to prepare a heritage resource inventory and preliminary impact assessment covering all areas within the twin tracking corridor considered to contain sites of high and moderate to high potential. This study was completed in June 1984. Although pleased that the study had been carried out, the B.C. Heritage Conservation Branch stated that it had hoped the studies would also have included consideration of areas of moderate potential as well as the high and moderate to high potential areas. During the public meetings in June 1984, the Panel heard that efforts were under way to obtain funding through the National Museum of Man to assist CN Rail to undertake further heritage studies on areas of moderate potential. During the September 1984 public meetings the Panel learned that these funds had not been secured. The Panel believes that moderate potential areas should not be overlooked.

24 The Panel recommends that CN Rail undertake heritage inventory and assessment studies in areas of moderate potential, as well as in areas of moderate to high and high potential.

CN Rail has not reported any significant heritage sites during its twin tracking construction to date. However, significant sites were encountered in CN Rail's recent Kamloops Junction yard expansion. In that case, CN Rail, in cooperation with the Kamloops Indian Band, undertook a heritage resource inventory and impact assessment study of the area. Prior to construction, areas of heritage value were excavated and artifacts recovered. The artifacts were turned over to the Indian Band. This method of resource recovery, compared with other options of resource avoidance and resource preservation, was acceptable to the Band. Although the Kamloops railyard expansion is not part of the twin tracking program being reviewed, the Panel found CN Rail's approach for identification, assessment, and recovery of heritage resources at this site to be appropriate.

The importance of heritage site identification, evaluation, and impact assessment prior to construction, followed by surveillance and monitoring of mitigation measures was underlined on a number of occasions during the review. CN Rail, as a federal Crown corporation carrying out a project on federal lands, is under no legal obligation to follow the requirements of the B.C. Heritage Conservation Act, administered by the B.C. Heritage Conservation Branch. However, CN Rail stated that it was prepared to operate within the terms of the Act and to cooperate with those agencies and groups interested in protecting heritage resources.

The Panel recommends that:

25 Sites considered by the B.C. Heritage Conservation Branch and/or local people to be of heritage value be protected or recovered.

26 CN Rail follows the guidelines and requirements of the B.C. Heritage Conservation Branch as if It were actually in receipt of a provincial permit.

27 CN Rail includes heritage information on environmental design drawings.

The Panel has also recommended (see section 2.6.4) that the B.C. Heritage Conservation Branch be invited to become a member of the Technical Working Group.

In the spring of 1984, a separate heritage study was undertaken by the Alliance of Tribal Nations (Sto'lo Nation Tribal Council, N'lakapxm Nation Tribal Council, North Thompson Indian Band and Deadman Creek Indian Band). They initiated this study because of the importance they attribute to heritage resources and concern that these resources were not being thoroughly investigated by CN Rail's consultants. The study reported on sites not identified by CN Rail's consultants. During the Panel's final public meetings in September, 1984 CN Rail acknowledged that some Indian heritage sites seemed to have been missed and agreed to cooperate with the Indians on future heritage investigations. The Panel is pleased that CN Rail intends to work with the Indians on future studies.

28 The Panel recommends that all future heritage investigations and recovery programs involving Indian heritage resources be carried out with the full cooperation and Involvement of the affected local bands.

3.5 Wildlife

The main areas of wildlife concern are the possibility of an increase in collisions between wildlife and trains and impacts on migratory bird habitat due to the construction of the second track.

Wildlife kills, particularly moose, occur primarily in winter when high snow banks may prevent wildlife from escaping an oncoming train. CN Rail indicated that with two tracks, snow removal equipment should keep both the tracks and the area between them relatively snow-free and this wider corridor should allow an escape route for wildlife. Work conducted by a CN Rail consultant in Jasper National Park where twin tracking is complete, although considered preliminary, indicates that wildlife mortalities have been approximately 50% lower during the first two years after construction of the second track than they were prior to construction.

The Panel agrees that the preliminary study results appear to support the CN Rail contention that the second track should reduce the number of train and wildlife collisions. If wildlife kills along the entire line were recorded, this would help confirm the effect of the twin tracking program on collisions and also identify areas or sites where frequent collisions occur. If such sensitive areas are identified, CN Rail, in consultation with the B.C. Ministry of Environment, should investigate procedures for reducing collisions in these areas.

With respect to wildlife habitat, twin tracking will result in a small loss of wetlands, primarily in the North Thompson area. Environment Canada indicated that the proposed projects examined to date would not have a significant impact on migratory bird habitat. It also pointed out that wildlife habitat losses could be important at a specific site when reviewed from a local perspective. Environment Canada said that it will ensure that potential habitat loss is carefully examined during specific project reviews by the Technical Working Group so that any habitat losses are minimized. The Panel concludes that the loss of wetlands to the twin tracking program will not be significant.

3.6 Toxic Spills

One of the most significant environmental issues associated with CN Rail's operations through the Fraser and Thompson River corridor is the possibility of a spill of toxic substances into the rivers as a result of a train derailment. Such a spill, particularly if it were to occur during a critical period of fish migration or in a particularly sensitive area, could destroy millions of fish.

Although the transport of hazardous commodities is an ongoing operational issue not directly related to the twin tracking program, the Panel believes that the program may have an effect on operational safety. However, the extent to which twin tracking could affect the risk of a spill of toxic substances is not clear to the Panel. CN Rail stated that the second track would reduce the risk of derailments. Others disagreed, pointing out that a risk assessment has never been carried out on the effects of the second track and that the second track would provide additional capacity which could increase the overall risk of derailment. In the Panel's view, the key issue is not whether the second track would increase or decrease the risk of derailments, but rather what steps can be taken to minimize the risk.

Environment Canada suggested that CN Rail carry out a risk analysis to assess the degree of hazard. Risk analysis is still developing and, although it is coming into greater use, it is a relatively new procedure in assessing impacts. It can be helpful in assessing and comparing the risks associated with alternatives where there are major differences between the alternatives. For example, if CN Rail were considering an alternative to the Thompson-Fraser route between Kamloops and Vancouver, then a risk analysis could provide useful input to the choice of route. However, at present, the Panel understands that such an analysis would be unlikely to distinguish between the risks associated with minor variations in design. Consequently, the Panel believes that it would be more beneficial to concentrate on emergency planning and response capabilities rather than conducting risk analyses.

If a derailment occurs, it is important to get the right people and equipment to the scene of the accident as quickly as possible, to have a clear line of command, to have an efficient communication system, and to provide the emergency team with accurate information on how best to handle the spilled or spilling materials. CN Rail appears to have a highly sophisticated railway emergency response system. The emergency response vehicles, equipment, and communication systems

The trains come by You can hear them coming You fee/ the vibration The place rocks. Dishes rattle and break. Crystal's chipped. Chandeliers sway My son has an aquarium and he said the water sloshes from side to srde n the aquarium. It IS something that you would have to experience to believe

Mrs Thorn/lay,
Kamloops

The same applies to the installation of concrete t/es, where they replace wooden t/es The noise intensity has not changed, but the sound IS different. Where once the clickety-clack of the wheels travelling over jointed rail was synonymous with railroads, on new continuous welded rail track the wheels often glide by wrth a whisper.

Mr. Bob Johnson,
CN Rail

Now, the noise IS appalling and the vibration is getting worse. I understand that when we get double tracking you're hoping to have double the quantity of trams, and here again you and I can't agree. I say we're going to get twice as much vibration — which we are over a time. You can't tell me that one train goes and I get certain amount of vibration. Another train comes up, I get a certain amount of v/brat/on from that. It isn't all going to me/d into one and be the same as it was originally.

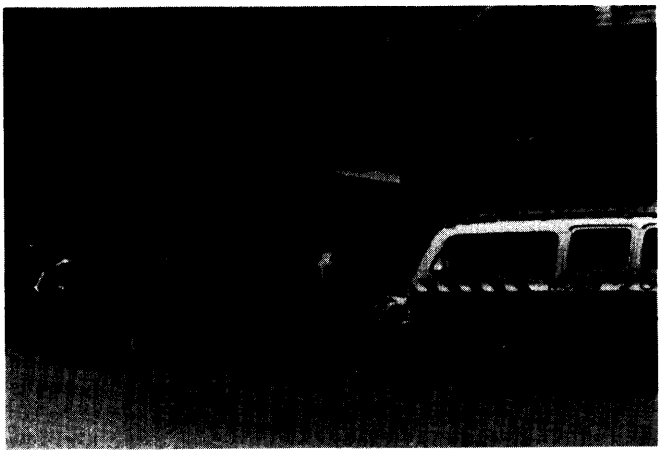
Mrs. Winsome Pye,
Clearwater

I agree with Mr Mohs when he said tonight that a lot more heritage work needs to be done within the twin tracking corridor. I think that we said that in our report. Mr. Host/and has said that as well, and of course CN Rail has agreed to a next stage of heritage work.

Dr Arnoud Stryd,
Arcas Assocrates (Hentage consultants to CN Rail)

This IS a Federal Government project conducted on federal land. CNR IS under no obligation to do archaeological work in this province under permit They have chosen not to do that That's a very Important point

Mr. Art Char/ton,
B.C Hentage Conservation Branch



were demonstrated to the Panel. A communications trailer which can be readily moved to any location maintains constant radio contact with the "front line" emergency vehicles and is equipped with a computer, printers, TV monitors, and other communications equipment. It can contact CN Rail's main computer to obtain information on the individual cars involved in an accident, the chemicals they contain, and how best to handle them.

The Panel was impressed with the equipment and with the dedication and enthusiasm of the staff. The Panel accepts that CN Rail's emergency response capability can effectively respond to most emergency situations.

In responding to an accident, it is usually necessary to assign priorities to the various containment, cleanup, and repair tasks in order to minimize any damage. While the Panel recognizes that the first priorities should be associated with human safety issues, it believes environmental concerns should receive full consideration during the development of contingency plans. To decide on environmental cleanup priorities and strategies, information is needed on the spilled substances and their likely environmental effects. Information is also needed on the sensitivity of the environment and the dispersion of substances in the rivers. This type of information is not presently available to the emergency crews, although much of it is contained in the resource atlas being compiled by CN Rail as part of the twin tracking environmental design process. The Panel believes that if information on environmental resources and sensitivities that could be affected by a spill were stored in a computer data bank, it could be accessed by CN Rail and other carriers of hazardous goods in the corridor.

The Panel recommends that:

29 **Environment Canada (with input and assistance from Fisheries and Oceans and the B.C. Ministry of Environment) set up and maintain a data bank on environmental resources and sensitivities, and that this data bank be readily accessible to CN Rail and other carriers of hazardous goods.**

30 CN Rail and the environmental agencies (Environment Canada, Fisheries and Oceans, and the B.C. Ministry of Environment) regularly discuss, review and update contingency plans for handling train derailments.

3.7 Vibration and Noise

Railway operations are noisy and can produce ground vibrations which are a continuing source of public concern. During the twin tracking program, noise and vibration alongside the rail line may increase as the operations move closer to some residences and trains pass more frequently.

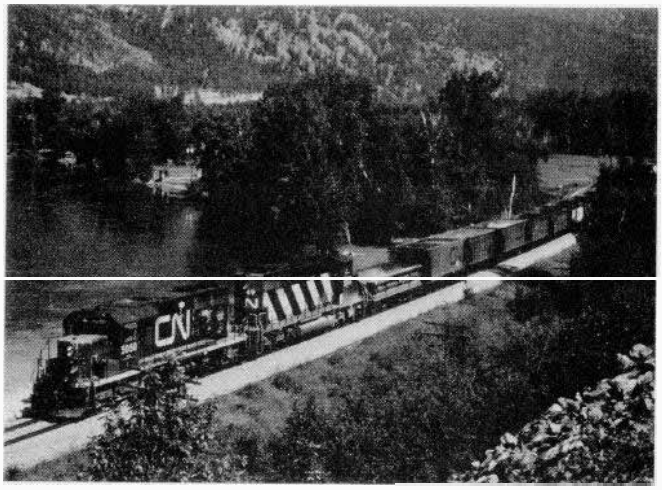
3.7.1 Vibration

CN Rail engaged two consulting companies to undertake surveys of vibration levels along the line following the Panel's June, 1983 public information meetings. Vibrations were recorded with seismic equipment at varying distances up to 100 m from the track. All measurements were taken alongside single track operations. Most measurements were found to be well below the levels where building damage might be expected to begin.

Shortly before the Panel's final public meetings in September, 1984, a 13 km (8 miles) section of new second track was placed in service through the Brocklehurst area of Kamloops. Many Brocklehurst residents attended the Kamloops public meetings and vociferously reported that vibration levels had grown intolerably worse since the new track came into use. CN Rail stated that it had taken some vibration measurements after the new line was in use and the levels were not found to be excessive or much different from the levels measured prior to the second track construction. The Kamloops residents countered by stating that none of the CN Rail measurements were taken when the trains causing the most serious problems were passing. Although problems appeared to be most severe for residents living adjacent to the tracks, others several blocks away also claimed to be experiencing vibrations.

Many residents were very distressed and reported that the value of their properties had been considerably lowered and, if something was not done, their normal life style would be severely disrupted. In addition, there were concerns for possible gas line or water line failures. Many called for speed reductions below the reported operating limit of 80 km/hr (50 mph), since some residents had observed that slower trains created less problem. Also, some observed that the trains operating on the new grade (usually used by loaded westbound trains) seemed to cause the greatest tremors. CN Rail stated that speed reduction was not an acceptable solution, as it would to some degree offset the value of the double track. In addition, CN Rail was concerned that this would create a precedent for other areas where it is trying to improve capacity with twin tracking.

Some of the factors mentioned to the Panel as possible contributors to the vibration problems were the use of continuous welded rail and concrete ties. The new second track through Brocklehurst was laid on wooden ties, so the possible effect of concrete ties can be discounted here. Also, the new railway grade through Brocklehurst was built over loose river-bottom materials, whereas the original grade and underlying material have had 70 years to consolidate. The extent to which these factors contribute to the vibration problems in Brocklehurst and other areas along the line is presently unknown.



Although the Brocklehurst residents were the most vocal in expressing their concerns regarding train induced vibrations, they were not alone. The Panel heard concerns about vibrations from residents in other areas along the line.

After the Kamloops meetings, CN Rail agreed to undertake further investigations into the Kamloops area vibration problems. These will be carried out by an independent consultant after consultation with affected residents. The Panel is pleased with the commitment CN Rail has made to address this issue and believes the problem is a serious one requiring prompt attention. The results of these studies were not available at the time of writing this report, and the exact magnitude, nature, and cause of the problem is not known,

31 The Panel recommends that CN Rail considers all options available following the completion of the Kamloops area vibration study and, in consultation with affected residents, develops procedures or initiates actions to minimize vibration levels in the Brocklehurst area and in other areas where train-induced vibrations have been identified as a problem.

3.7.2 Noise

Noise associated with railway operations can come from a number of sources. These include the exhaust noise from a large locomotive, the screeching of wheel flanges on curves and crossovers, the hammering caused by flat spots on wheels, the squeals in the running gear, the clickety-clack of wheels on switches, the impact noise as coupling slack is taken up or lost, and the blasting of train horns.

Concerns were expressed that the second track would eventually increase train frequency and, the subsequent noise, and bring the noise source closer to some of those affected.

To better understand noise levels along its line, CN Rail engaged a consultant to measure noise during the summers of 1983 and 1984 at a number of sites in Kamloops and Chilliwack. The consultant recorded wide fluctuations in levels due not only to train noises but also to other mechanical sources such as cars, trucks, and aircraft. These measurements were translated into a commonly used numerical indicator for noise disturbance known as Leq (24). This is defined as "the level of continuous sound which contains the same amount of acoustical energy as the fluctuating sound over the same 24-hour period." It is a weighted measurement with higher sound levels being given more weight than lower ones.

The evaluation of the effect of a particular noise on a given local community is highly subjective, as the group response to noise is dependent on numerous factors such as the type of area, the noise history of the area, and the detailed nature of the background noises. As a result, the consultant advised that there is no uniformly accepted standard or level of Leq (24). Guidelines have been used in some urban situations, and these generally fall within the range of Leq (24) from 55 to 75 dBA. Levels below an Leq (24) of 55 dBA are normally found to be completely acceptable, while levels above an Leq (24) of 75 dBA are normally found to be completely unacceptable.

In the tests carried out, the Leq (24) levels ranged from 55.8 to 63.7 dBA for residences between 35 and 165 m from the track and were up to 71.9 dBA at other locations within 22 m of the track. These results do not tell how much of the total level is contributed by railway noise and how much comes from other sources. Nor does it indicate the noise level during the day as compared to night or the short-term peak levels. Furthermore, these results suggest that current noise levels are neither clearly acceptable nor clearly unacceptable, given guidelines used elsewhere. However, it is recognized that the present noise levels are a continuing concern to residents near the tracks.

The Panel recognizes that CN Rail is limited in what it can do to reduce noise levels associated with its operations. For example, the curtailment of train-whistling can only occur with the approval of the Canadian Transport Commission and then only under a clearly defined set of conditions involving municipal by-laws and road-crossing protection. However, the Panel also recognizes that most of the noise measured exceeds normal community standards for levels that are considered completely acceptable.

32 The Panel recommends that CN Rail continues to monitor noise levels in sensitive areas and, where noise levels adjacent to residential areas are found to be higher than generally accepted standards, steps, such as the construction of noise barriers, be taken to reduce noise levels where practical.

The Panel notes that the problem of train-related noise and vibration appears to be a growing one and that their combined effects may be greater than each measured separately. At least part of the problem results from non-existent or inadequate local zoning restrictions that do not prohibit residential housing developments from being located adjacent to railway lines. The Panel suggests that an appropriate agency such as Transport Canada should look into this matter and possibly develop guidelines that could be adopted by local and provincial authorities, possibly by zoning, to minimize conflicts between railways and residential areas.

3.8 Track and Right-of-Way Maintenance

3.8.1 Weed Control

During the June, 1983 public information meetings, public concerns were raised regarding CN Rail's policy on the control of weeds within its right-of-way and the possibility of the second track construction disturbing natural ground cover and hence encouraging weed growth.

CN Rail stated that clauses calling for the reclamation of disturbed areas are included in all construction contracts. It also pointed out that reclamation procedures include the sloping of cuts, the levelling of disturbed areas and seeding (usually hydroseeding). It claimed that such procedures prevent weed infestation and promote the growth of grasses before weeds take hold. In Jasper National Park where the twin tracking program is largely completed, the Panel saw examples of some of CN Rail's recent disturbed area reclamation practices and was impressed with the results.

33 The Panel recommends that disturbed area reclamation standards for weed control similar to those used in Jasper National Park be adopted by CN Rail for the twin tracking program in British Columbia.

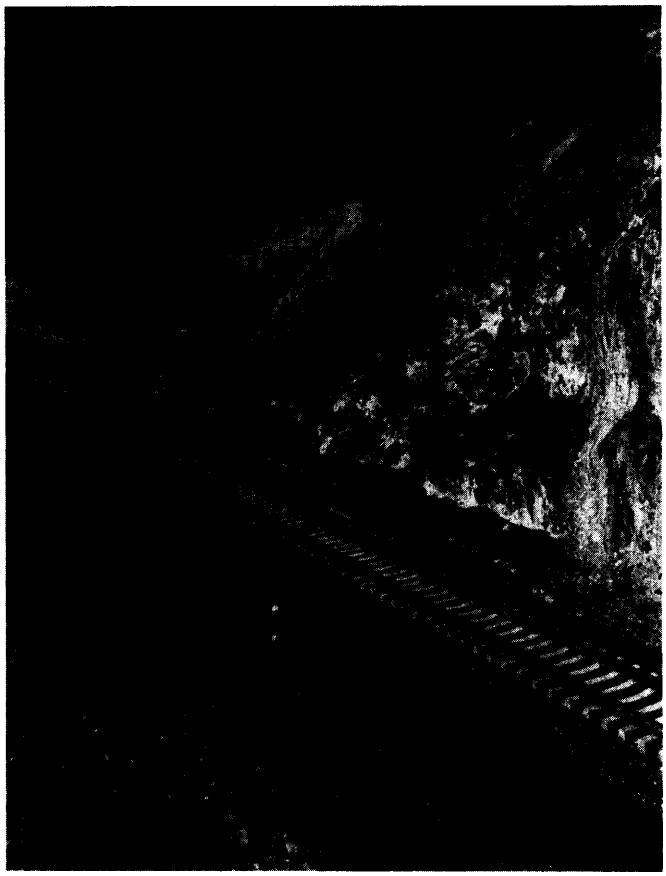
The problem of knapweed control was specifically drawn to the Panel's attention, since it is known that disturbed soils associated with twin track construction could promote knapweed infestation. In recent years, knapweed infestation of cultivated lands and rangelands has become a significant concern in B.C. In a report submitted to the Panel from CN Rail's Environmental Field Officer, CN Rail's program for the control of knapweed along its right-of-way was outlined. This program was commended by federal and provincial agencies. In addition, CN Rail has stated that if it hears of a knapweed problem along its right-of-way, it will make a special effort to spray the area. In spite of this, the Panel was advised that a knapweed problem still remains in some areas along the line.

34 The Panel recommends that CN Rail's knapweed control program be applied rigorously to all areas of its right-of-way where knapweed is reported to be a problem.

3.8.2 Rail Flange Lubricants

CN Rail has installed rail flange lubricators along its line in areas of heavy track curvature. These lubricators are designed to minimize train wheel and track rail wear through the application of a lubricant to the wheels of passing railway cars. Some of this lubricant ends upon the track grade and could find its way into nearby water courses. Since the second track would require additional lubricator installations, the Panel asked CN Rail to provide information on the toxicity of the lubricant material.

Although the manufacturer of the lubricant claimed that the material is not toxic, tests carried out by Environment Canada indicated "the grease has the potential to leach or emulsify toxic constituents into water." The Environment Canada tests were limited and cannot be considered conclusive. Although the manufacturer was reported to be carrying out additional tests on the toxicity of the grease to fish, the results of these tests were not available in October, 1984.



35 The Panel recommends that fish toxicity tests on the rail flange lubricant material be completed and if the use of the material is considered to pose an unacceptable risk by Fisheries and Oceans, Environment Canada or the B.C. Ministry of Environment, then it should be replaced with a more acceptable material.

3.8.3 Fouled Ballast

The habitat protection provisions of the Fisheries Act prohibit the deposition of deleterious substances into water frequented by fish. CN Rail acknowledges this and advises that fouled ballast wasted from its ballast cleaning and renewal operation remains as part of the railway grade and is not deposited into the waterways. This procedure takes place at about twenty year intervals and providing this continues unchanged for double track operations, the amount of fouled ballast material would double. The Panel believes that this material could accumulate to the point where sloughing of the embankments and natural bank erosion could result in this deleterious material entering the river.

36 The Panel recommends that CN Rail not allow fouled ballast material to accumulate on the roadbed to the point where there is any likelihood of this material entering a waterway and that excess material be removed to a disposal site acceptable to Fisheries and Oceans and the B.C. Ministry of Environment.

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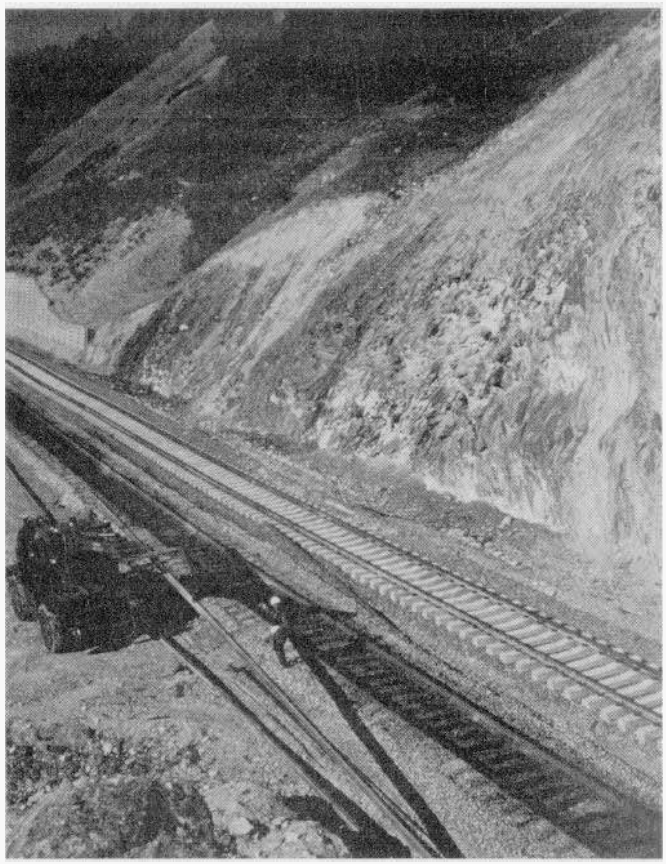

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4. INDIAN ISSUES

Many of the concerns raised by Indians regarding CN Rail's twin tracking program are similar to those raised by others. However, there are some reasons why Indians as a group will be affected differently than most other corridor residents. There are also cultural, historical and political realities that give rise to special Indian concerns regarding the twin tracking program.

The Panel accepts that the issues of Indian rights and aboriginal land claims are of great importance to the Indians and much was said about these during the final public meetings. However, these issues are clearly outside of the Panel's mandate. Nonetheless, the Panel believes that the land claims issues are clouding the ability of CN Rail and the Indians to deal more directly and effectively on matters related to twin tracking.

Indians have been living along the banks of the Fraser and Thompson Rivers for at least 10,000 years. Indian communities were generally located on the terraced benches close to the rivers which provided a source of food and means of transportation. As European civilization moved through British Columbia, the Indian occupied lands along the two rivers were eventually limited to about 70 small reserves. One rationale for small reserves was the assumption that the Indians would not require much land as they would continue to depend on salmon as their main food source. The construction of the original CN Rail line and other transportation links through the area had negative impacts on the Indian fishery and the Indian land base. The Indians expect that the construction of the second track will make this worse.

Throughout the review process, the Panel heard repeatedly from Indians that they had serious and deep rooted concerns about the twin tracking program as well as the ongoing operation of the CN Rail line. The Panel was impressed with the depth and sincerity of the Indians' concerns and recognizes that their situation regarding the twin tracking is unique.

4.1 Indian Fishery

Indians have a special relationship with the salmon that is often not understood by others. Salmon is a major item in the diet of many Indians in the area. In addition, the yearly cycles of the salmon runs are a central part of Indian culture and values. The act of catching and processing the fish has many social implications that cannot be compared to the commercial or sport fisheries. The Indians share the concerns for the salmon resource that are dealt with in other sections of this report, but their fishery is a traditional one that is unique.

In recognition of Indian dependence on salmon for food and barter and its cultural importance, the Government of Canada, in the 1800's, assigned exclusive rights to Indian bands to fish along portions of the Fraser and Thompson Rivers, both on and off reserve lands. Ownership of individual fishing locations is recognized by tribal councils and shared use is often accommodated by individual or band consent. Indians stressed that these rights are a form of land ownership and that CN Rail must negotiate with them if twin tracking projects impact on these rights in any way, just as it would with owners of fee simple land.

As part of its mandate, Fisheries and Oceans is responsible for the protection of the Indian fishery. The department issues annual Indian Food Fishing permits to individuals and bands. These permits specify maximum catches and fishing times to ensure adequate escapements and allocations to upstream bands and are regulated by periodic enforcement checks. Over 400 such permits were issued in 1982.

The Fraser-Thompson corridor Indian salmon catch has increased from an average 55,000 fish in the 1950's to over 270,000 at present. Almost all of this increase has taken place in the Fraser River from Hope to Lytton. Sockeye salmon make up an increasing proportion of the catch (70% in the Fraser and 90% in the Thompson). Pink salmon comprise the bulk of the remainder for both rivers. Chinook, coho and chum salmon and steelhead trout are also taken.

Not only does the Indian fishery demand specialized skills, it also requires specialized equipment. The Indian fishery equipment and regulations governing the fishery are geared to the present conditions and fish migration and holding patterns. If these are changed in any way by twin track construction, the ability of Indians to catch fish could be affected.

Indian fishing sites are numerous along both the Fraser and Thompson Rivers and the better locations are highly prized. The Sto'lo Nation and Nl'akapxm Nation Tribal Councils have identified many of these sites, although several Indian speakers at the public meetings claimed that all river banks are "fishing grounds". The Sto'lo Nation Tribal Council has identified 455 fishing sites on the Fraser River between Fort Langley and the Alexandra Bridge; 127 of which are located in the approximately 40 km between Hope and the Alexandra Bridge in the Fraser Canyon. The Nl'akapxm Nation Tribal Council has identified three exclusive band fishing areas on the Thompson River and five on the Fraser River between Lytton and the Alexandra Bridge. Not all Nl'akapxm Nation individual fishing sites were identified.

The Panel heard that many fishing sites have been damaged and destroyed in the past as a result of CN Rail related activities, either from the original track construction or from subsequent maintenance activities. Concerns were expressed that the second track construction could damage or destroy many more sites. The Panel recognizes that damage to fishing sites can occur not only as a result of direct encroachments into the sites, but also as the result of upstream and downstream encroachments that may alter the fish use of these sites. The Panel believes that any activity that could alter fish availability at a particular site or the ability of Indians to catch fish at that site must be considered in determining the total impact of twin tracking construction.

Concerns were also heard about damage to fishing site access trails. Construction works which interfere with access trails can hinder or prohibit safe access to and from fishing sites.

37 The Panel recommends that CN Rail take special care during the design and construction of twin tracking projects to preserve and protect and, where necessary, to replace Indian fishing sites and access trails.

4.2 Land Issues

Another concern expressed by many Indians was the loss of additional reserve land to the second track construction. The right-of-way granted to CN Rail for the construction of the first track required a substantial amount of reserve land. Many expressed concern that the second track construction will require additional right-of-way and further reduce their already limited land base. Still others pointed out that even though much of the twin tracking program can be carried out within the existing right-of-way, the effects of twin tracking could extend beyond the right-of-way boundaries. Examples of this cited during the public meetings included: cuts into steep banks causing erosion with the loss of further land adjacent to the right-of-way, the roadbed interfering with natural drainage of an area causing formerly dry arable land to become marshy, and poor weed control on the right-of-way allowing the spread of noxious weeds to adjacent lands.

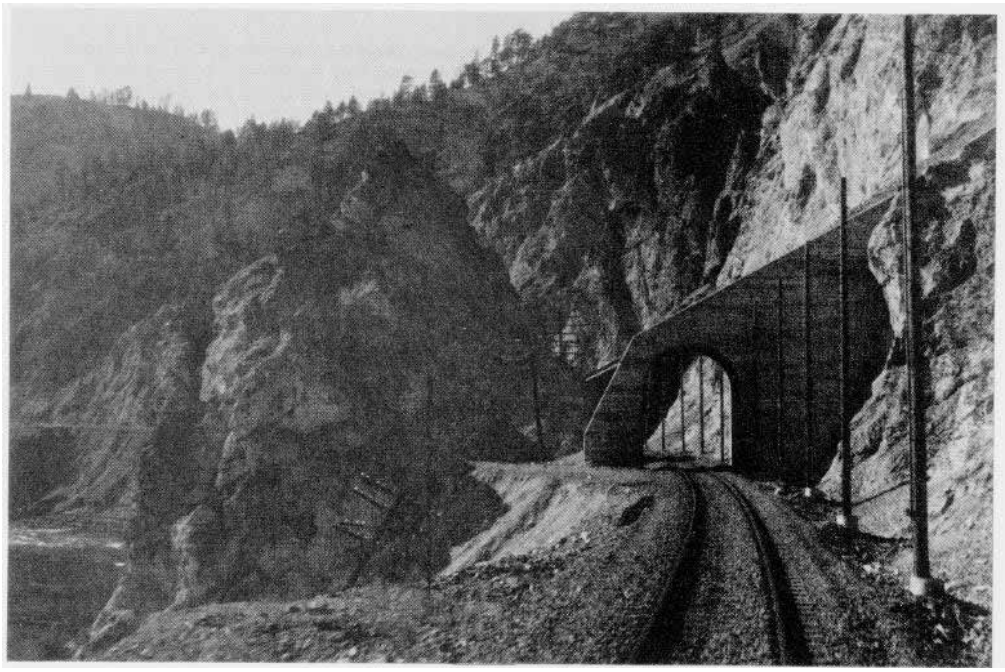
CN Rail stated that it wants to negotiate with either the bands or the tribal councils to acquire the additional right-of-way lands it may require. Some Indian representatives stated that they were reluctant to discuss any further alienation of land until all outstanding problems with CN Rail regarding land occupancy have been resolved. CN Rail indicated a willingness to work with the Indians towards a resolution of their problems. The Panel encourages CN Rail and the Indians to enter into serious discussions of all issues related to the present CN right-of-way through reserve lands and the need for additional lands for the second track.

4.3 Heritage Sites

Another significant concern to the Indians is the effect of twin tracking on heritage sites. The Panel recognizes the importance of this issue and has dealt with it in a separate section of this report (Section 3.4).

There can be no doubt that Great Britain, Canada and other nations have recognized the inherent sovereignty of the Aboriginal Nations and their right to self-government. We have the right to self determination. In the same respect we also have our inherent responsibility to safeguard the land and our environment.

Chief Edna Louis,
North Thompson Indian Band



5. ISSUES OUTSIDE THE PANEL MANDATE

Throughout the course of this review, a number of non-environmental issues were brought to the Panel's attention that are clearly outside its mandate. These include joint track utilization, private crossings, the fragmentation of land by the railway, traffic problems at level crossings, public safety, problems with the identification of railway right-of-way boundaries, right-of-way cleanup, trespass, railway relocation and local employment. In its Interim Report, the Panel described some of the concerns on these issues. During its final public meetings, the Panel heard additional concerns on some of these as well as some new issues. As in the Interim Report, the Panel has described these matters but has not made any recommendations.

5.1 Relocation of the Railway

During the final public meetings in Chilliwack, presentations were made to the Panel by the Mayor of Chilliwack, the Meadowbrook Ratepayers Association and the West Chilliwack Electors Association recommending that the railway be relocated outside Chilliwack. This recommendation was supported by the Regional District of Fraser Cheam in its presentation.

Those in favour of rerouting the railway argued that the second track would ultimately mean increased train traffic causing further delays in vehicular traffic movement across the 15 level crossings in Chilliwack. Associated with this was the concern that emergency vehicles would also be delayed. It was pointed out that costly grade separations, e.g. overpasses, are presently warranted for three crossings and these would reduce vehicle delays at these locations. Other concerns included fears of increased derailments involving hazardous goods in Chilliwack and increased noise and vibration. It was also suggested that the total cost associated with construction of a second track and the cost of grade separations could be applied to the construction of two tracks in a new corridor outside the community. In the opinion of those in favour of relocation there were a number of alternate locations which could be examined before twin tracking on the existing corridor is permitted. It was noted that once funds were committed to twin tracking it would be more difficult to consider relocation.

The Panel also received a petition from a representative of residents in the Fairfield Island area to the north of Chilliwack and adjacent to the Fraser River opposing the notion of relocating the railway to their area. Indians living on reserves along the river also expressed concern about relocating the line through their reserves. This underlines the complexity of relocation of the railway.

Twin tracking is not planned to commence in Chilliwack before 1988. Hence, there is time for discussion of various options. A first step in dealing with this problem could be to have the Regional District of Fraser Cheam determine whether agreement on an alternate route could be reached by its residents. In the Panel's opinion, a consensus of views would assist considerably in supporting a case for rail relocation outside Chilliwack. The Panel also notes that there may be important environmental issues which would have to be considered.

5.2 Joint Track Utilization

During the review, a number of people suggested that joint usage of existing track by both CN Rail and CP Rail might serve as a viable alternative to CN Rail's twin tracking program between Kamloops and Vancouver. In effect, this would involve a sharing arrangement between the railways, possibly with westbound traffic using one line and eastbound traffic using the other.

Joint track usage is being studied by Transport Canada in cooperation with the railways and the western provinces. The study results are expected in 1985 and will identify options available to expand capacity well beyond the 1980's. However, Transport Canada indicated joint track usage would not be an alternative to CN Rail's present twin tracking program since it would still be required even if joint track usage were to be implemented.

5.3 Road Crossings

During the review, a number of people expressed concern over the possibility of increased costs to them to pay for the extension of crossings over the second track. Road crossings are considered to be private, farm or public.

Private crossings were created for private use in agreement with CN Rail. The cost of an extended crossing over the second track is to be paid by the private owner. This also includes any grade changes in the road approach which might be required. In the case of farm crossings, CN Rail would extend the crossing over the second track and pay for any adjustments to the crossing approach. The responsibility for public crossings is mixed, as the costs are shared between the railway and the road authority.

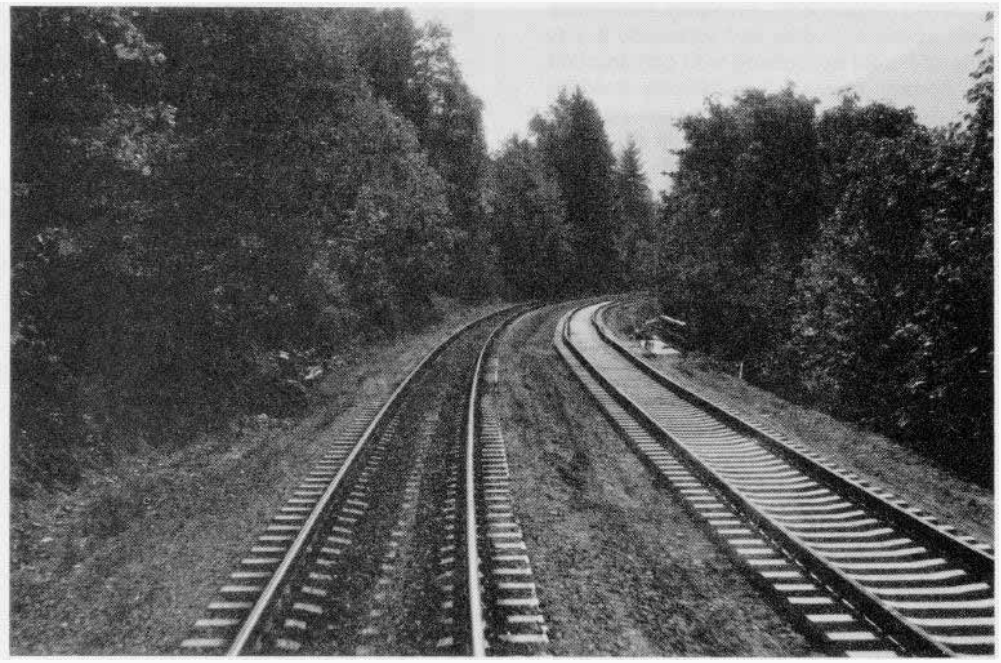
6. FUNDING OF ENVIRONMENTAL STUDIES

To examine the potential environmental effects of twin tracking, CN Rail and government agencies agreed from the outset that certain studies would have to be conducted. However, there was no agreement on how these studies should be funded. The Panel expressed concern about this in its Interim Report and strongly encouraged an early resolution of this dispute so there would be no interference with proper design and project approvals. It was evident during the final public meetings that this issue had still not been resolved. As a result, the Panel felt it necessary to make an immediate recommendation to the federal Ministers of Environment and Transport. In letters dated December 5, 1984, the Panel recommended to the Honourable Donald Mazankowski, Minister of Transport, and the Honourable Suzanne Blais-Grenier, Minister of Environment, that CN Rail continue to fund the planned studies, at least in the short term, until this matter is fully resolved.

CN Rail argued that some of the studies it has conducted were baseline studies and consequently, the costs should be assumed by the federal government as outlined in a 1977 Cabinet Directive relating to the federal Environmental Assessment and Review Process. In this directive, there were a number of conditions outlined regarding the allocation of environmental assessment costs between the federal government and project proponents. Specifically, the directive stated: the federal government should bear the costs of baseline studies; the proponent should bear the cost of the environmental impact assessment studies; and the government and proponent should share the cost of accelerated baseline studies with the incremental cost caused by acceleration being charged to the proponent. Baseline studies were defined as studies relating to the description of environmental properties and processes within a specifically defined area which will allow the identification of possible environmental impacts resulting from any anticipated intrusion by man. Accelerated baseline studies were defined as special cases that will arise when an unforeseen undertaking creates a need for an accelerated pace of work or for more detailed baseline data than was originally planned by government agencies as part of existing work programs.

The disagreement between CN Rail and the government agencies centres on the distinctions between baseline studies, accelerated baseline studies and environmental impact assessment studies. Considerable judgement is needed to make these distinctions and compromise is required to resolve differences of interpretation.

One of the roles established for Environmental Assessment Panels in a previous Cabinet Directive of 1973 was to provide guidance on methodologies for and the scope of environmental impact assessments. No role was given to Panels in defining what constitutes baseline, accelerated baseline and environmental impact assessment studies and how they should be funded. The terms of reference for this review also gave no specific direction to the Panel on this matter. Presumably this is a responsibility of the initiating department or the main resource agency. The initiating department, Transport Canada, has an important function in determining the need for and priority attached to railway expansion. The main resource agency is Fisheries and Oceans since the salmon fishery is the



main resource to be affected and on which most of the environmental studies focus. A new federal Order-in-Council issued in July 1984 on the Environmental Assessment and Review Process replaces the previous Cabinet directives and makes no mention of the allocation of costs.

CN Rail estimated that $4.3 million had been spent up to September 1984 on environmental studies, with $2.5 million of this total being considered by CN Rail to be baseline studies. The total capital cost of the twin tracking program is estimated to be $1.4 billion. Environmental studies completed to date represent 0.3% of this total cost. CN Rail pointed out that many of its studies will benefit others in the Thompson and Fraser river corridors and hence these should be characterized as baseline studies. Examples of studies it has undertaken which it believes should be categorized as baseline studies include preparation of a natural resource atlas for the area, studies on fish swimming capabilities for different species of fish and studies relating to the establishment of fish migration times.

In early 1984, Fisheries and Oceans agreed to pay $300,000 towards 1984 baseline studies. It indicated that this money was provided to prevent the 1984 studies program from stopping, there was no commitment to further funding and there was no consideration given to payment for studies that had already been completed in previous years. Fisheries and Oceans also supported CN Rail in its efforts to obtain funds for environmental studies from the Western Development Fund but monies were not forthcoming.

Transport Canada pointed out that it had not directed CN Rail to twin its mainline, rather this was a CN Rail decision based on its legislated mandate to ensure that adequate capacity would be available. The Panel's Terms of Reference state "the federal government has recognized the need for and therefore has encouraged the early construction of twin tracking of CN Rail's mainline in Western Canada". Transport Canada indicated that the Western Grain Transportation Act now enables the railways to receive sufficient revenues for grain transportation and thereby removes a serious drain on their ability to generate capital. Transport Canada also pointed out that it had no means of funding environmental studies for this program.

The Panel notes that Fisheries and Oceans had limited baseline information on the fish resources of the Fraser and Thompson River system prior to the start of the twin tracking program. As a consequence, CN Rail undertook the gathering of fisheries baseline data as part of its overall environmental studies program. This baseline information will be of long-term benefit to Fisheries and Oceans and to CN Rail in determining the impacts of the twin tracking program.

CN Rail indicated that environmental studies completed up to the end of 1984 would provide enough information for design and approval of all projects planned for construction in 1985 and some in 1986. For other projects in 1986 and beyond, there is inadequate environmental information to judge fully the potential impacts.

If the planned studies are not undertaken, government agencies would have to decide whether to approve a project based on limited environmental data or to delay the approvals process until they were able to collect the necessary data themselves. Based upon statements made by Environment Canada, the Panel has the impression that the latter would occur. Consequently, maintaining the existing rate of the review and approvals process can probably only be achieved if the environmental studies are completed as presently planned.

The Panel believes that delays in the studies program should be avoided because it would set back the twin tracking design and approvals process, and disrupt the continuity of biological information now being gathered by a competent team which might have to be disbanded. A delay would also impair the credibility of CN Rail's commitment to environmental protection and, in turn, could affect public confidence in government's ability to ensure that effective protective measures will be incorporated in the program.

Unless this funding dispute is resolved, it could not only affect the environmental studies, but also the mechanism and process for monitoring the continuing work of CN Rail and for implementing the recommendations of the Panel. This is a matter of concern to the Panel and of direct relevance to its mandate.

The Panel carefully considered the arguments that both CN Rail and Fisheries and Oceans made and concludes that both benefit from the environmental baseline studies. CN Rail benefits because it receives a timely review and approval of its plans by government agencies. Fisheries and Oceans benefits because it will have a greater understanding of the fish resources in one of the most important wild spawning river systems in North America. This information will help Fisheries and Oceans manage the fish resources and assess the impacts of possible future transportation and other developments in the corridor.

In the Panel's view, there was an acceptance by Fisheries and Oceans that some of the 1984 fisheries studies were considered to be baseline. Fisheries and Oceans contributed $300,000 towards the $1,200,000 environmental studies program undertaken in 1984. The Panel believes that this precedent of funding baseline studies should continue in the future. However, the Panel also realizes that it is difficult to separate the studies into the categories of baseline studies, accelerated baseline studies and environmental impact assessment studies. Given this difficulty, the Panel believes that in instances where baseline studies cannot be clearly separated from other studies, Fisheries and Oceans and CN Rail should continue to share total study costs in the same proportion as in 1984, i.e. 25% Fisheries and Oceans and 75% CN Rail.

7. FOLLOW-UP TO PANEL RECOMMENDATIONS

Throughout this report, the Panel has made a number of recommendations on a wide variety of issues, some of which are directed to CN Rail and others to government agencies. The Panel believes that there should be an independent mechanism in place to report periodically on the implementation of its recommendations.

A number of options are available. One is to leave this responsibility to the Technical Working Group or Steering Committee. However, the Panel recognizes that these groups could be disbanded once the environmental studies and design program is completed, possibly as early as 1986, and that the twin tracking program will take many years to complete. As many of the Panel recommendations apply to activities that could take place well after the Technical Working Group and Steering Committee are disbanded, this option may not be practical. Another option is to leave this follow-up role to a government agency such as Environment Canada. The Panel recognizes, however, that this role may be in conflict with some of the agency's other roles vis-a-vis the twin tracking program and that some of the Panel's recommendations are directed to government agencies as well as CN Rail.

The Panel believes that the Federal Environmental Assessment Review Office (FEARO) would be an appropriate independent body to undertake this follow-up role. As FEAR0 has provided the secretariat services to the Panel, it is fully familiar with the issues reviewed and the Panel recommendations, and has direct access to all of the documentation submitted. In addition, FEAR0 has the responsibility for the ongoing administration of the federal Environmental Assessment and Review Process, a responsibility that includes reporting on the implementation of the process.

The Panel recommends that:

38 The Federal Environmental Assessment Review Office be assigned the responsibility for periodically reviewing the manner in which the Panel's recommendations are being implemented and reporting the results of this review to the Ministers of Environment and Transport.

39 The frequency and method of reporting be left to the discretion of the Minister of Environment but that the reporting period not exceed three years.

40 The review and reporting be continued through to the end of the twin tracking program or until such time as the Ministers of Environment and Transport are satisfied that there is no further need for the review to be extended.

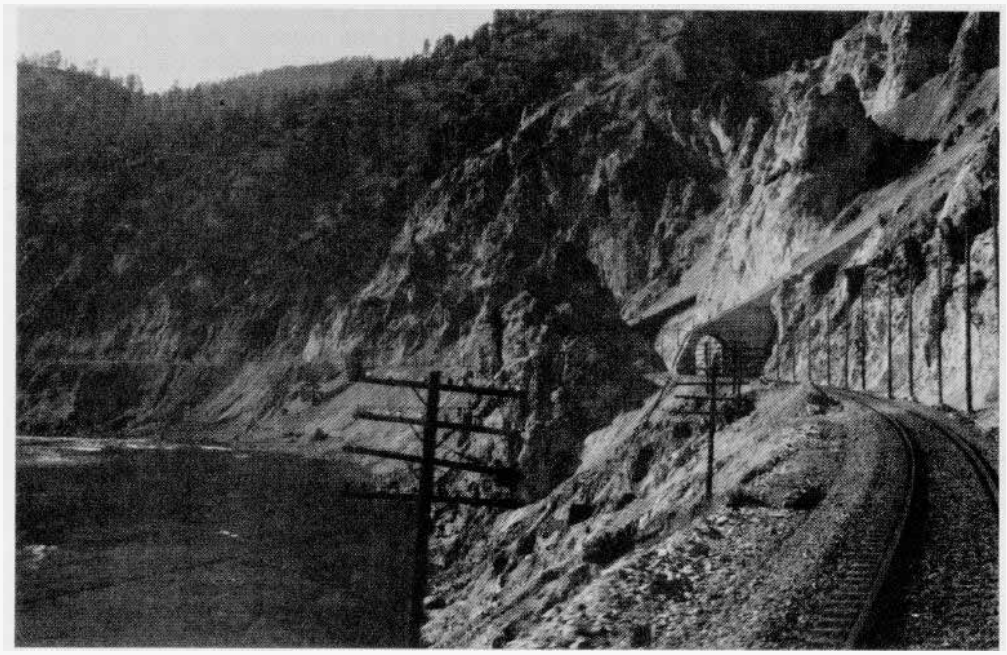
To facilitate the Federal Environmental Assessment Review Office's follow-up role on the Panel's recommendations, it would be helpful to have an annual report from CN Rail on the twin tracking program.

41 The Panel recommends that CN Rail prepare and submit to the Federal Environmental Assessment Review Office an annual report on the twin tracking program containing information on:

a) progress on individual twin tracking projects,

b) results of the various monitoring programs, and

c) progress on environmental studies.



8. LONG-TERM ENVIRONMENTAL IMPLICATIONS OF TRANSPORTATION RELATED ACTIVITIES IN THE FRASER AND THOMPSON RIVER CORRIDORS

In the letter of referral initiating the CN Rail Twin Tracking Panel review, the Minister of Transport asked for "any view and concern that the Panel may receive on possible long-term implications to the Fraser and Thompson corridors due to other transportation related activities" and that this information be compiled in a report separate from the Panel report dealing with the twin tracking program.

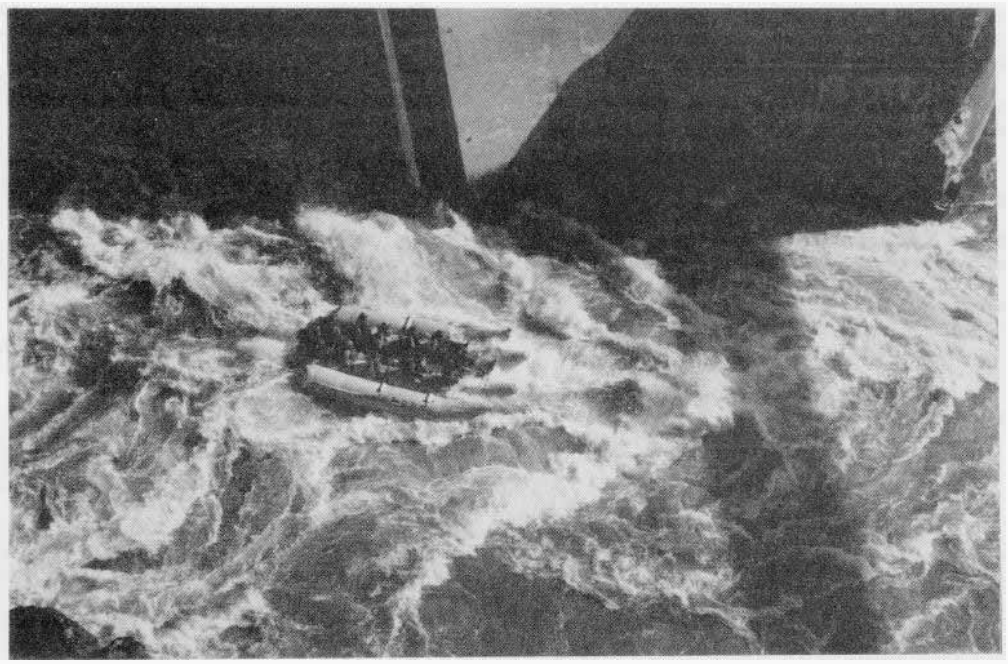
From a preliminary search, the Panel has determined that, with the exception of CN Rail's twin tracking plans, information on long-term plans for transportation related activities in the corridor and the effects of such plans on the environmental resources of the corridor are not well documented. The Panel, therefore, commissioned a consultant to prepare a report identifying transportation uses of the corridor, environmental and land use resources along the corridor that could be affected by transportation activities and areas of potential conflict among the various corridor users.

A draft of the report was circulated to a number of interested groups, transportation companies and government agencies and was discussed at a one day workshop held in Vancouver in July, 1984. Following the workshop, the report was finalized and copies made available to the public.

The Panel also prepared a document which summarizes the consultant's report and lists a number of issues on which it would like to focus discussion. This summary document has been distributed widely.

The Panel's next step in the corridor review will be to convene workshops to solicit views from the public, government agencies and transportation companies. Although the workshops will be open to the public, the Panel plans specifically to invite representatives from key public groups, government agencies and transportation companies to participate. The purpose of the workshops will be to discuss issues raised by the Panel and others relating to planned transportation activities in the corridor and their environmental effects.

Following the workshops, the Panel will submit a report on this review to the Ministers of Environment and Transport.



9. LIST OF RECOMMENDATIONS

Throughout this report the Panel has made a total of 41 recommendations on 10 different issue areas. The recommendations are reproduced in this section according to each issue area. The Panel recommends that:

Design and Approvals Process

1 **The B.C. Heritage Conservation Branch be invited to become a member of the Technical Working Group, or if it chooses not to become a member, be allowed to attend Technical Working Group meetings, and be invited to participate in preliminary site visits.**

2 **An Indian representative be appointed to the Technical Working Group by Indian and Northern Affairs Canada in consultation with the Alliance of Tribal Councils.**

3 **The Indian representative arrange for participation on preliminary site visits of other Indians who live on reserves adjacent to the area being examined during the visits so that concerns relating to access trails, fishing sites, heritage sites and other sensitive environmental resources can be brought to the attention of the Technical Working Group.**

4 **A representative from Indian and Northern Affairs Canada be appointed to the Steering Committee to ensure that Indian environmental concerns are represented at the Steering Committee level.**

5 **The Steering Committee be given the responsibility for ensuring that ail areas of environmental concern, including fish and fisheries, access to fishing sites, heritage resources and Indian environmental concerns, are dealt with properly.**

6 **in the future no construction should commence until at least 12 months after ail environmental design studies are completed.**

7 **CN Rail's Community Affairs Officer:**

a) be appointed as soon as possible and the position be continued for the life of the twin tracking program,

b) maintains regular contact with the public to keep them informed of progress and activities associated with the twin tracking program, and

c) feeds back concerns to CN Rail at a level where prompt action can be initiated.

Fisheries

8 **CN Rail continue to avoid encroachments in areas of difficult passage for migratory fish and make every effort to avoid encroachments in other areas important for fish holding, sport and Indian food fishing, rearing and spawning.**

9 **CN Rail and the Technical Working Group develop encroachment impact monitoring procedures for the approval of the regulatory agencies and that these procedures should include:**

a) criteria for determining which encroachment sites should be monitored,

b) parameters to be monitored,

c) frequency and duration of monitoring, and

d) reporting and analysis of monitoring results.

10 **CN Rail be given the prime responsibility for conducting monitoring programs in view of the importance of the monitoring results to impact assessment and future designs.**

11 **CN Rail apply monitoring results to the design of future encroachments and modify existing encroachments if monitoring results reveal unacceptable impacts.**

12 **Fisheries and Oceans and the B.C. Ministry of Environment clarify their habitat management and enhancement goals for the Fraser and Thompson River system.**

13 **CN Rail and the Technical Working Group quantify the impacts of encroachments into fish habitats and compare these figures with the habitat management and enhancement goals to determine the need for and design of compensatory habitats.**

14 **CN Rail and Fisheries and Oceans (and the B.C. Ministry of Environment, where appropriate) develop a new habitat compensation design process based on the principles of:**

a) requiring replacement of marginal habitat areas with compensatory habitat having similar physical characteristics to that being lost, and

b) requiring replacement of important habitat areas with compensatory habitat of equal productivity to that being lost.

15 **CN Rail overbuild replacement habitat, wherever practical, so that a larger or more productive habitat would be created than is being replaced.**

16 **Replacement habitat be pre-built, wherever practical, so that new habitat would be created in advance of the destruction of the old habitat.**

17 **Fisheries and Oceans (and, where appropriate, the B.C. Ministry of Environment) develop specific goals for what each replacement habitat should accomplish.**

18 **The continued functioning and effectiveness of compensatory habitat should be monitored on a long-term basis by Fisheries and Oceans (and the B.C. Ministry of Environment where appropriate) and, should it be found that any compensatory habitat is no longer functioning, it should be repaired or replaced by CN Rail.**

19 **Basic research be done by Fisheries and Oceans and the B.C. Ministry of Environment in conjunction with the compensatory habitat monitoring program to ensure, first of ail, that the habitats are functioning in ail respects and, secondly, that as much knowledge as possible be gained for the design, construction, and operation of future replacement habitats.**

20 Environment Canada be the repository for all monitoring information collected throughout the twin tracking program.

21 Environment Canada be responsible for overseeing the assessment of monitoring Information and its use In the development of future designs.

Disposal of Eroded Material

22 CN Rail, Fisheries and Oceans, and the B.C. Ministry of Environment develop procedures to be implemented by CN Rail for the disposal of eroded materlal.

Ancillary Activities

23 In order to ensure that spoil disposal practices are carried out in an environmentally appropriate manner, these activities be reviewed by and receive the approval of Fisheries and Oceans and the B.C. Ministry of Environment.

Heritage Resources

24 CN Rail undertake herltage inventory and assessment studies in areas of moderate potential, as well as in areas of moderate to high and high potential.

25 Sites consldered by the B.C. Heritage Conservation Branch and/or local people to be of heritage value be protected or recovered.

26 CN Rail follows the guidelines and requirements of the B.C. Heritage Conservation Branch as if It were actually in receipt of a provincial permit.

27 CN Rail includes heritage Information on environmental design drawings.

28 All future heritage Investigations and recovery programs involving Indian heritage resources be carried out with the full cooperation and involvement of the affected local bands.

Toxic Spills

29 Environment Canada (with input and assistance from Fisheries and Oceans and the B.C. Ministry of Environment) set up and maintain a data bank on environmental resources and sensitivities, and that this data bank be readily accessible to CN Rail and other carriers of hazardous goods.

30 CN Rail and the environmental agencies (Environment Canada, Fisheries and Oceans, and the B.C. Ministry of Environment) regularly discuss, review and update contingency plans for handling train derailments.

Noise and Vibration

31 CN Rail considers all options available following the completion of the Kamloops area vibration study and, In consultation with affected residents, develops procedures or initiates actions to minimlze vibration levels In the Brocklehurst area and In other areas where train-induced vibrations have been identified as a problem.

32 CN Rail continues to monitor noise levels in sensitive areas and, where noise levels adjacent to residential areas are found to be higher than generally accepted standards, steps, such as the construction of noise barrlers, be taken to reduce noise levels where practical.

Track and Right-of-Way Maintenance

33 Disturbed area reclamation standards for weed control similar to those used In Jasper National Park be adopted by CN Rail for the twin tracking program In British Columbia.

34 CN Rail's knapweed control program be applied rigorously to all areas of Its right-of-way where knapweed is reported to be a problem.

35 Fish toxicity tests on the rail flange lubricant material be completed and if the use of the material Is consldered to pose an unacceptable risk by Fisheries and Oceans, Environment Canada or the B.C. Ministry of Environment, then It should be replaced with a more acceptable material.

36 CN Rail not allow fouled ballast material to accumulate on the roadbed to the point where there is any likelihood of this material entering a waterway and that excess material be removed to a disposal site acceptable to Fisheries and Oceans and the B.C. Ministry of Environment.

Indian Issues

37 CN Rail take special care during the design and construction of twin tracking projects to preserve and protect and, where necessary, to replace Indian fishing sites and access trails.

Follow-Up to Panel Recommendations

38 The Federal Environmental Assessment Review Office be assigned the responsibility for periodically reviewing the manner in which the Panel's recommendations are being implemented and reporting the results of this review to the Ministers of Environment and Transport.

39 The frequency and method of reporting be left to the discretion of the Minister of Environment but that the reporting period not exceed three years.

40 The review and reporting be continued through to the end of the twin tracking program or until such time as the Ministers of Environment and Transport are satisfied that there is no further need for the review to be extended.

41 CN Rail prepare and submit to the Federal Environmental Assessment Review Office an annual report on the twin tracking program containing information on:

a) progress on individual twin tracking projects,

b) results of the various monitoring programs, and

c) progress on environmental studies.

ENVIRONMENTAL ASSESSMENT PANEL

CN RAIL TWIN TRACKING PROGRAM B.C.

R. G. Connelly

F. A. MacLean

N. L. McLeod

G. R. Peterson

S. O. Russell

APPENDIX A — TERMS OF REFERENCE FOR CN RAIL MAINLINE CAPACITY EXPANSION IN BRITISH COLUMBIA

ENVIRONMENTAL ASSESSMENT PANEL

Mandate

The Environmental Assessment Panel is to undertake a review of the environmental and related socio-economic impacts of the CN Rail capacity expansion projects on its mainline in British Columbia with emphasis on the Vale-mount-Vancouver segment.

Scope of the Review

The Panel is to assess the environmental and related socio-economic impacts of CN Rail's planned projects as outlined in the Project Description below.

The Panel is to examine the adequacies of the recent past, present and future CN Rail study programs, environmental designs, organization and processes associated with the implementation of these projects and conceptual designs.

Project Description

The CN Rail Plant Expansion Program involves the construction of double track over a significant length of its 440 mile route, predominantly within CN Rail's right-of-way corridor in B.C. The program projects involve cut and fill sections, bin walls and rip-rap for slope stabilization, reclamation and revegetation, tunnels, bridges, culverts and other engineering works to build a safe roadbed for the second track, with the centre line of this new track generally being 15 feet from the existing track. For some sections along the route, building the additional roadbed will require encroachments on the rivers and/or terrain adjacent to the present corridor. At present, CN Rail envisages the installation of 40 % — 50% of double track by about 1990. Some projects have been completed, some are under construction, others are at the engineering-environmental design and review stage, while the remainder of projects have been monitored and some accepted by a federal-provincial environmental task force.

Review

The federal government has recognized the need for and therefore has encouraged the early construction of twin tracking of CN Rail's mainline in Western Canada. It is in the national interest to have adequate, safe, economical and efficient railway transportation. Given the indeterminate configuration and scheduling and the continuing nature of CN Rail's railway mainline expansion program in B.C., the review process is to include:

1. Review of the CN Rail mainline expansion program as described above, assessment of the environmental and related socio-economic impacts, and identification of ways and means of dealing with these impacts. This will include a review of CN Rail's environmental study reports, mapping, environmental design study programs, status reports and site specific field survey reports and site specific engineering designs for component projects either completed, approved for construction or in the design stage;

2. Examination of any currently known environmental and related socio-economic issues associated with CN Rail's expansion projects recently completed in B.C. and the adequacy of CN Rail's designs to resolve these issues;

3. Identification of appropriate mechanisms that could facilitate implementation of the findings of the Panel. In this review the Panel should take account of existing mechanisms such as the current federal-B.C. task force;

4. Convening of public meetings by the Panel to receive input prior to the preparation of its reports;

5. Provision of existing and any additional information to interested parties to allow their participation in the review;

6. Submission to the Minister of the Environment, of a Panel report or reports which:

(i) presents the findings of the Panel and provides conclusions and recommendations on the environmental design of the CN Rail program and projects;
(ii) identifies an appropriate mechanism and process to monitor the continuing work of CN Rail and to implement the recommendations of the Panel.

APPENDIX B — PANEL MEMBER BIOGRAPHIES

Mr. Robert G. Connelly (Chairman)

Mr. Connelly is Director of the Central Region with the Federal Environmental Assessment Review Office in Ottawa. He graduated from the University of Waterloo in Civil Engineering and was first employed with the Proctor and Redfern Group, consulting engineers in Ontario. In late 1970 he joined Environment Canada in Winnipeg and was involved in environmental monitoring and pollution control programs in Manitoba. From 1975 to 1978, Mr. Connelly worked for the United Nations Economic Commission for Europe in Geneva where he was a member of the UN. secretariat to international meetings on environmental matters.

Mr. Fraser A. MacLean

Mr. MacLean is a retired provincial public servant now living in Victoria. He was born in British Columbia and graduated with a degree in Mechanical Engineering from the University of British Columbia in 1947. He joined the B.C. Department of Public Works then moved to the new Department of Highways in 1956 holding various positions including Assistant Deputy Minister and member of the Highway Board from 1962 to 197 1. In 1971 he moved to the Department of Commercial Transport as Deputy Minister then through a series of Ministry reorganizations became Assistant Deputy Minister, Transportation, in the current Ministry of Transportation and Highways. From 1971 to his retirement in 1980, his responsibilities have included size and weight regulation of highway trucking, regulation of motor vehicles and aerial tramways, regulation of provincial railways and pipelines, and transportation policy planning.

Mr. Norman L. McLeod

Mr. McLeod is retired and lives in White Rock. He worked from 1943 until his retirement in 1978 with CN Rail in various capacities. From 195 1 to 1957, he was Roadmaster at Boston Bar responsible for the area between Boston Bar and Spences Bridge. He then became Assistant Division Engineer in 1957 with jurisdiction from Vancouver to Jasper. In 1962, he was appointed Assistant Area Engineer in Vancouver and then in 1969 he became Assistant Operations Manager also in Vancouver. He moved to Edmonton in 1972 as Assistant to the Regional Chief Engineer for the Mountain Region (Alberta and B.C.). In 1974 he returned to Vancouver as the Manager of the Plant expansion Program. In this capacity, he had responsibility for the planning and execution of work involved in the construction of early segments of double tracking. From 1972 to 1975, Mr. McLeod also served as a member of the Railway Transport Commission's Safety Committee which was charged with the initial study and supporting recommendations to improve safety of CN Rail and CP Rail operations.

Mr. Ross Peterson

Mr. Peterson is a Vancouver based consultant specializing in fisheries biology. He obtained his Masters of Science in Zoology from the University of British Columbia in 1966. His work experience has included employment as a biologist with the Fisheries Research Board of Canada and the B.C. Fish and Wildlife Branch. In 1972, he joined and became Vice President of the consulting firm of Howard Paish and Associates Limited, a position he still holds. Mr. Peterson has been a president of the B.C. Chapter of the Canadian Society of Environmental Biologists, the Pacific Fishery Biologists and the North Pacific International Chapter of the American Fisheries Society. Mr. Peterson's professional training and experience has focussed on aquatic ecology and resource management, particularly as related to fresh water fisheries.

Dr. Denis Russell

Dr. Russell is a Professor with the Civil Engineering Department at the University of British Columbia (UBC). He received his education in Northern Ireland and obtained his doctorate in civil engineering from Queen's University in Belfast. Since coming to Canada in 1957, Dr. Russell has worked with consultants in the planning and design of major water resource projects, including the Mica Dam on the Columbia River. He joined the Civil Engineering Department at UBC in 1968 where he has been involved in teaching and research in water resources. He has also been involved with the Westwater Research Centre at UBC and a number of major interdisciplinary studies including the Okanagan Water Basin Study.

APPENDIX C

DETAILED SCHEDULE OF TWIN TRACKING PROJECTS

ALBREDA SUBDIVISION

Track Mileages	Yards, Sidings and Towns	Section Lengths (Miles)	Operational Sidings (Miles)	Projects, (Miles) Completed Pre 1983	Projects, (Miles) Under Construction 1983/84	Future Projects (Miles) 1985	1986	1987	1988	Post 1988	Major Structures
73.30- 74.30		1.00								1.00	
74.30- 74.80	VALEMOUNT	0.50								0.50	
74.80- 78.00		3.20								3.20	
78.00- 78.58	CEDARSIDE	0.58								0.58	
78.58- 80.20		1.62								1.62	Highway 5 Overpass
80.20- 80.70		0.50								0.50	Canoe River Bridge
80.70- 82.00		1.30							1.30		
82.00- 83.43	CANOE RIVER	1.43	1.43								
83.43- 89.80		6.37							6.37		
89.80- 90.63		0.83				0.83					
90.63- 91.93	ALBREDA	1.30	1.30								
91.93- 96.30		4.37				4.37					Highway 5 Overpass
96.30- 99.80	CLEMINA	3.50		3.50							
99.80-102.84		3.04				3.04					
102.84-103.45	GOSNELL	0.61				0.61					
103.45-105.50		2.05			2.05						
105.50-106.06		0.56								0.56	
106.06-107.75	LEMPRIERE	1.69	1.69								
107.75-l 13.20		5.45								5.45	
113.20-l 13.80		0.60								0.60	Pyramid Creek
113.80-l 15.20	PYRAMID	1.40	1.40								
115.20-121.40		6.20								6.20	
121.40-122.75	THUNDER RIVER	1.35	1.35								
122.75-123.40		0.65								0.65	North Thompson & Thunder River Bridges
123.40-127.64		4.24			4.24						
127.64- 128.24	REDSAND	0.60			0.60						
128.24-131.74		3.50			3.50						
131.74-132.30	BLUE RIVER	0.56	0.56								
TOTALS	59.00	7.73	3.50	10.39	8.85	0			7.67	20.86	

CLEARWATER SUBDIVISION

Track Mileages	Yards, Sidings and Towns	Section Lengths (Miles)	Operational Sidings (Miles)	Projects, (Miles) Completed Pre 1983	Projects, (Miles) Under Construction 1983/84	Future Projects (Miles) 1985	1986	1987	1988	Post 1988	Major Structures
0- 1.28	BLUE RIVER	1.28	1.28								
1.28- 4.10		2.82			2.82						
4.10- 4.70	ANGUS HORNE	0.60			0.60						
4.70- 7.23	2.53			2.53							Highway 5 Overpass
7.23- 8.66	WOLFENDEN	1.43	1.43								
8.66- 13.32		4.66								4.66	
13.32- 15.92	MESSITER	2.60		2.60							
15.92- 22.17		6.25								6.25	
22.17- 26.35	AVOLA	4.18		4.18							Highway 5 Overpass
26.35- 29.70		3.35								3.35	
29.70- 30.30	WIRE CACHE	0.60								0.60	
30.30- 32.30	2.00								2.00		
32.30- 33.80		1.50								1.50	N. Thompson River Bridge
33.80- 35.12	McMURPHY	1.32	1.32								
35.12- 40.57		5.45								5.45	
40.57- 41.83	WABRON	1.26	1.26								
41.83- 43.90	2.07								2.07		
43.90- 44.50		0.60								0.60	N. Thompson River Bridge
44.50- 46.76		2.26							2.26		
46.76- 48.06	IRVINE	1.30	1.30								
48.06- 52.40		4.34							4.34		
52.40- 53.75	VAVENBY	1.35	1.35								
53.75- 58.90		5.15							5.15		
58.90- 60.00		1.10								1.10	N. Thompson River Bridge
60.00- 60.38		0.38				0.38					
60.38- 61.73	BIRCH ISLAND	1.35	1.35								
61.73- 67.80		6.07				6.07					
67.80- 68.40	CLEARWATER	0.60				0.60					
68.40- 70.30		1.90				1.90					
70.30- 72.40		2.10					2.10				
72.40- 74.07	BLACKPOOL	1.67	1.67								
74.07- 78.10		4.03					4.03				

CLEARWATER SUBDIVISION-(Cont.)

Track Mileages	Yards, Sidings and Towns	Section Lengths (Miles)	Operational Sidings (Miles)	Projects, (Miles) Completed Pre 1983	Under Construction 1983/84	Future Projects (Miles) 1985	1986	1987	1988	Post 1988	Major Structures
78. IO- 82.35		4.25								4.25	
82.35- 83.66	BOULDER	1.31	1.31								
83.66- 88.80		5.14								5.14	
88.80- 90.50		1.70						1.70			
90.50- 91.90	CHU CHUA	1.40	1.40								
91.90- 97.05		5.15						5.15			
97.05- 98.46	CHINOOK COVE	1.41	1.41								
98.46-101.50		3.04						3.04			
101.50-103.99		2.49								2.49	Highway 5 Overpass & Barriere R. Bridge
103.99-105.34	BARRIERE	1.35	1.35								
105.34-107.95		2.61								2.61	
107.95-109.29	EXLOU	1.34	1.34								
109.29-l 15.04		5.75								5.75	
115.04-l 16.68	McLURE	1.64	1.64								
116.68-123.75		7.07								7.07	
123.75-125.06	VINSULA	1.31	1.31								
125.06-131.17	6.11			6.11							
131.17-132.51	RAYLEIGH	1.34	1.34								
132 51-137.63		5.12			5.12						
137.63-139.40	KAMLOOPS	1.77	1.77								
TOTALS		139.40	23.83	6.78	17.18	8.95	6.13	9.89	11.75	54.89	

ASHCROFT SUBDIVISION

Track Mileages	Yards, Sidings and Towns	Section Lengths (Miles)	Operational Sidings (Miles)	Projects, (Miles) Completed Pre 1983	Under Construction 1983184	Future Projects (Miles) 1985	1986	1987	1988	Post 1988	Major Structures
o- 0.31	KAMLOOPS	0.31	0.31								N. Thompson R. Bridge
0.31- 0.90		0.59								0.59	
0.90- 5.63		4.73			4.73						
5 63- 6.94	KISSICK	1.31	1.31								
6.94- 9.30		2.36			2.36						
9.30- 11.30		2.00								2.00	Battle Bluff Tunnel
11 30- 12.61		1.31						1.31			
12.61- 14.06	FREDERICK	1.45	1.45								
14.06- 18.60		4.54						4.54			
18.60- 20.20	JALESLIE	1.60	1.60								
20.20- 20.70		0.50								0.50	Copper Creek Tunnel
20 70- 24.50		3.80								3.80	
24.50- 25.90	SAVONA	1.40	1.40								
25.90- 28.30		2.40								2.40	
28.30- 31.69		3.39								3.39	Thompson River Bridge
31.69- 33.00	WALLACHIN	1.31	1.31								
33.00- 34.40		1.40								1.40	Thompson River Bridge
34.40- 39.37		4.97				4.97					
39.37- 40.69	McABEE	1.32				1.32					
40.69- 45.20		4.51				4.51					
45.20- 47.60		2.40								2.40	Thompson River Bridges
47.60- 47.90		0.30					0.30				
47.90- 49.4 1	ASHCROFT	1.51	1.51								
49.41- 50.50		1.09					1.09				
50.50- 52.00		1.50							1.50		Ashcroft Tunnel
52.00- 54.50		2.50							2.50		Thompson River Bridge
54.50- 57.74		3.24							3.24		Black Canyon Tunnel
57.74- 59.10	BASQUE	1.36	1.36								
59. 10- 60.60		1.50								1.50	Thompson River Bridge
60.60- 67.73		7.13				7.13					
67.73- 69.08	MARTEL	1.35	1.35								
69 08- 73.54		4.46						4.46			

ASHCROFT SUBDIVISION-(Conc.)

Track Mileages	Yards, Sidings and Towns	Section Lengths (Miles)	Operational Sidings (Miles)	Projects, (Miles)		Future Projects (Miles)					Major Structures
				Completed Pre 1983	Under Construction 1983184	1985	1986	1987	1988	Post 1988	
73.54- 75.22	SPENCES BR.	1.68	1.68								Highway Overhead Bridges
75.22- 78.50		3.28						3.28			
78.50- 79.33	SKOONKA	0.83								0.83	
79.33- 80.70		1.37								1.37	Skoonka Tunnel
80.70- 82.18		1.48								1.48	
82.18- 83.49	SEDDALL	1.31	1.31								
83.49- 85.60		2.11								2.11	
85.60- 88.74		3.14								3.14	Nicomen Tunnel
88.74- 90.13	PITQUAH	1.39	1.39								
90.13- 95.76		5.63								5.63	White Canyon Tunnel
95.76-97.21	LASHA	1.45	1.45								
97.21-100.30	LYTTON	3.09								3.09	Thompson & Fraser River Bridges (2)
100.30-101.63	CISCO	1.33	1.33								
101.63-103.00		1.37	1.37								
103.00- 104.98		1.98								1.98	Fraser River Bridge
104.98-106.39	CONRAD	1.41	1.41								
106.39-109.71		3.32								3.32	Jackass E. & West Tunnel
109.71-I 11.09	FALLS CREEK	1.38	1.38								
111.09-I 14.54		3.45					3.45				
114.54- 115.98	INKITSAPH	1.44	1.44								
115.98-I 16.90		0.92					0.92				
116.90-I 18.93		2.03					2.03				
118.93-I 19.50	BOOTHROYD	0.57					0.57				
119.50-121.60		2.10					2.10				Nine Mile Creek Bridge
121 60-122.07		0.47			0.47						
122.07- 123.40	MARTINSON	1.33	1.33								
123.40-125.28		1.88			1.88						Stoyoma Creek Fill
125.28-125.50	BOSTON BAR	0.22	0.22								
TOTALS		125.50	24.54	0	9.44	17.93	10.46	13.59	7.24	42.30	

YALE SUBDIVISION

Track Mileages	Yards, Sidings and Towns	Section Lengths (Miles)	Operational Sidings (Miles)	Projects, (Miles) Completed Pre 1983	Projects, (Miles) Under Construction 1983184	Future Projects (Miles) 1985	1986	1987	1988	Post 1988	Major Structures
o- 1.14	BOSTON BAR	1.14	1.14								
1.14- 2.23		1.09				1.09					Anderson River Bridge
2.23- 3.54	HICKS	1.31	1.31								
3.54- 9.39		5.85								5.85	Hells Gate Tunnel
9.39- 10.70	KOMO	1.31	1.31								
10.70- 12.50		1.80								1.80	Alexandra Tunnel
12.50- 17.57		5.07							5.07		Highway 1 Overhead
17.57- 19.00	STOUT	1.43	1.43								
19.00- 26.20		7.20								7.20	Stout, Twin & Yale Tunnel
26.20- 27.52	YALE	1.32	1.32								
27.52- 35.65		8.13								8.13	
35.65- 36.96	TRAFALGAR	1.31	1.31								
36.96- 40.15		3.19								3.19	Coquihalla River Bridge
40.15- 43.04	HOPE	2.89								2.89	
43.04- 44.35	FLOODS	1.31	1.31								
44.35- 51.20		6.85								6.85	
51.20- 52.93		1.73					1.73				
52.93- 54.29	CHEAM VIEW	1.36	1.36								
54.29- 64.10		9.81					9.81				
64. IO- 65.20		1.10								1.10	
65.20- 66.50	ROSEDALE	1.30	1.30								
66.50- 71.28		4.78								4.78	
71.28- 71.98	CHILLIWACK	0.70	0.70								
71.98- 76.25		4.27								4.27	
76.25- 77.50	ARNOLD	1.25	1.25								
77.50- 78.70		1.20								1.20	
78.70- 78.90		0.20								0.20	Sumas River Bridge
78.90- 86.70		7.80								7.80	
86.70- 90.90		4.20		4.20							
90.90- 94.50		3.60						3.60			
94.50-101.70		7.20		7.20							
101.70-106.40		4.70			4.70						

YALE SUBDIVISION-(Cont.)

Track Mileages	Yards, Sidings and Towns	Section Lengths (Miles)	Operational Sidings (Miles)	Projects, (Miles) Completed Pre 1983	Under Construction 1983184	Future Projects (Miles) 1985	1986	1987	1988	Post 1988	Major Structures
106.40-108.00	WEST LANGLEY	1.60	1.60								
108.00-I 13.00		5.00			5.00						
113.00-I 18.10	THORNTON	5.10		5.10							
TOTALS		118.10	15.34	16.50	9.70	1.09	11.54	3.60	5.07	55.26	

Notes:

1. Track mileages are based on the Environmental Overview plans prepared for CN Rail in June, 198 1.
2. Project timings are as set out by CN Rail in May, 1984 and are subject to change. Specific dates have yet to be assigned to most post 1988 projects.
3. Project boundaries are as defined by CN Rail in May, 1984. They are designated on the charts by horizontal lines.
4. All lerıgths are given in miles to correspond to railway practice.
5. Operational sidings are those sidings which will be incorporated into the twin tracking program as listed in CN Rail's May, 1983 timetable. Little, if any, grade expansion is required on these sections, although track structure and ballast may be improved.

APPENDIX D

Information Received by the Panel

A. Documents/Reports

1. Report dated June, 198 1 prepared for CN Rail by Reid Crowther & Partners Ltd. entitled "CN Twin Tracking Program Valemount to Vancouver, Environmental Overview, Volume 1".

2. Report dated June, 1982 prepared for CN Rail by Reid Crowther & Partners Ltd. entitled "CN Twin Track Project, Environmental Design Program, 1981-82 Status Report, Series 1, Volume 3".

3. Environmental Overview Drawings (Volumes 2A — 2D) prepared for CN Rail by Reid Crowther & Partners Ltd. — consists of approximately 100 drawings/photo mosaics containing environmental baseline information.

4. Preliminary Site Visit Reports prepared for CN Rail by Reid Crowther & Partners Ltd.

—Albreda Subdivision Mile 123.2 to 132.3 (dated Sept., 1982)

—Albreda Subdivision Mile 80 — 105.5 (dated Oct., 1982)

—Clearwater Subdivision Mile 0 — 9.5 (dated Sept., 1982)

-Ashcroft Subdivision Mile 116 — 122 (dated Sept., 1982)

-Ashcroft Subdivision Mile 122 to Yale Subdivision Mile 2.2 (dated Sept., 1982)

5. Sto'Lo Nation report dated March, 1983 entitled "Upper Sto'Lo Impact Study Re: Twin Track Project, Alexandra Bridge to Langley, B.C., Final Report".

6. Report prepared for North Thompson Indian Band by Warren Development Realty Ltd entitled "Choo Choos on the Chu Chua" dated May 16, 1983.

7. Transcripts of Panel's Public Information Meetings held between June 20 — 24, 1983.

8. Report prepared by VME Associates Ltd. for CN Rail entitled "Assessment of Train Vibrations CNR B.C. Southline Birch Island to Matsqui Junction" dated Nov. 16, 1983.

9. Report prepared by Arcas Associates for CN Rail entitled "CN Rail Railyard Expansion Project, Heritage Mitigation Study, Kamloops Junction, B.C." dated Nov., 1983.

IO. Report prepared by Arcas Associates for CN Rail entitled "CN Rail Twin Tracking Project — Heritage Inventory and Assessment" dated Feb. 17, 1984.

11. Document prepared for CN Rail entitled "CN Twin Track Project, Environmental Study Design Program, 1984 Study Outline".

12. Environmental Design Report (drawings) Albreda Subdivision Mile 123.4 to Clearwater Subdivision Mile 8.5 prepared for CN Rail by Reid Crowther & Partners Ltd. dated Feb. 20, 1984.

13 CN Rail's Response dated March 16, 1984 to the questions contained in the Panel's Interim Report.

14 Fisheries and Ocean's Response dated March 19, 1984 to questions contained in Panel's Interim Report.

15 Report prepared by Arcas Associates for CN Rail entitled "CN Rail Twin Tracking Project — Final Statement Heritage Inventory and Preliminary Impact Assessment" dated June 4, 1984.

16. CN Rail's Response dated May 25, 1984 to the Panel's request of April 10, 1984 for additional information.

17. Transcripts of Panel's General Session Final Public Meetings held on June 19 & 20, 1984.

18. Report prepared by Dr. Gary Faulkner for CN Rail entitled "Sound and Vibration Survey, CN South Line, 1983 and 1984" dated September, 1984.

19. Report prepared by VME Associates for CN Rail entitled "Assessment of Train-Related Vibrations, CNR B.C. Yellow-head Division, Birch Island to Matsqui Junction, B.C." dated Sept. 18, 1984.

20. Report prepared by D.B. Lister and Associates Limited for CN Rail entitled "Study of 1983 Pink Salmon Spawning in the Thompson River Relative to the CN Twin Tracking Program" dated Sept., 1984.

21. Report dated Sept. 14, 1984 on the CN Twin Tracking Project Environmental Design Workshop held on August 15 & 16, 1984.

22. CN Rail memo dated Sept. 18, 1984 on the subject of "Effect of Vibrations on the Stability of Slopes".

23. Report prepared by Carsal Enterprises for CN Rail entitled "Monitoring of Animal Kills on the CN Twin Track — Jasper National Park" dated Sept. 15, 1984.

24. Report (in letter form) prepared by Klohn Leonoff for CN Rail on the possibility of landslides through the Fraser Canyon due to future CN Rail tunnelling operations, dated Sept. 11, 1984.

25. CN Rail report dated June 27, 1984 on Knapweed Control Program — Kamloops Region.

26. Report prepared by Mr. Gordon Mohs for the Alliance of Tribal Councils entitled "Alliance Heritage Study" dated Sept., 1984.

27. Transcripts of Panel's Community Session Final Public Meetings held between September 24 — 27, 1984.

B. Submissions to the Panel

1. Brief from B.C. Ministry of Forests, Chilliwack Forest District, dated June 23, 1983.

2. Submission from the Alliance of Tribal Nations dated June, 1983.

3. Presentation from the Nl'akapxm Nation Tribal Council dated June, 1983.

4. Submission from the Heritage Conservation Branch of the B.C. Ministry of Provincial Secretary & Government Services, dated June 21, 1983.

5. Submission from the Regional District of Fraser Cheam, dated June 9, 1983.

6. Submission from the Sto'Lo Nation, dated June 20, 1983.

7. Submission from the federal/provincial Task Force, dated July, 1983.

8. Submission from the B.C. Ministry of Environment, dated July, 1983.

9. Submission from the B.C. Wildlife Federation, dated November 9, 1983.

10 Submission from Fisheries and Oceans Canada, dated May, 1984.

11 Submission (letter) from the Archaeological Society of British Columbia, dated June 4, 1984.

12 Submission from the B.C. Ministry of Environment, dated June 5, 1984.

13. Submission from Environment Canada, dated June, 1984.

14. Submission from the Nl'akapxm Nation Tribal Council entitled "A Preliminary Assessment of the Environmental Impacts of the Canadian National Railway Twin Tracking Project on Nl'akapxm Nation Indian Bands" dated Sept. 24, 1984.

15. Submission from the Ashcroft Indian Band. dated September, 1984.

16. Submission from the Lillooet Tribal Council, dated Sept. 26, 1984.

17. Submission from the Regional District of Fraser Cheam, dated Sept. 27, 1984.

18. Submission from the Meadowbrook Ratepayer Association, dated Sept. 27, 1984.

19. Submission from the United Fishermen and Allied Workers' Union, dated October, 1984.

C. Letters Addressed to the Panel

1. Letter dated June 6, 1983 from the North Thompson Indian Band with list of concerns.

2. Letter dated June 20, 1983 from Mr. J.R. Wanless of Hacienda Caballo expressing concerns.

3. Letter dated June 24, 1983 from the Archaeological Society of B.C. with statement of concerns.

4. Letter dated June 30, 1983 from the B.C. Ministry of Forests, Clearwater Forest District, with a list of concerns.

5. Letter dated July 5, 1983 from the Heritage Canada Foundation supporting the position of the Archaeological Society of B.C.

6. Letter dated July 8, 1983 from CN Rail with comments on a number of issues raised during the June, 1983 Public Information Meetings.

7. Letter dated July 11, 1983 from the Public Affairs Section of CN Rail responding to some of the issues raised during the June, 1983 Public Information Meetings.

8. Letter dated July 27, 1983 from CN Rail consultants Reid Crowther & Partners Ltd. with details of 1983 environmental studies program and information on CN Rail's environmental design program.

9. Letter dated July 27, 1983 from CN Rail with comments on submissions to the Panel from the federal/provincial Task Force (dated July, 1983) and from the B.C. Ministry of Environment (dated July, 1983).

10. Letter dated Aug. 4, 1983 from Fisheries and Oceans regarding the status of Crown Agencies viz-a-viz the Fisheries Act.

11. Letter dated August 24, 1983 from the Railway Transportation Committee of the Canadian Transport Commission with records of train derailments and information relating to the transportation of dangerous goods. This was received in response to a request from the Panel.

12. Copy of letter dated Sept. 8, 1983 from CN Rail to the Heritage Conservation Branch with information on CN's heritage study program.

13. Letter dated Sept. 13, 1983 from the federal/provincial Task Force with information from the Inland Waters Directorate of Environment Canada on issues relating to water quality, erosion and solids intrusion into water courses.

14 Letter dated Oct. 25, 1983 from the Heritage Conservation Branch of the B.C. Ministry of Provincial Secretary & Government Services with information relating to their methods and criteria for identifying, classifying and protecting heritage resources in B.C.

15 Letter dated Oct. 26, 1983 from the Outdoor Recreation Council of B.C. with comments on river access and recreational issues.

16 Letter dated Oct. 4, 1983 from the Heritage Conservation Branch of the B.C. Ministry of Provincial Secretary & Government Services regarding heritage studies being done by CN Rail.

17. Letter dated Oct. 28, 1983 from the B.C. Ministry of Environment with comments on the Panel's Interim Report.

18. Letter dated Nov. 15, 1983 from the Kamloops Flyfishers Association with list of concerns.

19. Letter dated Jan. 19. 1984 from the Regional District of Fraser Cheam expressing concerns and enclosing Regional District report of CN's public information meeting held in Chilliwack on Jan. 10, 1984.

20. Copy of letter dated Feb. 9, 1984 from CN Rail to the North Thompson Indian Band responding to some of the Band's concerns.

21. Letter dated March 21, 1984 from CN Rail with attached Terms of Reference for CN Rail's environmental supervisor.

22. Letters dated March 23, 1984 and April 5, 1984 from Mr. K. Kupka, Chairman of the CN Rail Twin Tracking Steering Committee, regarding no net loss criteria.

23. Letter dated May 4, 1984 from the Heritage Conservation Branch of the B.C. Ministry of Provincial Secretary & Government Services with information relating to CN Rail heritage inventory and assessment program.

24. Letter dated June 1 1, 1984 from the Outdoor Recreation Council of B.C. with list of concerns.

25. Copy of letter dated July 1 I, 1984 from the Chairman of the Steering Committee to the Nl'akapxm Nation Tribal Council in response to Tribal Council's request to be better informed of Technical Working Group activities.

26. Letter dated June 27, 1984 from the Environmental Protection Service of Environment Canada regarding CN Rail's knapweed control program.

27. Letter dated July 16, 1984 from CN Rail responding to some concerns raised during the Panel's public meetings held on June 19 & 20, 1984.

28. Letter dated July 25, 1984 from the Chairman of the Twin Tracking Steering Committee regarding meeting between the Steering Committee and Tribal Council representatives.

29. Letter dated July 26, 1984 from CN Rail with information on environmental design and approvals process.

30. Letter dated Aug. 17, 1984 from CN Rail in response to Panel letter to CN Rail dated Aug. 9, 1984.

31. Letter dated Aug. 21, 1984 from Chairman of Twin Tracking Steering Committee with comments on CN Rail's letter to the Panel dated July 26, 1984.

32. Letter dated Sept. 6, 1984 from the Heritage Conservation Branch of the B.C. Ministry of Provincial Secretary & Government Services regarding funding for heritage studies.

33. Copy of letter dated Sept. 10, 1984 from CN Rail to Environment Canada responding to that portion of Environment Canada's June, 1984 submission to the Panel dealing with the transportation of dangerous goods.

34. Copy of letter dated Sept. 21, 1984 from Environment Canada to CN Rail in response to CN Rail letter to Environment Canada dated June 18, 1984. Both letters deal with the topic of hydraulic effects of river encroachment.

35. Letter dated Sept. 24, 1984 from the United Transportation Union, Local 701, Port Coquitlam with expression of concerns.

36. Letter dated Oct. 5, 1984 from the City of Kamloops with copies of complaints received by the City regarding CN Rail related vibration problems.

37. Letter dated Oct. 5, 1984 from CN Rail with further clarification of issues discussed during the final public meetings.

38. Letter dated Oct. 5, 1984 from Ms. Leslie Pinder on behalf of the Alliance of Tribal Councils with list of questions they would like to see addressed by CN Rail and Fisheries and Oceans Canada.

39. Letters dated October/November, 1984 from Kamloops area residents regarding noise and vibration problems along the CN Rail line.

D. Miscellaneous Material Received by the Panel

I. Document prepared for CN Rail by Reid Crowther & Partners Ltd. entitled "A Revised Program to Meet Construction Scheduled to 1988" dated Feb. 16, 1983.

2. Petition containing 65 names (Sept. 1984) from Chilliwack area residents stating their opposition to any relocation of the CN Rail line near the Fraser River on Fairfield Island.

3. Table received from Nl'akapxm Nation Tribal Council summarizing reserve land lost to transportation right-of-ways.

4. List of criteria received from CN Rail for development of compensatory habitat for coho salmon in tributary areas of the North Thompson/Albreda.

5. Information dated July 2, 1984 from the B.C. Ministry of Environment on knapweed control on CN Rail's right-of-way.

6. Information dated June 26, 1984 from the B.C. Ministry of Environment on Public access to rivers and recreational resources adjacent to CN Rail's South Mainline.

7. Terms of Reference for Transport Canada's Joint Track Usage Study (Kamloops — Mission Area).

8. Draft CN Rail 1983 document entitled "Factors to be Considered for Selecting Location of Second Main Track".

APPENDIX E — LIST OF PUBLIC MEETING PARTICIPANTS

I — INFORMATION MEETINGS, June 1983

Mr. Abrahamson	CN Rail
Mr. Bennett	CN Rail
Mr. Bergeron	Steelhead Society
Ms. Braches	Archaeological Society of British Columbia
Mr. Brown	Chamber of Commerce
Chief Brown	Lytton Indian Band
Chief Campbell	Boothroyd Indian Band
Mr. Celesta	
Ms. Cullington	Outdoor Recreation Council of British Columbia
Mrs. Dekelver	Archaeological Society of British Columbia
Mr. Dirven	
Mrs. Doman	Regional advisor to the Heritage Conservation Branch
Chief Douglas	Sto'lo Nation Tribal Council
Ms. Drake	Lillooet Tribal Council
Mrs. Drake	Lillooet Tribal Council
Chief Dunstan	Lytton Indian Band
Chief Edmonds	Ashcroft Indian Band
Mr. Fahlman	Consultant to CN Rail
Mrs. Frisk	Outdoor Recreation Committee
Mr. Grey	Regional District of Fraser Cheam
Mr. Hamlen	B.C. Ministry of Forests
Mr. Harrison	
Mr. Hebden	
Mr. Hjalmarson	
Mr. Hostland	CN Rail
Mr. Jansen	
Mr. Johnson	
Mrs. Joseph	Sto'lo Nation Tribal Council
Mr. Larsen	
Ms. Leon	Sto'lo Nation Tribal Council
Chief Lewis	Chu Chua Indian Band
Mrs. Lyon	
Mr. MacKay	
Mr. MacLennon	CN Rail
Mr. Mardon	
Mr. Mattenly	Improvement District of Clearwater
Mr. McDonald	Meadowbrook Ratepayers' Association
Mrs. McIntyre	
Mr. Nash	Regional District of Fraser-Cheam
Mr. Patterson	Kamloops Flyfishers
Mr. Payne	Fisheries and Oceans
Mr. Pirie	
Mrs. Pye	
Mr. Rennie	CN Rail
Ms. Russell	
Mr. Sam	Nl'akapxm Nation Tribal Council
Mr. Seagel	Reid, Crowther and Partners Limited
Mr. Sector	B.C. Ministry of the Environment
Mrs. Sedgwick	
Mr. Sleuidge	Matsqui Ratepayers' Association
Mr. Sloan	
Mr. Spinks	Nl'akapxm Nation Tribal Council
Mr. Stephenson	CN Rail
Mr. Sterling	Lower Nicola Band Council
Chief Terry	Bridge River
Mr. Tun bridge	District of Chilliwack
Mr. Vanderveen	
Mr. Warren	
Mr. Weisbrich	
Mr. Zablosky	

II — GENERAL SESSIONS, June 1984

Mr. Barrs	Alliance of Tribal Councils
Mr. Beach	Environment Canada
Mrs. Braches	Archaeological Society of British Columbia
Mr. Buhawk	Indian and Northern Affairs Canada
Mr. Charlton	B.C. Heritage Conservation Branch
Chief Douglas	Sto'lo Nation Tribal Council
Mr. Duncan	Environment Canada
Mr. Fahlman	Consultant to CN Rail
Mr. Hoisak	Transport Canada
Mr. Hostland	CN Rail
Mr. Kellerhalls	Consultant to CN Rail
Mr. Kupka	Environment Canada
Mr. Lister	D.B. Lister and Associates Ltd.
Ms. Loos	North Thompson Band
Mr. Oakey	Environment Canada
Mr. Payne	Fisheries and Oceans
Mr. Pennier	Alliance of Tribal Councils
Mr. Rennie	CN Rail
Mr. Sam	Nl'akapxm Tribal Council
Mr. Scales	CN Rail
Mr. Seagal	Reid, Crowther and Partners Limited
Mr. Sector	B.C. Ministry of the Environment
Mr. Sherwood	Environment Canada
Mr. Spinks	Alliance of Tribal Councils
Mr. Tomlinson	United Fisherman and Allied Workers Union
Mr. Wiebe	Environment Canada
Mr. Wilson	Environment Canada

III — COMMUNITY SESSIONS, September 1984

Mr. Abbott	CN Rail
Mr. Atherton	
Mr. Atleo	Native Brotherhood of British Columbia
Mr. Atzen berger	
Mr. Balava	
Mr. Barz	Nl'akapxm Tribal Council
Mr. Blakeney	Canadian Transport Commission
Mr. Boyd	Fisheries and Oceans
Ms. Bradley	
Mr. Brownlee	

Ms. Caldwell	Thompson Valley Mobile Homeowners Association
Ms. Campbell	
Mr. Celesta	
Mrs. Chambers	
Mr. Charlton	B.C. Heritage Conservation Branch
Mr. Collins	
Mr. Cunningham	
Mrs. De Kelver	Archaeological Society of British Columbia
Mr. Doherty	
Mr. Douglas	Sto'lo Tribal Council
Ms. Douglas	Cheam Band Council
Mr. Duncan	Environment Canada
Ms. Eacreet	
Chief Edmunds	Ashcroft Indian Band
Mr. Eisler	
Mr. Fahlman	Consultant to CN Rail
Dr. Faulkner	Consultant to CN Rail
Mr. Fenrich	
Mr. Flieger	
Ms. Freeman	
Mr. Gadsby	**CN** Rail
Mr. Gore	
Ms. Hale	
Ms. Henderson	
Mr. Hoizak	Transport Canada
Mr. Holowatiuk	
Mr. Hostland	CN Rail
Mr. Hum bert	
Ms. Hungar	
Mr. Hutchison	Deadman's Indian Band
Mr. Ignace	Deadman's Creek Band
Mayor J. Jansen	Mayor of Chilliwack
Mr. Jellinek	West Chilliwack Electors Association
Mr. Johnson	CN Rail
Ms. Joseph	Sto'lo Nation
Mr. Jubinville	
Ms. Karcioglu	
Mr. Kehler	
Mr. Keller	
Mr. Kosakoski	Fisheries and Oceans
Mr. Kupka	Environment Canada
Mr. L. Matthew	North Thompson Indian Band
Mr. Lacey	
Mr. Lengkeek	West Chilliwack Electors Association
Mr. Lister	D.B. Lister and Associates Ltd.
Chief Louis	North Thompson Indian Band
Mr. MacDonald	B.C. Ministry of Environment
Mr. W. Matthew	
Mr. McDonald	Meadowbrook Ratepayers' Association
Mr. McNeill	
Mr. Mohs	Alliance of Tribal Councils
Mr. Molloway	Nl'akapxm Tribal Council
Mr. Nixon	Alliance of Tribal Councils
Mr. Payne	Fisheries and Oceans
Mr. Penner	Sto'lo Nation Tribal Council
Mr. Pennier	Nl'akapxm Tribal Council
Mr. Perri	
Mr. Phillips	Sto'lo Nation Tribal Council
Ms. Pinder	Alliance of Tribal Councils
Mr. Platzer	
Mr. Point	Nl'akapxm Tribal Council
Mrs. Pretty	Regional District of Fraser-Cheam
Mr. Prinse	
Mr. Purvis	
Mrs. Pye	
Mr. Rathbone	
Chief Redan	Lillooet Tribal Council
Mr. Sam	Nl'akapxm Nation Tribal Council
Ms. Sawka	
Mr. Scales	CN Rail
Mr. Seagel	Reid, Crowther and Partners Limited
Mr. Sedgwick	Cattle Stockman's Association
Mr. Spinks	Nl'akapxm Tribal Council
Mr. Strudwick	
Mr. Stryd	ARCAS Associates
Mr. Taggart	Canadian Transport Commission
Ms. Thornilay	
Ms. Tuck	Indian and Northern Affairs Canada
Mr. Turner	CN Rail
Ms. Uyeda	
Mr. White	
Ms. Wilkes	

APPENDIX F — ACKNOWLEDGEMENTS

The Panel wishes to express its thanks to all those who participated in the review of the CN Rail Twin Tracking Program in British Columbia. This includes individuals and groups and representatives of federal, provincial and local government agencies who spent considerable time and effort in preparing briefs and presenting them to the Panel. The Panel also acknowledges the cooperation of CN Rail staff and their consultants.

The Panel also wishes to extend special thanks to its Executive Secretary, Paul Scott, and supporting staff who assisted in the review and the completion of the report. They are: Jim Clarke, Diane Fournier, Stephen Fuller, Robin Lauer, Douglas Parkinson, Paulette Smith, and Jean Thomas.