Canada

Comprehensive Study Report

Alliance Pipeline Ltd. on behalf of the Alliance Pipeline Limited Partnership

Alliance Pipeline Project

GH-3-97

September 1998

Comprehensive Study Report

In the Matter of

Alliance pipeline Ltd. on behalf of the Alliance Pipeline Limited Partnership

Application dated 3 July 1997

GH-3-97

September 1998

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Chapter 1

Summary

On 3 July 1997, Alliance Pipeline Ltd. applied to the National Energy Board ("the Board") for a certificate of public convenience and necessity to construct and operate the Alliance Pipeline Project ("the Project"), the Canadian portion of a proposed pipeline to transport natural gas from the Western Canada Sedimentary Basin to the area of Chicago, Illinois. Since the Project would involve the construction of a pipeline with more than 75 km of new right-of-way, it was subject to a comprehensive study under the *Canadian Environmental Assessment Act* ("*CEAA*").

The Project, which extends from northeastern British Columbia and northwestern Alberta to a point on the international border near Elmore, Saskatchewan, would consist of approximately 1565 km (970 miles) of principally 914 mm (36 inch) diameter mainline, seven mainline compressor stations, approximately 770 km (480 miles) of laterals, 26 lateral compressor stations, and other related facilities. The estimated capital cost of the pipeline system in Canada is approximately $2 billion (Canadian).

This Comprehensive Study Report ("CSR") is intended to satisfy the requirements of the *CEAA*. The Responsible Authorities for this Project were the Board, the Department of Fisheries and Oceans, and the Prairie Farm Rehabilitation Administration. This CSR incorporates the results of public participation, including advice from the Responsible Authorities and other interested federal departments, particularly Environment Canada, and from the Province of Saskatchewan.

The environmental assessment process for the Project commenced with a public scoping to identify the factors and scope of factors to be assessed, followed by the Board establishing a process for conducting a comprehensive study pursuant to the *CEAA*. Part of this process included the hearing conducted pursuant to the *National Energy Board Act* which allowed for public participation in the environmental assessment. The Board's offices in Calgary, Alberta served as the primary hearing location, and regional sessions were conducted in Fort St. John, British Columbia; Edmonton, Alberta; and Regina, Saskatchewan to facilitate participation by persons living in the areas along the proposed pipeline route and regional interest groups.

The CSR describes the Project, the environmental assessment process, including public participation, the potential environmental effects, the assessment methodology, mitigative measures, and the criteria used in evaluating the significance of the environmental effects. The CSR also provides recommendations and conclusions regarding the significance of the Project's potential adverse environmental effects.

Sustainable development, in the context of this Project, is inherent in the proposed mitigative measures and recommendations which are designed to minimize potential impacts of the Project on the environment. In the assessment and drafting of recommendations, the capacity of any renewable resources that were likely to be significantly affected by the Project to meet the needs of the present and those of the future were considered.

It was concluded that the Project is not likely to cause significant adverse environmental effects, provided that the mitigative measures, recommendations, monitoring, and follow-up programs committed to during the hearing, as well as the 41 recommendations set out in this CSR are implemented.

Chapter 2

Project Description and Environmental Assessment Process

2.1 The Application and Project Overview

On 3 July 1997, Alliance Pipeline Ltd. ("Alliance" or "the Company") applied to the National Energy Board ("the Board" or "the NEB") on behalf of the Alliance Pipeline Limited Partnership for (i) a certificate of public convenience and necessity to construct and operate the Canadian portion of a proposed natural gas pipeline system from northeastern British Columbia ("B.C.") and northwestern Alberta to the midwest United States ("U.S. or U.S.A.") and (ii) related toll and tariff authorizations.[1] The application was made pursuant to Parts III and IV of the *National Energy Board Act* ("*NEB Act*").

The Canadian portion of the pipeline to Chicago, referred to as the Alliance Pipeline Project ("the project") is also subject to the requirements of the *Canadian Environmental Assessment Act* ("*CEAA*"). The *Comprehensive Study List Regulations* made pursuant to the *CEAA* require a comprehensive study of the proposal, since more than 75 km of new right-of-way would be required.

The Project would consist of (i) approximately 1565 km (970 miles) of mainline and related facilities from a point near Gordondale, Alberta to a point on the Canada / U.S. border near Elmore, Saskatchewan and (ii) approximately 770 km (480 miles) of lateral pipelines and related facilities in B.C. and Alberta. Seven mainline compressor stations and 26 lateral compressor stations are planned. The U.S. portion of the mainline would extend approximately 1430 km (890 miles) to the system's terminus near Chicago, Illinois, where it would connect with the integrated North American pipeline grid. The mainline would be 914 and 1067 mm (36 and 42 inches) in diameter and the laterals would range in size from 114 to 610 mm (4 to 24 inches).

The Project is depicted in Figures 2-1, 2-2, and 2-3, and is described in more detail in Appendix I. As shown by the last of those figures, and the accompanying lateral legend (Table 2-1), the system is configured to receive gas from 44 existing gas plants.

The Project is scheduled to commence service in the second half of the year 2000 and would be capable of delivering 37.5 million cubic metres (1.325 billion cubic feet) of natural gas per day on a firm basis. The estimated capital cost of the entire pipeline to Chicago is approximately $3.7 billion in Canadian dollars, approximately $2 billion of which would be for the Canadian portion of the system.

[1] Alliance Pipeline Ltd. is the general partner of the Alliance Pipeline Limited Partnership, which has as its members (as of 30 January 1998) IPL Energy Inc., Westcoast Energy Inc., Mapco Canada Energy Inc., and affiliates of Fort Chicago Energy Partners L.P., Coastal Corporation, PanEnergy Corp., and Unocal Canada Limited.

Figure 2-1
Alliance Pipeline Project

Figure 2-2
Pipeline Route Map/Mainline and Compressor Stations

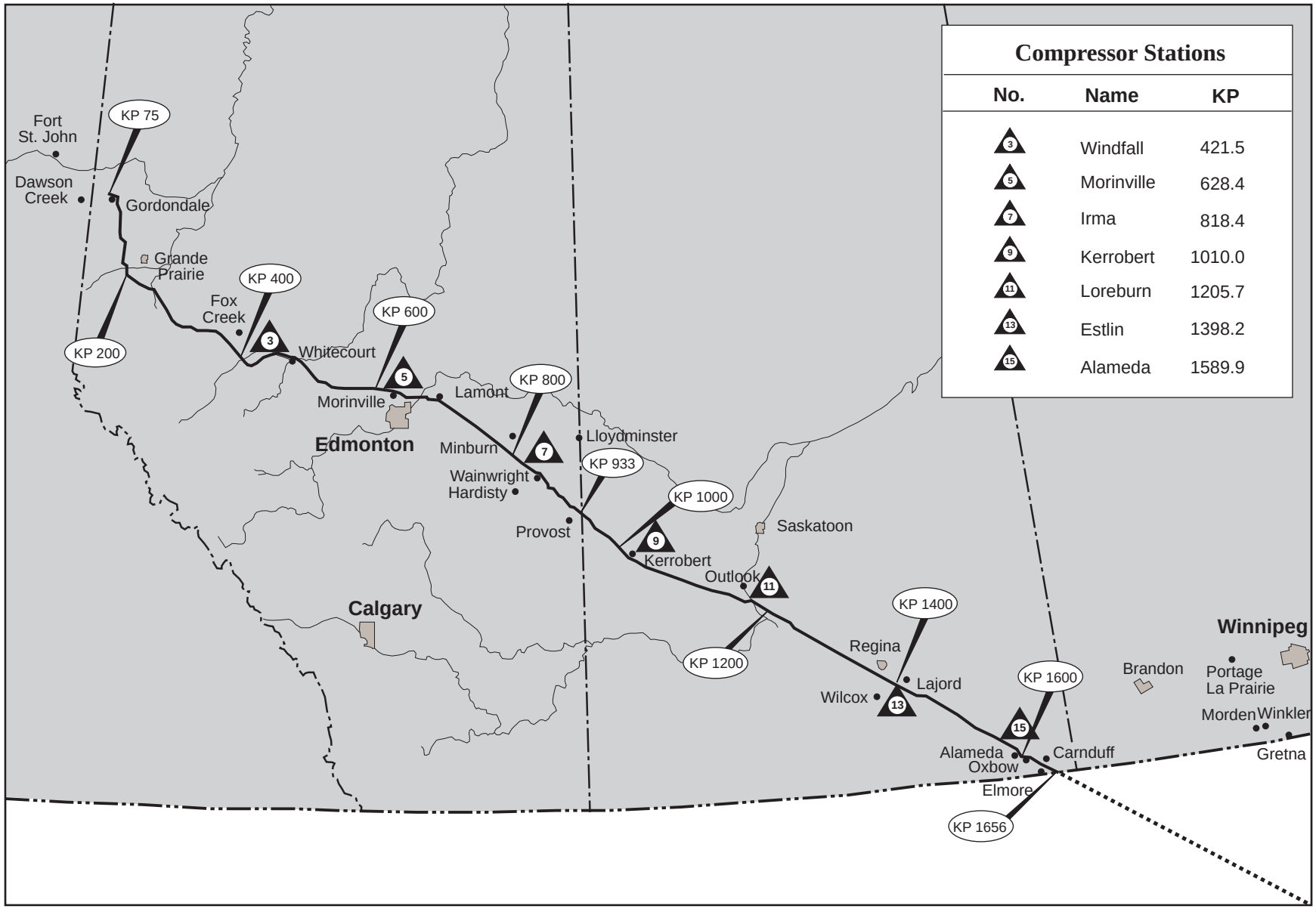

Figure 2-3
Pipeline Route Map (Laterals)

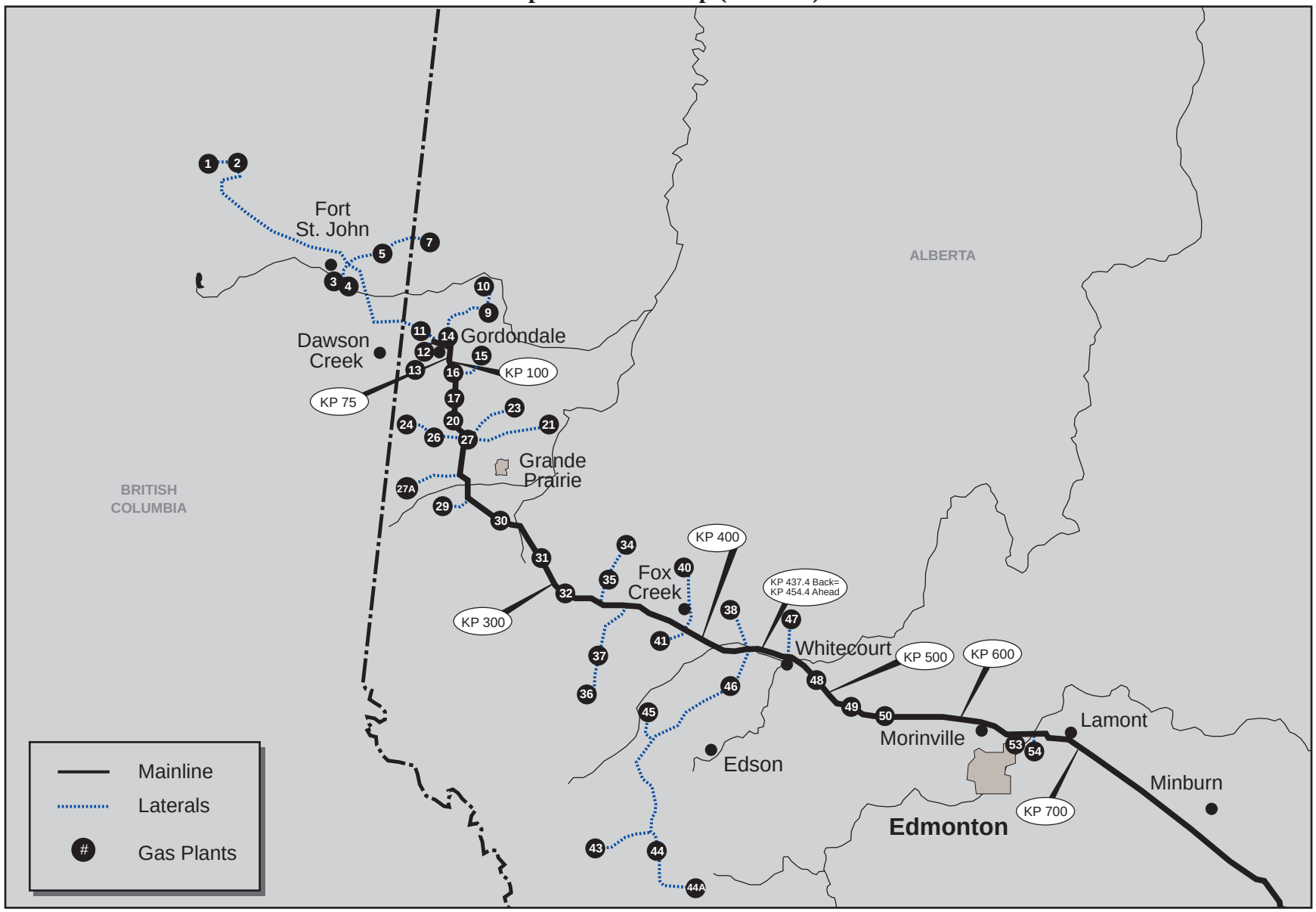

Table 2-1
Lateral Pipeline Legend

Lateral Name	Plant No.	Plant Name	Plant Location
Highway Lateral	BC 01	Highway - WGSI	b-36-I 94-B-16
Aitken Creek Lateral	BC 02	Aitken Creek - Westcoast	d-44-L 94-A-13
Taylor Lateral	BC 03	McMahon - Westcoast	01-36-82-18W6
Taylor Lateral	BC 04	Younger - Solex	02-36-82-18W6
Boundary Lake Lateral	AB 05	Boundary - Petrocan	14-24-84-15W6
Boundary Lake Lateral	AB 07	Boundary Lake S. - Rigel	01-14-85-09W6
Peace River Lateral	AB 09	Fourth Creek - Cranrock	16-11-82-09W6
Peace River Lateral	AB 10	Josephine - Rigel	09-01-88-10W6
Pouce Coupe Lateral	AB 11	Pouce Coupe - Star	11-34-79-12W6
Gordondale West Lat.	AB 12	Pouce Coupe - C.N.R.L.	11-19-79-11W6
Gordondale West Lat.	AB 13	Gordondale - Westcoast	16-02-79-12W6
Peace River Lateral	AB 14	Gordondale - Cranrock	11-24-79-11W6
Whitburn Lateral	AB 15	Progress - Suncor	07-22-78-09W6
Whitburn Lateral	AB 16	Progress - Norcen	08-01-78-10W6
Valhalla North Lateral	AB 17	Valhalla - Can. Abraxas	13-21-76-09W6
Valhalla S. Connection	AB 20	Valhalla - Crestar	01-29-75-09W6
Teepee Creek Lateral	AB 21	Teepee Creek - Talisman	07-02-74-04W6
Spirit River Lateral	AB 23	Sexsmith - AEC	04-08-75-07W6
Hythe Lateral	AB 24	Hythe / Brainard - AEC	14-18-74-12W6
Hythe Lateral	AB 26	Knopic - Rigel	16-21-73-10W6
Wembley Connection	AB 27	Wembley - Crestar	05-19-73-10W6
Elmworth Lateral	AB 27A	Elmworth - Can. Hunter	01-08-70-11W6
Wapiti Lateral	AB 29	Wapiti - Imperial	04-08-69-08W6
Gold Creek Lateral	AB 30	Gold Creek - Petrocan	13-26-67-05W6
Karr Lateral	AB 31	Karr - Can. Hunter	04-10-85-02W6
Simonette Lateral	AB 32	Simonette - Encal	09-06-63-25W5
Ante Creek Lateral	AB 34	Ante Creek - Rio Alto	10-18-65-23W5
Ante Creek Lateral	AB 35	Waskahigan - Rio Alto	15-07-64-23W5
Bigstone Lateral	AB 36	Bigstone W. - Petromet	14-28-59-22W5
Bigstone Lateral	AB 37	Bigstone - Amoco	06-10-61-22W5
Two Creeks Lateral	AB 38	Two Creeks - Summit	07-04-63-18W5
Fox Creek Lateral	AB 40	Kaybob - Petrocan	08-09-64-19W5
Kaybob Lateral	AB 41	Kaybob - S. I & II - Amoco	01-12-62-20W5
Edson West Lateral	AB 43	Galloway - Ranger	14-14-53-20W5
Edson Lateral	AB 44	Edson - Talisman	04-11-53-18W5
Edson Lateralp	AB 44A	Wolf South - Poco	05-01-51-15W5
Kaybob South Lateral	AB 45	Kaybob S. - III Chevron	11-15-59-18W5
Edson Lateral	AB 46	W. Whitecourt - Amoco	08-17-60-15W5
Carson Creek Lateral	AB 47	Carson Creek - Mobil	04-23-61-12W5
Whitecourt Lateral	AB 48	Whitecourt - Petrocan	12-26-59-11W5
Paddle River Lateral	AB 49	Paddle River - Canoxy	13-06-57-08W5
Cherhill Lateral	AB 50	Cherhill - Chauvco	02-25-56-06W5
Fort Sask. Lateral	AB 53	Fort Sask. - Chevron	05-14-55-22W4
Fort Sask. Lateral	AB 54	Fort Sask. - Dow	12 & 13-55-22W4

For logistical purposes, Alliance has divided the construction of the mainline into nine segments or spreads to be built over 18 months. Lateral construction would also be packaged into spreads where an individual contractor may construct several laterals. Pipeline construction would involve clearing, grading, trenching, stringing, welding, lowering-in of pipe, backfilling, pressure testing, clean-up, and reclamation. Station construction would involve clearing and grading, excavation, construction of foundations, facilities assembly, testing and commissioning, and clean-up.

Construction was initially proposed to commence in the late summer or fall of 1998 (with the aim of achieving a November 1999 in-service date). The Company announced in early March 1998, however, that it was rescheduling contractor and supplier commitments to recognize the current realities of the Canadian regulatory process. Alliance provided information on the relative seasonal timing of work for each spread; however, specific construction start dates were not specified. This information is summarized in Appendix II.

2.2 Purpose and Need

The purpose of the Project, as stated by Alliance, is threefold:

(i) to increase market access for production from the Western Canada Sedimentary Basin ("WCSB") which, according to Alliance, is currently constrained by the lack of sufficient pipeline capacity between the WCSB and end-use markets across North America (particularly in the U.S. midwest);

(ii) to provide a link between gas markets in North America which will facilitate the integration of those markets and reduce the high price differentials between them; and

(iii) to increase total natural gas supply available to customers in the midwest U.S. and markets across North America, particularly competitively priced natural gas supplies from the WCSB, thereby serving existing and growing energy requirements.

Alliance submitted that the Project offers the following advantages:

(i) a direct route from the WCSB to interconnections with the integrated U.S. pipeline system near Chicago;

(ii) the ability to provide a competitive influence on the actions of existing pipeline systems;

(iii) economies of scale;

(iv) the advantages of higher-pressure technology; and

(v) a comparatively shorter right-of-way, which results in superior economics and less land disturbance.

In support of the commercial need for the Project, Alliance filed information relating to natural gas supply, markets, project financing, and overall economic feasibility.

Alliance reported that the need for the Project is further demonstrated by shipper commitments totalling 36.7 million cubic metres (1.294 billion cubic feet) per day or 98 per cent of the available

firm capacity. The agreements by the shippers to enter into 15-year firm transportation service contracts translate into an aggregate financial commitment to the Project of approximately $4.7 billion (Canadian). When the corresponding commitments relating to the U.S. segment are included, shippers have made commitments to pay approximately $8.2 billion (Canadian).

2.3 Environmental Assessment Process

At year-end 1996, Alliance filed a preliminary submission requesting that the Board initiate the scoping of the environmental assessment that would be required under the *CEAA* in respect of the Project. The Company advised in its preliminary submission that, while most of its pipeline would parallel existing rights-of-way, more than 75 km of new right-of-way would be required. That would trigger the comprehensive study provisions under the *CEAA*, requiring that the Project be assessed by way of a comprehensive study and/or a review panel.

In response to the preliminary submission, the Board contacted other federal authorities to ascertain which departments had an interest in the Project and what their involvement would be in the environmental assessment. The participation of federal departments is summarized in section 2.4. A public registry was also established, shortly after receipt of Alliance's preliminary submission, in accordance with the requirements of the *CEAA*.

After obtaining initial responses from federal departments, the Board began a public scoping process, which concluded with the issuance of a final scope of environmental assessment dated 19 June 1997. Section 2.5 provides further details of the scoping process and Appendix III outlines the scope of environmental assessment.

Following receipt of Alliance's application made pursuant to the *NEB Act* on 3 July 1997, the Board, as lead Responsible Authority ("RA"), established a process for the conduct of a Comprehensive Study pursuant to the *CEAA*. In order to minimize duplication and facilitate public participation in the environmental assessment process, the Board ensured that *CEAA*-related matters were incorporated into the issues list for consideration in the Board's public hearing process established pursuant to the *NEB Act*.

When it receives an application for a certificate of public convenience and necessity, the Board has an obligation to consider environmental matters under both the *CEAA* and as part of its consideration of the public interest under section 52 of the *NEB Act*. Under the *CEAA*, the Board considers the factors set out in the scoping document, while under the *NEB Act* the Board has the discretion to decide what factors are relevant in determining the public interest. For example, the *CEAA* requires a consideration of socio-economic effects only if they result from an environmental effect of a project. The Board usually considers a broader range of socio-economic effects when considering an application under the *NEB Act*.

On 3 September 1997, the Board issued Hearing Order GH-3-97 setting out the Directions on Procedure for the public hearing. The Board indicated in its hearing order that the GH-3-97 proceeding would be held both to obtain the evidence and views of interested persons on the application which had been filed by Alliance under the *NEB Act* and to provide a forum for public participation in the Comprehensive Study to be conducted under the *CEAA*.

The Board convened a pre-hearing conference, which lasted for six days starting 17 November 1997, to hear argument on a number of pre-filed Notices of Motion. Among the outcomes were Board directions to Alliance to file additional evidence and the fixing of 6 January 1998 as the date for commencement of the hearing.

A number of initiatives were undertaken as part of the process established by the Board to facilitate public participation in the review of the Project. These initiatives included:

(i) **Public Scoping Exercise** - The Board undertook a public scoping exercise for the Project as further discussed in section 2.5.

(ii) **Limited Participation Intervenor** - The Board developed a form to facilitate the filing of interventions and created a new category of intervenor for the hearing, namely the limited participation intervenor. This was intended to accommodate the needs of those persons who wished to attend the oral hearing to ask questions and make representations but who did not wish to go through the written process leading up to the oral hearing. The Board effected service for limited participation intervenors and provided documents upon request.

(iii) **Public Seminars** - Board staff conducted public seminars in advance of the oral hearing to explain the hearing procedures, and routing and land acquisition matters, and to answer related questions. Information on the Board's process, the hearing, and overview information on the Project was available for attendees. Two seminars were conducted at each of the following three locations (one in the afternoon and one in the evening): Fort St. John, British Columbia; Edmonton, Alberta; and Regina, Saskatchewan. Interventions were accepted at the seminars, during the days following, and at the regional hearing sessions.

(iv) **Regional Hearing Sessions** - Regional hearings were held in Regina, Saskatchewan; Fort St. John, British Columbia; and Edmonton, Alberta during the month of February 1998 to facilitate participation by persons living in areas along the proposed pipeline route and regional interest groups.

(v) **Teleconferencing** - The Board provided toll-free telephone numbers for persons wishing to obtain Project information and listen in on the proceedings. For the first time, the Board facilitated the presentation of evidence and cross-examination of witnesses by teleconference (using the toll-free connection).

The oral hearing covered 77 days in total between the dates of 6 January 1998 and 21 May 1998, with the Board's offices in Calgary serving as the primary hearing location.

As provided for in the Board's Directions on Procedure, those persons not wishing to participate in the public hearing, but who had concerns or comments regarding the Project, provided their input through letters of comment.

After the close of the hearing, the Board released a draft of the Comprehensive Study Report ("CSR") for comment by all participants and relevant federal departments and agencies prior to finalizing the document. Comments were received from the following parties:

- Rocky Mountain Ecosystem Coalition, submission dated 9 July 1998;
- Mr. Allan Johnstone, submission dated 10 July 1998;
- Confederation of Regions Political Party (Federal), submission dated 16 July 1998;
- Alliance Pipeline Ltd., submission dated 28 July 1998;
- Treaty 8 Tribal Association, submission dated 7 August 1998;
- Prairie Farm Rehabilitation Administration, submission dated 10 August 1998;
- Environment Canada, submission dated 11 August 1998;
- Canadian Environmental Assessment Agency, submission dated 12 August 1998;
- IPL Energy Inc., submission received 12 August 1998;
- Department of Fisheries and Oceans, submission dated 12 August 1998; and
- Alliance Pipeline Ltd., submission dated 17 August 1998.

The Board considered the comments. To the extent that these comments were based on facts taken in evidence at the hearing, the Board considered them, and in some instances, revised the draft report.

Please refer to Appendix IV for a chronology of key steps and milestones in the environmental assessment of the Project. Appendix V provides a listing of the key documents upon which the Board's assessment was based. Appendix V also includes a concordance of the key documents to assist the reader in referencing information from the public registry for sections of this report which may be of interest to them. It should be noted, however, that in compiling the CSR, all evidence adduced as part of the Hearing GH-3-97 was considered. Although the CSR covers all of the requirements of the *CEAA* with respect to the assessment of the Project, the focus of the report is on those issues which required special consideration. Further to this, the CSR does not include an exhaustive list of the Company's proposed mitigative measures. Numerous environmental mitigative strategies have been proposed by Alliance which would be considered "standard practices" in the pipeline industry. Most of these measures are described in Volumes IV, V, and VI of the application, and in topic-specific reports (Appendix V). Only those measures which were unusual, required further commitment from the Company, or involved special consideration are directly mentioned in this CSR. For a thorough listing of evidence, reference should be made to the Public Registry established by the Board for this Project.

2.4 Consultation with Other Federal Departments and Agencies

In January 1997, shortly after receipt of Alliance's preliminary submission and prior to receipt of Alliance's application, the Board contacted several federal departments and agencies to determine their interest or role in the environmental assessment of the Project pursuant to section 5 of the *CEAA*. Those contacted were: the Canadian Environmental Assessment Agency ("the Agency"), Agriculture and Agri-Food Canada, including the Prairie Farm Rehabilitation Administration ("PFRA"), Department of Fisheries and Oceans, including both the Habitat Management Division ("DFO-Habitat") and Canadian Coast Guard ("DFO-CCG"), Department of Canadian Heritage, Department of National Defence, Environment Canada, Health Canada, Indian and Northern Affairs Canada ("INAC"), Natural Resources Canada ("NRCan"), and Western Economic Diversification. A summary of their role in the environmental assessment is provided in Table 2-2.

Table 2-2
Summary of Federal Government Involvement in the *CEAA* Process (Post-Scoping)

Department/Agency	Responsible Authority	Specialist Department	No Involvement
Agriculture and Agri-Food Canada (other than PFRA)			X
Agriculture and Agri-Food Canada (Prairie Farm Rehabilitation Administration)	X	X	
Canadian Environmental Assessment Agency		X	
Department of Canadian Heritage			X
Department of Fisheries and Oceans (Canadian Coast Guard)	X		
Department of Fisheries and Oceans (Habitat)	*	X	
Department of National Defence			X
Environment Canada		X	
Health Canada		X	
Indian and Northern Affairs Canada			X
Natural Resources Canada			X
Western Economic Diversification			X

* The Department of Fisheries and Oceans is a Responsible Authority; however, DFO-Habitat has not yet determined whether it has a *CEAA* trigger as a result of its responsibilities pursuant to the *Fisheries Act*. See text for further details.

Based on the responses received, and after obtaining further information from Alliance regarding the Project proposal, the Board sent a letter in March 1997 to nine of these departments requesting input on the proposed scope of assessment. The scoping process is described in greater detail in section 2.5 of this CSR. In addition to soliciting input from federal departments during the scoping phase, the Board invited further input from those departments which expressed an interest in continuing involvement in the environmental assessment, had identified themselves as RAs pursuant to the *CEAA*, or from which specialist advice was sought.

The DFO-CCG and PFRA indicated that they would be RAs. DFO-Habitat indicated that it would require further information regarding several sensitive watercourse crossings before it could make a determination whether an Authorization under the *Fisheries Act* would be required and, thus, whether DFO-Habitat would be an RA in this regard. The RAs, DFO-Habitat, and Environment Canada provided extensive specialist advice in respect of the Project. Health Canada included some advice in

its initial response to the Board, and the Agency provided input related to the *CEAA* and associated process.

The DFO-CCG indicated that it normally receives an application pursuant to section 108 of the *NEB Act* for conduct of crossings on navigable watercourses. Such an application would trigger its involvement in the *CEAA* process. Accordingly, the DFO-CCG requested information from Alliance regarding the potential effects of the Project on navigation. In March 1998, the DFO-CCG advised the Board that the information provided by Alliance was sufficient for it to complete a review of the effects of the Project on marine traffic and the public right of navigation. The DFO-CCG also attached a list of watercourses which it had determined were navigable and for which leave under section 108 of the *NEB Act* would be required if the Project were approved. The DFO-CCG further indicated that it would not consider granting leave to Alliance until it was notified of the Board's decision.

DFO-Habitat provided letters throughout the assessment process that outlined concerns and indicated the need for further information in respect of the department's responsibility for fish and fish habitat. In February 1998, DFO-Habitat submitted a letter describing its outstanding concerns. Partly in response to the issues identified by DFO-Habitat, Alliance provided site-specific crossing plans for sensitive watercourse crossings in addition to its more general mitigative measures. In May 1998, DFO-Habitat advised the Board that it had received all of the outstanding fish habitat information that had been requested by the department.

The PFRA is an RA by virtue of its status as the landowner of community pastures crossed by the pipeline. The PFRA submitted that it would be necessary for Alliance to obtain a Right of Entry to Survey and Construct in each PFRA pasture. During the assessment process, the PFRA submitted letters describing the items Alliance would need to address prior to receiving a Right of Entry. In response, Alliance referenced specific mitigative measures that would be applied in the pastures, and indicated that it would adhere to the intent of the guidelines entitled, *Restoration of Saskatchewan's Agricultural Crown Rangelands - Guidelines and Procedures for Developers* for all PFRA pastures crossed by the pipeline. Alliance also noted that it would apply for a Right of Entry to Construct prior to the commencement of construction.

Environment Canada submitted several letters outlining concerns regarding: the construction schedule, timing of construction, revegetation, spill contingency, disruption of waterfowl, migratory birds, raptors and associated habitat, disturbance to species listed by the Committee on the Status of Endangered Wildlife in Canada ("COSEWIC"), water quality at watercourse crossings, and air emissions.

The Board attached copies of all correspondence provided by federal and provincial departments and agencies to formal Information Requests issued to Alliance by the Board. Alliance addressed the concerns directly with the departments involved and also via its responses to the Board's Information Requests. The Board also followed up on any outstanding information through hearing questions and undertakings requested of Alliance. Specialist departments whose concerns were addressed in this way were provided copies of relevant hearing transcripts for their review. Any outstanding concerns expressed by relevant federal departments were taken into consideration by the Board when it developed the recommendations of this CSR.

Several of the specific concerns raised by federal and provincial departments and agencies during the course of the assessment are detailed in the relevant sections of this CSR.

Concerns were raised by the Rocky Mountain Ecosystem Coalition ("RMEC") regarding the nature of the participation of other federal departments, that would have a decision-making responsibility, particularly DFO-Habitat. The RMEC argued that it should have been allowed to cross-examine personnel from DFO-Habitat and that DFO-Habitat was not in a position to participate in the preparation of the CSR.

Conclusions

In relation to the arguments of RMEC about the ability of the Board to take into consideration the views of DFO-Habitat in this CSR, it is noted that the Board's responsibilities under the *CEAA* and the *NEB Act* overlap. The Board considers the environment under both Acts. In this instance, for a number of reasons, including the avoidance of duplication of both a substantive and procedural nature, the Board has used the hearing process to carry out its responsibilities under both the *CEAA* and the *NEB Act*. In doing so, it has invited and facilitated the comments and involvement in the hearing process of both Federal and Responsible Authorities under the *CEAA* as well as all other interested persons, whether their interests related to the Board's mandate under the *NEB Act* or the *CEAA*. For example, the Board ensured that all relevant correspondence and minutes of meetings between Alliance and DFO-Habitat were placed on the public record for review by interested parties. Furthermore, Federal and Responsible Authorities and other parties had an opportunity to comment on the draft CSR prepared by the Board prior to the CSR being forwarded to the Minister of the Environment pursuant to section 21 of the *CEAA*. In these and other ways, the Board has worked to facilitate the involvement of federal departments while respecting the procedural parameters within which it must operate. It follows that, the Board can consider the comments of DFO-Habitat in the preparation of this CSR, just as it can consider the written comments of other parties and other federal departments who chose to contribute to the process, subject to considerations as to weight.

The RMEC argued that it should have been able to cross-examine DFO-Habitat personnel during the Board's Public Hearing Process. First, it is noted that the RMEC could always deal directly with DFO-Habitat. Second, there was no requirement for DFO-Habitat to appear unless a subpoena was issued. The RMEC did not ask that a subpoena be issued to personnel from DFO-Habitat, although the RMEC is familiar with the process, having initiated it in another hearing. Therefore the Board does not accept the RMEC's argument that it should have been allowed to cross-examine DFO-Habitat personnel.

2.5 Scope of the Environmental Assessment

The *CEAA* contains several provisions in relation to scoping, which is a prerequisite to an environmental assessment. Decisions are to be made in relation to the scope of the project, the factors to be considered in the environmental assessment, and the scope of those factors. These scoping decisions provide a general framework of issues to focus the assessment information that must be filed by an applicant and the assessment process undertaken by the RAs. With the guidance provided by a scoping exercise, the applicant can complete the preparation of the documentation relating to the assessment of the environmental effects of the project and the assessment process can commence.

In planning a public participation process for scoping, the Board considered that Alliance had already provided opportunities for public input through its public consultation sessions. Rather than duplicate Alliance's efforts, the Board sought comments on Alliance's proposed scope of environmental assessment. Chapter 3 contains a summary of Alliance's public consultation initiatives.

On 11 March 1997, the Board asked a number of federal departments to provide comments on the draft scope, particularly in regard to the following:

- the appropriateness and completeness of the draft scope;
- whether power facilities should be added as an associated physical work;
- any views on the matters set out in paragraph 16(1)(e) of the *CEAA*[1]; and
- the level of detail for the scope of the factors.

The Board prepared a draft scope based on the material filed by Alliance and the comments received from other federal departments and agencies. On 18 April 1997, the Board released a draft scope and advised that it had decided to invite written comments from the public prior to any determinations being made (16 May 1997 set as due date for comments). Copies of the draft scope were forwarded directly to Alliance and a number of persons that the Board thought might be potentially interested. The public at large was also made aware of the exercise through a Board news release and a public notice which was circulated by Alliance in 50 newspapers at the Board's request. Comments were received from 23 parties.

The Board considered all of the comments, and further consultations with the Canadian Environmental Assessment Agency and other federal government departments were undertaken prior to the release of the final scope of environmental assessment on 19 June 1997. Please refer to Appendix III for full particulars, including the Board's response to submissions questioning the jurisdiction of the Board to initiate a scoping exercise and undertake scoping decisions prior to the filing of an application.[2]

The RMEC argued in its final submissions that the Project had not been scoped in accordance with the *CEAA*. In particular, the RMEC pointed the Board toward the wording of subsection 15(3) of the *CEAA*, which in its view required the Board to include in the scope of the project any other related undertakings.[3] Those related undertakings could be proposed by the proponent for the applied-for physical work or could be within the control of the proponent or others and could be tied to physical works other than the applied-for facilities.

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[1] Paragraph 16(1)(e) of the *CEAA* reads as follows: *Every screening or comprehensive study of a project and every mediation or assessment by a review panel shall include a consideration of the following factors ... (e) any other matter relevant to the screening, comprehensive study, mediation or assessment by a review panel, such as the need for the project and alternatives to the project, that the Responsible Authority or, except in the case of a screening, the Minister, after consulting with the Responsible Authority, may require to be considered.*

[2] Reference pages 2 and 3 of the Board's 19 June 1997 letter (Appendix III) for discussion on the jurisdictional issue.

[3] Subsection 15(3) of the *CEAA* reads as follows: *Where a project is in relation to a physical work, an environmental assessment shall be conducted in respect of every construction, operation, modification, decommissioning, abandonment or other undertaking in relation to that physical work that is proposed by the proponent or that is, in the opinion of (a) the Responsible Authority, or (b) where the project is referred to a mediator or a review panel, the Minister, after consulting with the Responsible Authority, likely to be carried out in relation to that physical work.*

Conclusions

The Board properly exercised its discretion and acted within its jurisdiction when establishing the scope of the project for the purposes of this assessment. In its view, while it may be required to include in the scope of the project undertakings that the proponent acknowledges are directly tied to the applied-for physical work (i.e. its construction and operation), the Board continues to have discretion as to what other undertakings will be included in the scope of the project. It exercised that discretion after taking into consideration the comments received from the public as a result of the scoping process.

2.6 Alternatives to the Project

Alliance submitted that several alternatives to the Project were considered but that none met the objectives or offered the advantages cited in section 2.2.

Alliance submitted that the necessary transportation capacity between the WCSB and the midwest U.S. did not presently exist on any natural gas transmission system, and that any proposal to add that capacity would require the construction of substantial new facilities, exceeding those proposed by the Company.

Alliance's representations on specific alternatives were as follows:

(i) **Expansion of the TransCanada PipeLines and Viking or Great Lakes Gas Transmission Systems** - Looping of the pipeline facilities and the addition of compression facilities on the TransCanada and Viking (or Great Lakes) systems would be required. Use of the most cost-effective technology would not be possible with the integration of new facilities into the existing TransCanada and Viking (or Great Lakes) facilities. The length of the route of these systems indicates that the total land disturbance would exceed that of the Project.

(ii) **Expansion of the NOVA Gas Transmission, Foothills Pipe Lines, and Northern Border Systems** - Looping of the pipeline facilities and the addition of compression facilities on the NOVA Gas Transmission, Foothills Pipe Lines, and Northern Border systems would be required. Use of the most cost-effective technology would not be possible with the integration of new facilities. The length of these systems indicates that the total land disturbance would exceed that of the Project.

(iii) **Altamont Circle Route** - This route would require the construction of the Altamont Gas Transmission system (in both Canada and the U.S.) which would only deliver gas to the Rocky Mountain region, and would not create a link between eastern and western markets nor increase transportation capacity for volumes to be delivered to the U.S. midwest. To fulfil these objectives, additional facilities would need to be added on numerous systems to allow gas to be transported from the terminus of the Altamont Project east and north to the load centres in the midwest area on existing systems. The length of the route of these systems indicates that the total land disturbance would be in excess of that required for the Alliance Pipeline Project. Further, the utilization of existing systems beyond the terminus of the Altamont Project would preclude use of the most cost-effective technology.

As noted in section 2.2, Alliance indicated that 98 per cent of the available firm capacity on the Project has been subscribed for 15 years. Alliance submitted that this high level of subscription provides strong commercial evidence that the proposed transportation service is necessary and a preferred option in comparison to the alternatives, including that of not undertaking the Project.

Alliance also maintained that the "do-nothing" alternative would not meet the Company's objectives of improving the competitive position of western Canadian natural gas in North American markets and introducing choice and competition into the natural gas transportation sector in western Canada.

During the Board's public hearing, parties attempted to demonstrate that Alliance had not conducted an adequate environmental assessment of alternatives to the Project. Alliance conceded that no such in-depth assessment had been made, but argued that such assessments are not required when the conclusion reached in respect of the project being proposed is that it will cause no significant adverse environmental effects after mitigation. Moreover, Alliance argued that the point was academic as there were no viable alternatives to the Project.

Conclusions

In the context of the *CEAA*, and taking into consideration the nature of the proposed project, "alternatives to" were considered as encompassing any feasible different project that would achieve the objectives of the proposed Project, as well as the option of not undertaking the Project.

Alliance has sufficiently considered alternatives to the Project and has reasonably concluded that none are viable.

2.7 Assessment Criteria

The ultimate objective of an environmental assessment is to determine whether or not a project is likely to cause significant adverse effects, taking into account any applicable mitigation measures. In order to determine the significance of a potential environmental effect, the following criteria were applied:

- magnitude: the severity of the environmental effects;
- geographic extent: how widespread or localized the environmental effects would be;
- duration and frequency: the persistence and frequency of the effects;
- irreversibility: the reversibility or permanence of the environmental effects; and
- ecological context: the environmental sensitivity of the area(s) most affected, the presence or absence of rare, endangered, or environmentally significant wildlife, fish, or vegetation species.

The above criterion were applied to the assessment in the context of the applicant's proposed mitigation measures, and the recommendations found within this document. These criteria were used in the evaluation of potential cumulative effects as well as potential project-specific effects. The weight placed on each criteria varied depending on which potential effect, or which particular factor was being assessed. For example, the irreversibility of an effect on a rare or endangered species of

wildlife would be weighted more heavily than the irreversibility of the same effect on an abundant species. Similarly, the measurement of the geographic extent of a cumulative effect would vary depending on the factor or effect being assessed. For example, the potential adverse cumulative effect of air emissions were measured on a regional airshed basis, whereas the potential adverse cumulative effects on archaeological or historical resources were considered on a site-specific basis.

Further insights into how the above-noted criteria were applied during the environmental assessment of the Project can be found in Appendix III: Scope of Environmental Assessment, and Appendix VI: Ruling re: Scope of Assessment.

Chapter 3

Alliance's Public Participation Program

3.1 Program Description

In mid-1996, Alliance commenced a public involvement program that was designed to satisfy the requirements for Early Public Notification ("EPN") set out in Part II of the Board's *Guidelines for Filing Requirements* and in the Agency's *Guide to Preparation of a Comprehensive Study*. Alliance submitted that it attempted to identify persons and organizations that might be interested in participating in the scoping activities for the Project. Alliance's ongoing public involvement program included:

- identification of key stakeholders and provision of information;
- toll-free telephone line and Internet web site;
- personal contact with all residents and landowners:
  - whose lands lie within 400 m of the proposed pipeline; and
  - within a 1.6 km radius of the proposed compressor stations;
- meetings with:
  - federal and provincial representatives;
  - rural, county, and urban municipality officials; and
  - Aboriginal representatives;
- meetings and workshops with non-governmental organizations and environmental groups;
- newspaper notices identifying project location;
- radio announcements on local radio stations along the proposed route;
- 16 open houses along the proposed mainline route; and
- school outreach programs in conjunction with open houses.

The results of the program were utilized in issue scoping, resolution and management, and in the collection of baseline information on environmental and socio-economic components of the environmental assessment. Alliance provided summaries of comments received during its public comment program and a description of how the matter had been resolved or whether any follow-up consultation was required. The program also had the goal of initiating an ongoing communications program with as many relevant stakeholders as possible, which would continue in the subsequent construction and operation phases of the Project. Further details on consultations with Aboriginal groups are set out in section 4.15 respecting First Nations.

The Company noted that it would continue to forward the results of ongoing consultation to the Board on a quarterly basis until such time that all concerns and comments were resolved. Alliance also noted that it would notify the Board of any new issues that may arise from its consultations.

3.2 Public Concerns

During the hearing parties identified a number of unresolved concerns involving routing (i.e. the number of pipelines on their property and its fragmentation by the rights-of-way), impacts on land use (i.e. disturbance of enhanced wildlife habitat, sled dog training), and the specific location of the Estlin

Compressor Station. Specific concerns on potential environmental effects are addressed in the following sections of the CSR.

The issue of flaring associated with upstream oil and gas development was also raised by a number of parties, including the Indigenous Ecology Alliance, the Peace River Regional District, the RMEC, Mr. Allan Johnstone, Dr. Scott, the Blueberry Farms Community, and the Chetwynd Environmental Society. The negative environmental effects that parties attributed to flaring were direct public health effects of the emissions, impacts on vegetation, especially organic agriculture operations, and a general reduction in regional and local environmental quality. The concern was expressed that Alliance's proposed export capacity would stimulate further upstream development, including the flaring associated with well development, and would cause further adverse cumulative environmental effects, particularly in northeastern B.C. and northern Alberta.

Alliance indicated that upstream gas production/processing facilities were not addressed in its application, since those facilities would not be required for the Project and are not included in the scope of environmental assessment. Alliance stated that its proposed facilities are tied in to existing gas production facilities. Alliance further stated that it is difficult to make any direct connection between transportation capacity and drilling activity, particularly in western Canada, since experience has demonstrated that drilling activity leads to the development of pipeline activity.

Alliance acknowledged that it is part of an industry that is growing and which will continue to grow, and that northeast B.C. will be a service area for the proposed pipeline. Alliance confirmed that it intends to be a good corporate citizen by participating in the evolution and growth of the industry in a positive way, including contributing to the Rocky Mountain Fund that industry has initiated, once the Project moves ahead. Alliance explained that the purpose of those funds, which would be matched by the Province of B.C., would be to provide for research which would contribute to resource management decision-making for that area.

Conclusions

Only a limited number of parties had any specific comments in regard to Alliance's consultation program, or the quality of information provided. On the whole, persons and organizations providing comments, or participating in the Hearing, appeared to understand what the Project would entail and the potential environmental effects that would be associated with the Project. Comments and concerns of persons and organizations not participating in the hearing were communicated in Alliance's application and subsequent filings.

The concerns expressed by a number of parties regarding the potential environmental and public health effects of the flaring associated with upstream oil and gas development were carefully listened to and are acknowledged. The regulation of upstream oil and gas development in this region is not subject to the authority of the Board under the *NEB Act*. For the purposes of the environmental assessment being undertaken under the *CEAA*, there is a mandate to consider the effects of flaring where those effects are occurring within the boundaries (both of time and space) established for the cumulative effects assessment and are acting cumulatively with environmental effects from the Project. The effects of air emissions from upstream oil and gas activities, to the extent that these would combine with Project emissions to affect

ground level concentrations of nitrogen dioxide and levels of greenhouse gases, are addressed in sections 4.10, Air Quality and 4.17, Cumulative Environmental Effects.

Reasonable means were undertaken to ensure that the public, especially those who would be directly affected or in close proximity, were aware of the proposed Project, the potential environmental effects, and the significance of any effects, and were afforded several avenues to provide comments so that these could be taken into account.

Chapter 4

Environmental Assessment

4.1 Description of Environment

Alliance submitted that the general ecological setting along the Project route can be divided into three distinct segments crossing four major ecologic zones. The three segments are identified as: the Grande Prairie/Peace River region; the boreal forest from the Wapiti River to Whitecourt; and the parkland/prairies region from Whitecourt to the Canada/U.S. border. The Grande Prairie/Peace River region is characterized by flat to rolling farmland, interrupted by the forested and rolling Saddle Hills. The area from the Wapiti River to Whitecourt is covered by mixedwood and coniferous forests as well as muskeg. From near Whitecourt to the U.S. border, the proposed route traverses primarily agricultural land, gradually changing from undulating, wooded, parkland landscapes to relatively flat prairies. The four major ecological zones crossed by the Project are: boreal, foothills, parkland, and northern grasslands. Boreal forest is traversed by the lateral pipelines in British Columbia, over 50 per cent of the lateral pipelines in Alberta, and the mainline up to KP 596. The foothills zone is covered in the transition to the Peace Lowland with parkland and grassland zones covering the remaining two thirds of the route.

The Project crosses five physiographic regions which, from west to east, are: Interior Plains (Great Plains); Northern Alberta Lowlands (also called the Alberta Plateau); Southern Alberta Uplands; Eastern Alberta Plains (also referred to as Alberta High Plains); and the Saskatchewan Plains. Elevations range from about 700 m above sea level in British Columbia to 495 m above sea level at the Canada/U.S. border. Alliance submits that the greatest topographic relief and steepest slopes are encountered at some of the proposed river crossings such as those at the Wapiti, Athabasca, and Battle Rivers.

The bedrock underlying the route is categorized as mainly Cretaceous to Tertiary age marine and non-marine strata comprising a thick sedimentary sequence of sandstones, siltstones, and mudstones/clay-shales. Alliance submits that ironstone, bentonite, and tuff as well as coal intervals are locally present. Exposures of bedrock are generally confined to river and larger creek valleys, although some shallow bedrock occurs in upland regions. Most near-surface bedrock is soft.

The Project crosses five Soil Zones: Gray; Dark Gray; Black; Dark Brown; and Brown. The far western portion of the route is dominated by the Gray and Dark Gray Soil Zones, while the segment between the Wapiti River and Mayerthorpe is in the Gray Soil Zone. From Mayerthorpe to Deadman Lake, Alberta the route primarily encounters the Dark Gray Soil Zone before changing to the Thick Black Soil Zone. This Zone extends to an area southeast of Vegreville, Alberta. The Thin Black Soil Zone is encountered near the town of Wainwright, with the remainder of the Alberta and Saskatchewan segments in the Dark Brown Soil Zone. A small area of the Brown Soil Zone is encountered near Kerrobert, Saskatchewan and a small area of the Thin Black Soil Zone is found southeast of Oxbow, Saskatchewan. Approximately two hundred soil types have been identified along the route. Of note, approximately 20 per cent of the route crosses saline and/or sodic soils and some soils encountered do not have an appreciable depth of topsoil, such as those found under natural forest vegetation.

Approximately 28 per cent of the proposed mainline route and 61 per cent of the lateral routes would traverse various regions of native vegetation. The other 72 per cent of the proposed mainline and 39 per cent of the laterals would pass through agricultural lands. The majority of the native vegetation along the laterals and western portions of the pipeline are forested. Mixed forests of white spruce, black spruce, lodgepole pine, balsam fir, aspen, paper birch, and balsam poplar are most common. Black spruce forests occur on moister sites. As the route progresses eastward through the Peace River Parkland Subregion, the vegetation becomes characterized by mixed upland forests intermingled with grasslands. These forests are typically aspen and white spruce, with balsam poplar on wetter sites. In the Central Parkland Subregion, aspen parkland predominates in the south and closed aspen forests in the north, much of which is affected by clearing for agricultural purposes. Grasslands are dominated by western porcupine grass, sedges, pasture sage, and intermediate oat grass. Other remaining grasslands tend to be dominated by rough fescue and western porcupine grass, with June grass and western wheat grass in certain areas. Most of the grasslands in Saskatchewan and eastern Alberta have been cleared for agricultural purposes.

Priority wildlife species were identified by Alliance in its application. The Project crosses lands with a high capability to provide a wide variety and abundance of food plants and other habitat elements for ungulates, as well as being winter ranges on which animals from the surrounding areas depend. The western portion of the route traverses the northern edge of the west central caribou planning area which includes the winter range of woodland caribou. Grizzly bear core security habitat is also crossed in several areas along the western portion of the route. Examples of endangered raptors that may be affected along the route are burrowing owls, peregrine falcons, and ferruginous hawks. Priority warblers potentially encountered include the Cape May, black-throated green and blue warblers, and bay breasted and Connecticut warblers. Waterfowl affected would include various species of ducks, Canada geese, coots, white fronted geese, snow geese, and trumpeter swans. As well, Sandhill crane habitat may be intersected in southern Saskatchewan.

Alliance identified 505 watercourses that would be traversed by the pipeline, more than 70 of which are classified as sensitive. A variety of fish species are found in the watercourses, many of which are sport fish species. Small forage and benthic dwelling fish are common in all regions covered by the Project, whereas coldwater sportfish such as bull trout, rainbow trout, whitefish, and Arctic grayling predominate in the western portion of the route. Coolwater species such as walleye, sauger, and northern pike are common in the eastern portion. Species of special management concern are also found in the Project area. The bigmouth buffalo and lake sturgeon, both of which are of national concern, are listed by the COSEWIC. Bull trout have significance at the provincial level in British Columbia and Alberta. Species of regional concern are also identified by Alliance in the Aquatic Resource and Habitat Assessment referenced in Appendix V.

Further details of the environmental setting for the Project are found in Volume IV of the application and the topic-specific reports written in support of Alliance's application as listed in Appendix V of this report.

4.2 Routing and Facility Site Selection

4.2.1 Alternative Means of Carrying out the Project

Alliance considered a number of routes, pipeline diameters, operating pressures, and compressor configurations and spacings in designing the Project.

4.2.1.1 General Route

The objective of Alliance's route selection process was to select a route that would, most feasibly, transport natural gas from the WCSB to the area of Chicago, Illinois. Alliance examined several major route alternatives in selecting a general route for the Project. An initial determination was made to follow existing rights-of-way to the maximum extent as opposed to an entirely new route. Alliance therefore considered existing pipeline systems which are oriented in the desired direction. The approximate lengths of pipeline for the general route alternatives identified in Figure 4-1 are as follows:

- NGTL/Foothills/Northern Border pipelines 3120 km (1940 miles)
- NGTL/Foothills/Northern Border pipelines, modified version 2950 km (1840 miles)
- Cochin/Dome Pipeline 2770 km (1720 miles)
- IPL/Lakehead Pipeline 2830 km (1760 miles)

Alliance stated that the northern Alberta route was dictated in large part by the location of the gas plants to be connected and Fort Saskatchewan, being the location of receipt points and a hub for natural gas liquids in Alberta. For the purpose of comparison, Alliance chose the Latornell Junction, in western Alberta, as a common starting point for all four general route alternatives with a common end point near Chicago, Illinois.

Alliance's analysis of the four general route alternatives included a consideration of any major laterals which would be required, total pipeline length, and potential environmental effects for each alternative. Alliance determined that all four alternatives were environmentally acceptable. The first two general routes were rejected due to length.

Alliance further evaluated the environmental effects of the Cochin/Dome and Interprovincial/Lakehead routing from Kerrobert to Chicago and provided a comparison of the two routes, which considered parameters such as total pipeline length, forested land, major river crossings, and wetlands. Alliance noted that the Interprovincial/Lakehead route is longer than the Cochin/Dome route and submitted that the environmental setting is significantly more sensitive than the Cochin/Dome routing, particularly in the U.S.

Alliance ultimately selected the Cochin/Dome alternative for its preferred general route.

Figure 4-1
General Route Alternatives

4.2.1.2 Mainline Route

Once Alliance chose a preferred general route, it evaluated alternatives for segments of the mainline route using the following criteria:

- parallel existing linear features where possible;
- take the most direct route possible, minimize the length of the pipeline;
- avoid National or Provincial Parks, military bases, ecological reserves, and designated Natural Areas;
- avoid environmentally sensitive areas such as: Special Places 2000 nominated and candidate sites, Critical Wildlife Habitats, Wildlife Key Areas, Provincial Recreation Areas, and Environmentally Significant Areas ("ESAs");
- minimize crossings of known wildlife and vegetation special status species habitat;
- minimize new rights-of-way and new roads in forested areas, native prairie, and minimize the number of water crossings;
- avoid areas where the environment could adversely impact the pipeline such as: unstable slopes or large muskegs;
- accommodate landowners, government agencies, and interested environmental groups;
- avoid urban areas, residences, public facilities, and existing or planned country residential subdivisions;
- avoid cemeteries, dugouts, windmills, outbuildings, feedlots, granaries, abandoned farmsteads, corrals, oil and gas well sites, etc. and minimize crossings of shelter belts; and
- cross roads and waterbodies at the maximum allowable angles to minimize the length of the pipeline.

The proposed mainline and laterals would parallel linear features for approximately 80 per cent and 62 per cent of their lengths respectively. In July 1996 the initial route was presented to various government agencies and landowners throughout B.C., Alberta, and Saskatchewan for comments and criticism. These consultations resulted in the proposing of alternative routes at specified segments. The proposed alternatives were examined using the criteria submitted and those that better suited the criteria were adopted.

Figures 4-2 and 4-3 depict the major routing alternatives that were considered after the preferred general route had been chosen. Table 4-1 provides a brief description of the major routing alternatives depicted on Figures 4-2 and 4-3.

Mainline Alternative Routes

Many of the mainline reroutes that were adopted by Alliance were for the purpose of avoiding ESAs. For example, a reroute became preferable to avoid crossing McMillar Creek due to concerns raised about its importance as a spawning area for cold water species. Alliance also adopted the Fox Creek Alternative so that the proposed mainline would only cross the Athabasca River once instead of three times. Although the route would require the Edson Lateral to cross the river, it was determined that the lateral crossing the river once would have a smaller impact on the environment than would the mainline crossing the river twice would have. Another reroute, which resulted in an additional 600 m of proposed pipeline, was drafted in order to minimize the adverse environmental effects that would be

Figure 4-2
Alternative Routes Upstream of Fort Saskatchewan

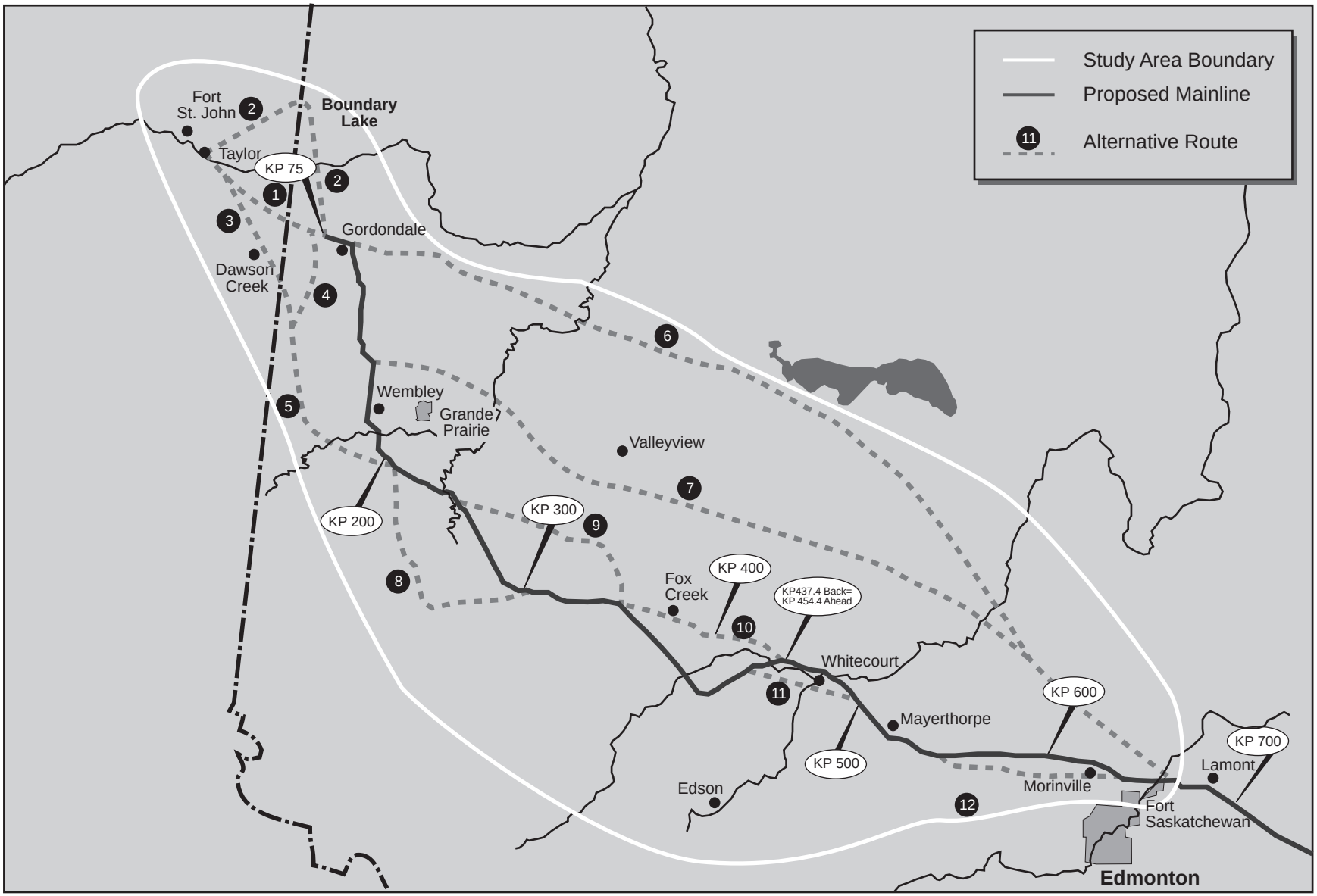


Figure 4-3
Alternative Routes Downstream of Fort Saskatchewan

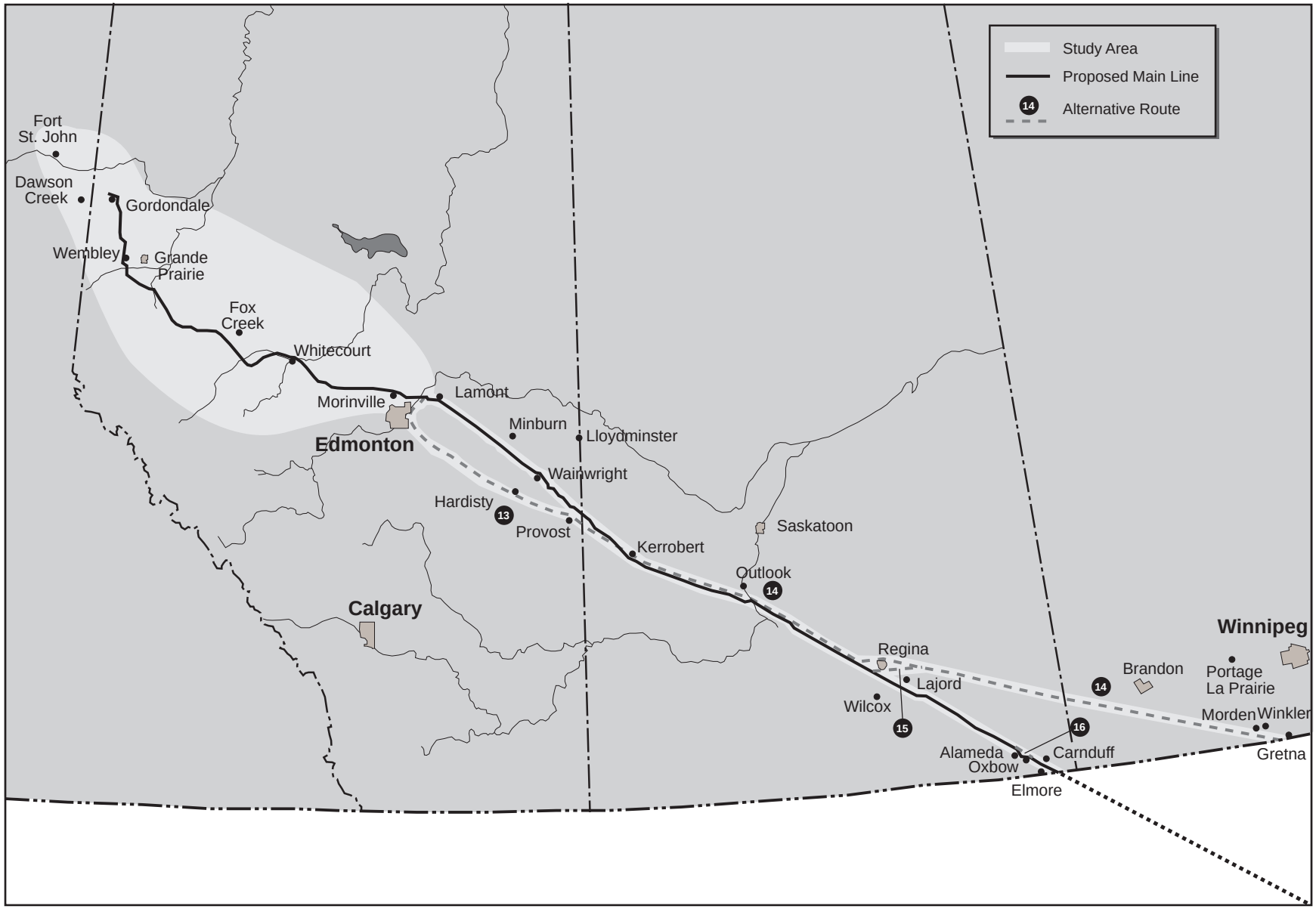


Table 4-1
Major Alternative Routes for the Project Mainline*

1.	Parallel WEI pipeline from Taylor to Gordondale area.
2.	Combination of new right-of-way and parallels of existing pipelines from Taylor to Boundary Lake and NGTL pipeline from Boundary Lake to Gordondale.
3.	Parallel oil pipeline and BC Hydro powerline from Taylor to Dawson Creek with new right-of-way from Dawson Creek to Brainard area.
4.	Partial parallel of Alberta Power powerline, WEI pipeline, seismic lines, and partial new right-of way from Gordondale to Brainard area.
5.	Parallel NGTL pipeline from Brainard area to Elmworth/Wapiti area.
6.	Parallel NGTL pipeline from Gordondale area to High Prairie area, new right-of-way to Swan Hills, and parallel Federated and Peace pipelines to Fort Saskatchewan.
7.	Parallel Suncor and Peace pipelines, Alberta Power powerline, Esso, Northwestern Utilities and Peace pipelines.
8.	Parallel Peace Deep Basin oil pipeline from Elmworth/Wapiti area to the Simonette area.
9.	Parallel NGTL pipelines from Smoky river to Crooked Lake.
10.	Parallel Peace Pipeline and Highway 43.
11.	Parallel existing pipelines and new right-of-way clearing from Windfall area to Whitecourt area.
12.	Parallel Peace Pipeline and Highways 43 and 37 from Whitecourt area to Namao.
13.	Parallel Alberta Energy Co., Alberta Oil Sands and other pipelines through Northeast Edmonton Pipeline Corridor and Restricted Development Area from Fort Saskatchewan to IPL Edmonton Terminal, then parallel IPL pipeline east to Kerrobert.
14.	Parallel IPL pipeline from Kerrobert to international border and Lakehead pipeline to Chicago.
15.	Parallel TransCanada Pipeline corridor from Cochin intersection to IPL intersection east of Regina.
16.	Parallel Cochin pipeline under the Alameda Reservoir.

* Route alternatives are depicted on Figures 4-2 and 4-3.

felt in the Elbow Sand Hills. Concerns relating to the initial routing through this area were raised by government agencies relating to wind erosion, reclamation, and wildlife habitat in the area, and by Aboriginal representatives due to the spiritual significance of the Sand Hills to the Blackfoot Nation. Alliance conducted various reroutes in order to reduce the length of right-of-way that would encounter native prairie, improve river or creek crossings, and to avoid future building sites and present residences.

Strathcona County expressed the opinion that Alliance's proposed route would not fulfil the criteria; specifically, that it would not minimize potential land use conflicts or potential adverse environmental effects. Concerns were raised about the effects the Project would have on Astotin Creek and the environmentally sensitive lands surrounding it. Also, Strathcona County felt that the proposed route should parallel an existing linear corridor as it crosses the Scotford Heavy Industrial Area of Strathcona, especially since this area already contains various oil, gas, and product lines. Alliance submitted that the Strathcona area had been subject to more reroutes than any other Canadian section of the Project, but that it would continue in its attempt to respond to the concerns of residents, corporations, and landowners in the area.

Several landowners having one or more existing pipelines on their property submitted that they did not agree with the criteria for paralleling existing rights-of-way. In the context of parallel rights-of-way, the landowners raised concerns regarding safety, land value, and land use.

Cochin Pipe Lines Ltd. noted that Alliance would cross its existing system 22 times in Canada and asked that the Board direct Alliance to substantially reduce the number of crossings. Alliance stated that there was nothing unusual about that number of crossings and that a reduction would jeopardize certain environmentally sensitive areas as well as Alliance's relationship with some of the landowners.

4.2.1.3 Lateral Routes

The lateral routes were drafted following the same criteria used to determine the mainline route. Alliance advised that, during public consultation, significant concerns were only expressed with the routing of two of the laterals. Both of these laterals of concern initially violated Alliance's own routing criteria. Initially, the Aitken Creek Lateral would have crossed a corner of the Beatton Provincial Park, and the Edson Lateral would have cut across the middle of the Edson West Candidate Natural Area. The Aitken Creek Lateral was rerouted so that it would go around the provincial park, and the Edson Lateral was rerouted so that it would only cut through the northeast corner of the candidate area.

4.2.1.4 Facility Site Selection

After the mainline route was generally determined, Alliance identified the optimal locations for above ground facilities. Alliance submitted that its hydraulic plans were designed for compressor station spacings of approximately 193 km along the mainline. Depending on the specific requirements of the station, some had the flexibility to be moved upstream or downstream of their optimal location up to a distance of 6.4 km. Lateral compressor stations and meter stations were sited according to the same criteria as the mainline compressor stations except that their proximity to plant sales lines and existing meter stations was also taken into consideration. All of the lateral compressor and meter stations would be located at gas processing plants, or similar facilities, and, in order to minimize new clearing or environmental disturbance, Alliance submitted that it would attempt to negotiate with plant

operators in order to place its equipment on land inside the existing plant sites. The Project would require 50 mainline block valves and seven lateral block valves. These would be located at approximately 32 km intervals on the right-of-way on high ground. After the optimal sites for these facilities were determined, survey teams were sent out to select the appropriate sites. Alliance submitted that the following criteria were used to assess potential facility site locations:

- proximity to the hydraulic optimum location; preferably within 2.4 km;
- environmental acceptability;
- ease of access;
- pipeline locations;
- level, non-organic, well drained areas; and
- price and economics.

4.2.1.5 Project Design

Alliance considered 914 and 1067 mm (36 and 42 inch) diameter pipeline for the mainline. In order to lower the pressure upstream of the Windfall Compressor Station, and the corresponding design pressure of the laterals, a 1067 mm (42 inch) diameter mainline was selected for Gordondale to Windfall. This would reduce compression requirements to nominal amounts for some receipt points and eliminate the need for compression at others.

Alliance further noted that it considered and decided to use internal coating on the mainline and all laterals 406 mm (16 inches) and larger in diameter. Internal coating would enable Alliance to use smaller compressors, and the combination of the smaller compressors and the internal coating would result in lower fuel consumption.

Conclusions

The scope of the environmental assessment for the Project included "alternative means" of carrying out the Project, which within the context of the *CEAA* refers to methods which are technically and economically feasible. Alternative means include those means that are within the scope and control of the proponent of the project under review.

Alliance has provided satisfactory information pertaining to the alternative means of routing and designing the Project that have been considered. The criteria utilized in selecting the applied-for facilities adequately address the environmental effects of the alternative means. Accordingly, the requirement to consider alternative means, as set out in paragraph 16(2)(b) of the *CEAA* and the scope of environmental assessment established for this Project, has been satisfied.

4.2.2 Temporary Facilities

4.2.2.1 Potential Environmental Effects

In addition to permanent facilities, temporary facilities would also be required for the construction of the Project. Sites for these facilities would be determined prior to construction. Potential

environmental effects associated with these facilities would be consistent with those identified for the permanent facilities. The temporary facilities associated with the Project would include:

- shoo-flies and temporary access roads;
- work camps; and
- contractor yards, pipe storage, stockpiles, and staging areas.

4.2.2.2 Mitigative Measures

The mitigation measures applied would be consistent with those identified for permanent facilities. The development of any new sites would require stripping and stockpiling the topsoil for reclamation of the site upon completion of construction. Construction of any camps would conform to the Camp Construction and Operation Plan, which would be submitted to the Board prior to construction if a work camp is necessary.

The following criteria would be applied in the selection of sites for temporary facilities:

- avoid watercourses and wetlands;
- avoid steep slopes, organic soils, and poorly drained areas;
- use existing cleared sites in forested areas and agricultural fields in agricultural areas;
- avoid native prairie areas and areas that would require clearing of trees;
- select sites that will not be in conflict with existing land uses;
- avoid ESAs (except if the site already experiences industrial use and its use during construction will prevent the need to create new clearings elsewhere); and
- avoid areas with known or high potential for wildlife species with a designated status, sensitive and significant wildlife areas, areas with known or high potential for plants with a designated status, and areas with known or high potential for heritage resources.

Each site proposed to be used for a temporary facility during construction would be subject to an initial environmental evaluation to determine the need for specific studies such as wildlife or vegetation.

Alliance submitted, however, that it could foresee circumstances where these criteria could not be applied. An example provided was where a temporary access road (shoo-fly) would be required in a river valley with known or high potential for wildlife or rare plant habitat. In these unusual circumstances, specific wildlife, rare plant, or heritage resources surveys would be undertaken to identify appropriate mitigative measures.

Conclusions and Recommendations

With the application of the above-noted criteria, potential environmental effects could be satisfactorily addressed with the mitigative measures set out in the other sections of this CSR. However, circumstances where the above-noted criteria would not be applied would require consideration on a case-by-case basis to ensure that appropriate measures are undertaken to protect the environment. Accordingly, any certificate issued for the Project should require that Board approval be sought for temporary facilities that would not be in accordance with these criteria. Therefore, it is recommended that the following conditions be included in any certificate that may be issued:

Recommendation 1

The Company shall apply the following criteria for the siting of all temporary facilities including construction camps, pipe and equipment storage, work areas, warehouse areas, borrow pits, staging areas, new access and other areas that would be used or disturbed prior to or during construction:

(a) avoid native prairie areas and areas that would require clearing of trees by:

(i) using existing cleared sites in forested areas and agricultural fields in agricultural areas, with preference being given to areas currently experiencing industrial use; and

(ii) using sites in areas of native prairie that have been previously cleared of native vegetation and/or altered for industrial use;

(b) avoid Environmentally Significant Areas unless the site already experiences industrial use and its use during construction will prevent the need to create new clearings elsewhere;

(c) avoid areas with known or high potential for wildlife, and significant habitat for wildlife, with a designated status (COSEWIC and provincial), as well as other sensitive/significant wildlife areas;

(d) avoid areas with known or high potential for plants with a designated status;

(e) avoid watercourses and wetlands;

(f) avoid steep slopes, organic soils and poorly drained areas;

(g) avoid areas with known or high potential for heritage resources; and

(h) select sites that will not be in conflict with existing land uses.

Recommendation 2

The Company shall submit to the Board for approval, at least 30 days prior to the disturbance of any proposed temporary facility site that is not in accordance with the criteria noted in Recommendation 1:

(a) a description of the site;

(b) the environmental effects and measures that would be used to mitigate these effects and, in the event that measures other than those adduced during the hearing are proposed, an analysis supporting the use of these measures; and

(c) the results of consultations with landowners and the relevant municipal, provincial, and federal government departments and agencies.

With the application of the above-noted criteria together with the recommended conditions, the temporary facilities required for the construction of the Project are not likely to cause significant adverse environmental effects.

4.3 Physiography and Bedrock

Alliance undertook a geotechnical assessment for the purposes of route refinement, background information for Alliance's environmental impact assessment, and development of appropriate mitigation. Published background data, air photo interpretation, and field observations, including examination of major watercourse crossings, were utilized. A more detailed study of sensitive river crossings was undertaken in early 1998 to assist in determining the feasibility of preferred watercourse crossing methods including directional drilling. Watercourse crossings are covered in more detail in section 4.7 on Fish and Fish Habitat.

The greatest relief and steepest slopes along Alliance's proposed route are encountered in the vicinity of major river and creek crossings. It is at these sites where terrain instabilities and potential for erosion are highest. Bedrock may be encountered within the pipeline trench depth at about 43 sites along the mainline route. Shallow bedrock has also been identified along the lateral routes, most frequently in river valleys. Most bedrock is weathered and soft.

4.3.1 Potential Environmental Effects

Physiography and bedrock geology often impose constraints on the project design and construction. In the case of the Project, unstable landslide terrain and near-surface bedrock in isolated locations are the major factors impacting the pipeline. Unstable areas can cause unwanted stresses or movement of the pipeline which could lead to pipe exposure or even rupture. Other major physical factors influencing the pipeline design are related to hydrology and soils and are discussed in subsequent sections.

The pipeline can also impact the geophysical aspects of the environment, particularly terrain stability. More specifically, Alliance's pipeline construction activities could cause:

- re-activation of small pre-existing terrain instabilities;
- development of instabilities in backfilled areas during and/or following right-of-way grading;
- development of instabilities in backfill material where two-tone grading of sideslopes would be undertaken; and
- creation of potential visual impacts in areas where the original, steep, or hummocky terrain contours could not be re-established.

4.3.2 Mitigative Measures

The effects of the physical environment on the pipeline are largely dealt with by routing the pipeline around areas that impose constraints on the construction process. In some cases, the constraints imposed by the environment would necessitate crossings of other pipelines where they otherwise would not be undertaken. In areas where other factors outweigh the impacts of the physiographic environment on the pipeline, the Company proposed various means of dealing with the constraints. For example, blasting may be required at watercourse crossings where bedrock is more commonly exposed by downcutting of rivers. However, no special mitigative measures were provided by Alliance for blasting in upland areas because the soil survey indicated the bedrock was likely soft enough to be ripped mechanically.

Alliance submitted that, during pipeline route selection, it avoided most areas of unstable terrain. However, where there were routing constraints, some small unstable areas would likely be encountered, mainly at river crossings. Alliance proposed the following standard mitigation measures to minimize any impacts with respect to terrain instabilities:

- back-slope right-of-way cuts;
- maintain or re-establish surface and subsurface drainage; and
- install drainage and erosion controls.

Additionally, Alliance committed to following the site-specific recommendations of an on-site geotechnical advisor in areas where unstable slopes are encountered. Monitoring would be ongoing for the life of the Project. After completion of construction, the monitoring would initially focus on the progress of revegetation and effectiveness of drainage control structures. Once reclamation had stabilized, emphasis would be placed on monitoring performance of erosion control measures at stream crossings.

Conclusions

The environmental effects of the Project on the physiography and bedrock are not likely to be significant with the proper application of Alliance's proposed mitigative measures. Similarly, any adverse effects of the physiography and geology on the Project are not likely to be significant with the measures proposed by Alliance including routing and site selection.

4.4 Soils

Alliance conducted a detailed soil assessment of the mainline and lateral routes and compressor station facility sites in order to provide baseline data, to evaluate the suitability of the soils for reclamation, and to recommend soil handling procedures. The soil study involved the use of existing information combined with data collected in the field. The site investigations were carried out with a density of 1.0 to 1.5 sites per km to a depth of 1.2 m. In areas where the investigations indicated the presence of possible problem soils, investigations were conducted to a depth of 2.0 m.

Survey results indicated that most of the proposed mainline route traverses soils classified for their agricultural capability by the Canada Land Inventory ("CLI") as having no significant limitation for crops (Class 1) to moderately severe limitations that restrict the range of crops and/or require special

conservation practices (Class 3). Areas with severe limitations (Class 4) to no capability (Class 7) for agriculture are concentrated within the forested areas of the Saddle Hills and from Wilson Lake to Whitecourt, and are also found adjacent to many of the stream and river crossings, as a result of adverse topography and soil shallowness. Organic soils are not placed in capability classes, but would be encountered in forested areas.

Areas of potential problem soils and subsoils have been identified and noted on Alliance's alignment sheets. Alliance used criteria proposed by the Alberta Pipeline Environmental Steering Committee to determine whether special handling would be required. Alliance also used topsoil thickness, upper subsoil thickness, stone or gravel content, presence or absence of sodic bedrock, texture, salinity, sodicity, and map unit length to determine the need for alternate handling requirements. Alternate soil handling procedures would consist of either over-stripping topsoil or the use of a three-lift procedure.

Alliance identified 62 areas collectively comprising about 50 km in total distance along the pipeline route, which would require alternate soil handling procedures to maintain soil capability. Aside from the mainline, Alliance indicated that alternate handling procedures would be required only on the Fort St. John Lateral, for a total distance of approximately 4 km.

4.4.1 Potential Environmental Effects

The major potential adverse impacts to soils which could result from the Alliance Pipeline Project are summarized in Table 4-2.

Table 4-2
Potential Adverse Effects on Soils

Mixing	- loss/lowering of soil capability/productivity through topsoil/subsoil mixing; - loss/lowering of soil capability/productivity through introduction of soft sodic bedrock into upper soil material; - loss/lowering of soil capability/productivity through introduction of consolidated sandstone/ bedrock slabs into upper soil horizon; - loss of topsoil through trench instability during trenching; - loss/lowering of soil capability/productivity through introduction of saline lower subsoils into upper subsoil material; - loss/lowering of soil capability/productivity through introduction of gravels at depth into upper horizons on agricultural lands.
Erosion	- loss of topsoil through wind and water erosion.
Compaction, Pulverization, and Rutting	- degradation of soil structure; - loss of soil capability/productivity; - drainage disruption.
Trench Subsidence	- drainage disruption; - disruption of agricultural practices.

Since many of the soils encountered on the route are fine textured, they are highly susceptible to compaction and rutting. These soils, and some of the poorly drained Gleyoslic and Organic soils

would be most adversely affected when wet. This makes the need to properly identify and mitigate work on wet soils an important consideration in Alliance's mitigation plan.

4.4.2 Mitigative Measures

Alliance has proposed a number of measures to mitigate the adverse impacts of the Project on soils.

Table 4-3 summarizes the methods Alliance submitted for mitigating the adverse impacts identified above.

Table 4-3
Mitigative Measures for Soil Impacts

Mixing	- specific stripping widths, depths, and techniques are denoted on the alignment sheets; - topsoil will be stripped and salvaged in appropriate areas; - use three-lift soils handling or overstripping procedures in soils with saline or gravelly lower layers; - pick stones to the equivalent of surrounding topsoils and subsoils; - backfill soils in the correct sequence; - ensure appropriate distances between subsoil and topsoil piles; and - suspend trenching if trench sloughing occurs, and ensure lowering-in and backfilling are scheduled in order to minimize the length of time the trench is open.
Erosion	- revegetation with cover crops; - installation of permanent surface berms; - straw crimping; - roll-back of slash; - suspension of topsoil stripping in high winds if drifting or topsoil loss is evident; and - tackify topsoil windrows on wind erodible soils as identified on alignment sheets with biodegradable, non-toxic tackifiers.
Compaction, Pulverization, and Rutting	- suspend construction activities during wet weather; - rip compacted subsoils to 30 cm depth with a multishank ripper, then disc, chisel plough or cultivate to provide smooth surface prior to topsoil replacement; - use a subsoiler plough on compacted subsoils that are under a competent sod layer; - blade rutted subsoils or topsoils flat prior to topsoil replacement on cultivated land; and - lightly cultivate rutted soils on vegetated land and re-seed.
Subsidence	- compact subsoils during backfilling to minimize amount of spoil to be feathered over stripped area on agricultural lands; - leave slight crown over trench to compensate for settlement; and - place larger crown over trench in forested lands, especially where soils are frozen during construction.

One of the most important measures for mitigating impacts to soil productivity on cultivated land is the stripping of topsoils. Alliance provided criteria for use of different stripping widths and methods based on land use and vegetation types. Essentially, stripping widths are increased in cultivated areas where the topsoil is directly exposed, and reduced in well-sodded areas such as native prairie where the vegetative cover provides some protection to the soil and where the conservation objectives emphasize protection of rare plant communities rather than soil productivity. Organic soils in muskeg areas would not normally be stripped unless mineral subsoils are found in the upper 1.0 m of trench depth. Special stripping methods such as the three-lift would be used where poor quality lower subsoils exist, and mixing with upper subsoils could degrade the overall soil capability. Preferred stripping methods were delineated on the alignment sheets, and alternative stripping methods and criteria for their use were identified.

Alliance submitted that normal practice on cultivated lands would be to strip the trench and spoil side only. During the regional hearing in Fort St. John, concerns were expressed about non-stripping of topsoils on the working side of the trench in cultivated areas. Alliance indicated that, although there can be difficulties with working on the topsoil, it has been common practice in the pipeline industry, and with proper implementation of mitigation measures it would be possible to mitigate any potential impacts to soil productivity.

Frozen soils are often more susceptible to admixing during stripping, primarily due to dislodging large frozen lumps. Some landowners expressed concern about winter construction on agricultural lands. Alliance indicated that, for the purposes of soil stripping, the winter season was not defined by calendar date, but rather by soil condition. Overall, in Alliance's originally proposed schedule, approximately 8.5 km of agricultural lands along the right-of-way were included in winter construction spreads.

In order to avoid the stripping of frozen soils, Alliance indicated that it would pre-strip soils on agricultural lands where access during non-frozen conditions was possible. However, Alliance also identified frozen topsoil stripping procedures for situations where pre-stripping was not practical. Specifically, Alliance indicated that stripping depth accuracy would be ensured by ripping or scarifying the topsoil along the trench line using multiple, shallow passes with equipment capable of fine depth control.

Admixing of soil can also result from storage of subsoils on unstripped topsoil in cultivated areas during winter. In order to avoid or minimize the potential for admixing, Alliance submitted that it would smooth the microtopography in the subsoil storage area to provide a clean interface between the topsoil and subsoil. Where available, snow would also be used to delineate the storage interface. Alliance would also undertake an assessment of topsoil quality and soil productivity in agricultural areas where frozen topsoil stripping was conducted. Alliance has further committed to use appropriate remedial measures should any problems be identified.

Since many of the soils encountered along the pipeline route are susceptible to wind erosion, Alliance identified several conditions which would indicate that tackifiers are required. The alignment sheets identify areas covered by susceptible soils, but Alliance recognizes that specific conditions would also dictate the need to apply special wind erosion control measures. Erosion control may be required for topsoil and spoil storage piles, especially during winter construction where soil is pre-stripped, or

where it would be necessary to wait for spring to replace topsoil. The tackifiers used are to be biodegradable, non-toxic, and organic.

Many of the soils along the proposed route are also highly susceptible to compaction and rutting. Alliance has provided a list of wet soil indicators for the implementation of summer and winter contingency measures as outlined below:

- rutting of topsoil to the extent that admixing may occur;
- excessive wheelslip;
- excessive build-up of mud on tires and cleats;
- formation of puddles; or
- tracking of mud down the road as vehicles leave the right-of-way.

The contingency measures that would be implemented if and when one of the indicators occurred are as follows:

Summer Contingencies:

- restrict construction traffic where feasible to equipment with low ground pressure tires;
- work only in non-problem areas, such as well-drained soil or well sodded lands until conditions improve;
- install geotextiles, swamp mats or corduroy constructed from non-merchantable timber in problem areas;
- consider stripping topsoil from the working side in problem areas;
- suspend timber skidding operations or implement other measures if the potential exists for merchantable timber to be damaged through contact with wet or muddy soils; or
- suspend construction until soils dry out.

Winter Contingencies (similar to summer with the addition of):

- postpone construction until evening or early morning when ground conditions are frozen;
- employ frost inducement measures such as snow packing or ploughing to increase the load bearing capacity of thawed ground; or
- suspend construction until soils freeze.

Alliance did not provide relative measures or parameters for the contingency indicators. The Company stated that it was not aware of analytical, measurable criteria which could be applied to the indicators, and felt that it may not be possible to develop measurable criteria that would be satisfactory to the Board. Instead, the Company indicated that it would rely on the sound judgement of field staff in applying the criteria at the time of construction. The Company also committed to notify appropriate government agencies and the Board as soon as feasible, once contingency measures have been implemented.

Alliance has submitted that it intends to employ environmental inspectors with sufficient training and experience to be able to identify existing or potential soil protection problems during construction. The inspectors will be directed to seek advice of specialists as often as necessary to select the most appropriate mitigation measures. Alliance has also committed to retain a soil specialist who would normally be in contact with the environmental inspectors via phone and facsimile. The soil specialist

would also be available to visit problem sites and provide direct advice to the environmental inspectors.

Even with the appropriate application of mitigative measures some residual effects would be anticipated, but Alliance submits that there are no situations where there is a high probability of permanent or long-term effect of high magnitude that cannot be technically or economically mitigated or compensated. Possible residual effects on soils would be:

- minor mixing and admixing of topsoil with subsoils;
- minor surface erosion until cover crop has established;
- some pulverization and loss of soil structure;
- possible trench subsidence depending on local conditions; and
- need to dispose of larger stones and bedrock.

Alliance has also recognized that some of the mitigation measures for pulverized soils are actually restorative, since impacts would already have occurred in certain cases. The Company has committed to employ the appropriate mitigative measures first and resort to restoration only as a last resort.

Conclusions and Recommendations

The information provided by Alliance with respect to potential environmental effects upon soils, and the majority of the proposed mitigation and monitoring measures relevant to the potential adverse effects is satisfactory. However, in the absence of measurable criteria for determining when to employ contingency measures in wet soil conditions, it is imperative to have a qualified soils specialist on-site when there is potential to encounter wet soil conditions. The soils specialist should have a degree with a specialization in pedology, experience with the types of soils to be encountered, and be familiar with pipeline construction methods and the potential impacts of construction activities on wet soils. The soils specialist should have the authority to make decisions in the field in consultation with the construction supervisor, regarding soils protection measures, including the decision to shut down construction.

Upon assessment of Alliance's proposed contingencies and criteria for work on cultivated lands in wet soil conditions, it is thought that unless full-width stripping has been undertaken, the only viable contingency for work on cultivated lands in wet soil conditions is the suspension of work activities. Similarly, in areas of native prairie, construction should be halted if any one of the indicators occurs. These measures would provide a satisfactory level of confidence that soils would be properly protected should wet conditions be encountered during construction. In this regard, it is also recommended that any certificate issued to Alliance be conditioned as follows:

Recommendation 3

Unless the Board otherwise directs, the Company shall:

(a) ensure that the detailed environmental inspection plan submitted to the Board for approval (pursuant to Recommendation 35), includes the identity, qualifications and

experience of the soils specialist(s) that will be responsible for ensuring proper identification of the indicators in (i) through (vi) of paragraph (c);

(b) ensure that the soils specialist(s) identified in (a) will respond in a timely manner, to the site on any spread where wet soil indicators are likely to occur, and shall have at least equal authority to that of the construction supervisor for matters regarding the implementation of contingencies and shutdown, as well as the recommencement of construction activities following the suspension of work;

(c) implement appropriate wet soils contingency measures as described in its application or as otherwise adduced in evidence, if one of the following indicators occurs:

(i) rutting of topsoil to the extent that admixing may occur;

(ii) excessive wheelslip;

(iii) build-up of mud on tires and around cleats;

(iv) formation of extended puddles on the workspace;

(v) excessive tracking of mud along the road as vehicles leave the right-of-way; or

(vi) any other indicator that may be used to determine the potential for construction to cause an adverse effect on soils in wet condition;

(d) suspend construction in areas of native prairie if one of the above indicators occurs;

(e) unless otherwise directed by the landowner, suspend construction on cultivated land if one of the above indicators occurs and full-width topsoil stripping has not been undertaken; and

(f) report forthwith to the Board which wet soils contingency measures were implemented, and why they were implemented.

It is also recognized that post-construction monitoring of the soil and crop conditions is essential to determine whether the mitigation and reclamation measures for soils were properly applied and effective. Monitoring measures for soil and crop conditions should form part of Alliance's reclamation and monitoring plan and the results should

be included in the post-construction reports required pursuant to recommendations 36, 37, and 38.

Based on the information provided, and with the implementation of the proposed mitigation measures and recommendations, it is concluded that the Project is not likely to cause significant adverse environmental effects on soils.

4.5 Vegetation

The construction, operation, and maintenance of the proposed pipeline and related facilities would have the potential to cause the following adverse environmental effects on vegetation:

- loss of rare or unique plant species;
- alteration or partial loss of rare or significant vegetation communities;
- introduction or spread of weeds;
- alteration or clearing of forest;
- loss of vegetation important to wildlife; and
- impacts on agricultural lands.

The variety of potential adverse effects that could result from the Project stem from the variety of vegetation along the proposed route. Approximately 28 per cent of the proposed mainline route and 61 per cent of the lateral routes would traverse various regions of native vegetation. The proposed Alliance route would cross the various subregions, ecoregions, and biogeoclimatic zones outlined in Table 4-4. The other 72 per cent of the proposed mainline and 39 per cent of the laterals would pass through agricultural lands. Given the variety of vegetative regions along the proposed route, the potential effects of project activities would vary from site to site.

Table 4-4
Vegetation Regions Traversed

British Columbia Biogeoclimatic Zone	Alberta Subregions	Saskatchewan Ecoregions
Boreal White and Black Spruce	Lower Foothills	Aspen Parkland
Dry Mixedwood (subregion)	Dry Mixedwood	Moist Mixed Grassland
	Central Mixedwood	Mixed Grassland
	Central Parkland	
	Peace River Parkland	

In order to identify the potential effects of the pipeline construction and operation activities on vegetation, Alliance prepared its assessment based on a rare species survey and a community typing survey. Alliance initiated the studies with a literature review in order to compile data on known or potentially rare plant species and communities in the vicinity of the proposed route. Following the literature review, field surveys were conducted along selected segments of the proposed route. During the initial mainline surveys Alliance sampled 141 segments of native vegetation totalling 145 km. Additional field surveys were later conducted along both the mainline and lateral routes. Selected survey segments were chosen, attempting to ensure that all major vegetation community types were

surveyed, and that the selected segments tended to be areas representative of their respective vegetation communities. Survey segments were also chosen to ensure that all sensitive communities and habitats were included, such as native prairie, wildlife habitat, and environmentally significant areas.

4.5.1 Potential Environmental Effects

4.5.1.1 Loss of Rare or Unique Plant Species

Many of the routine procedures that would be conducted in the construction and operation of the pipeline, such as clearing, topsoil stripping, and right-of-way traffic, have the potential to cause the loss of rare or significant plant species. In order to estimate the potential magnitude of rare vegetation loss the Project would cause, segments along the proposed pipeline route were surveyed for rare vascular plant species. The survey methodology varied depending on the type of vegetation community being surveyed. In regions where the vegetation appeared to be fairly homogeneous, or the potential for rare plants seemed low, the rare plant survey was only conducted approximately every 250 m along the right-of-way. Those vascular plant species found along the survey segments were compared with lists of special status species to determine whether they were a rare or unique species. Then, in order to estimate the potential magnitude of the impact on the rare vascular plant species, an area up to 500 m on each side of the right-of-way was surveyed to see if the species occurred outside the area of disturbance.

The surveys found a variety of rare species that would potentially be impacted by the construction and operation of the proposed pipeline. Initial surveys found 23 rare or potentially rare species that could be affected and further surveys, conducted along both the mainline and the laterals, found 52 species. Each of the identified species has a provincial status ranking based on its abundance. The ranks range from S1, indicating extreme rarity, to S5 indicating abundance. None of the species identified in the survey results had a ranking higher than S3, representing uncommon or rare. Out of the 52 species indicated, three had a provincial ranking status of S1, 25 were ranked as S2, and five were ranked as S1S2. In total, rare plant species were located in over 291 locations along the proposed route during the surveys. Mitigative measures will be necessary in order to avoid the loss of individuals or populations of any of the noted species. Saskatchewan Environment and Resource Management ("SERM") requested that, where rare species are encountered during construction, Alliance consult with SERM and noted the recommended 25 m buffer zone.

4.5.1.2 Alteration or Partial Loss of Rare or Significant Vegetation Communities

As shown by Table 4-5, the Project would also have the potential to alter or cause a loss of significant vegetation communities. In order to identify the potential impacts of the Project on rare or significant plant and forest communities along the proposed route, Alliance conducted a community typing survey. This survey identified sensitive or significant communities, ESAs, and vegetation important to wildlife that would be potentially impacted along the proposed route. The initial identification of major blocks of vegetation along the proposed route was done visually through aerial reconnaissance. After the aerial observations, representative sampling sites were used to identify and classify each community. The vegetation communities were not only identified, but those encountered were characterized by species composition, dominance, canopy cover, maturity, and other associations. Alliance found several significant vegetation communities that could be adversely affected by the Project, including: northern grasslands; aspen parkland transitions with remnant fescue grassland components; wetlands; and old growth forests. Initial surveys located two significant northern

grassland areas that would be traversed by the pipeline. Alliance submitted that one of the areas (KP 578.7 to KP 579.4) would be avoided by re-routing, but that it would be unsuitable, based on vegetation surveys, to avoid the other (KP 595.5). Alliance submitted that other mitigative measures would be taken at that location to minimize disruption of the significant northern grassland area. The proposed route would also cross five remnant native prairie Saskatchewan Wetland Conservation Corporation sites and three fescue grassland sites.

Table 4-5
Significant Vegetation Communities of Concern

Community Type	Affected Area / Location
old growth forest	950 ha of forested land
northern grasslands	KP 578.7 to 579.4 and near KP 595.5
various plant communities	KPs 1069.0, 1095.9, 1262.7, and 1333.6 to 1336.0
wetland	vicinity of KP 943.3
remnant native prairie	425 ha of native prairie
transitional aspen parkland-grassland	vicinity of KPs 882.2, 873.6, and 877.6

4.5.1.3 Introduction or Spread of Weeds

The introduction or spread of weeds to new areas is a serious concern, especially on agricultural lands. The concern for the potential spread of weeds was often expressed by landowners, communities, and environmental groups during public consultation meetings and through letters of comment. Introduced weeds, or undesirable species in general, could have the potential to overtake the natural vegetative species, resulting in a loss of natural vegetation, reduced crop yields, loss of food for wildlife, and/or a loss of biodiversity. Weed infestations were noted as survey teams conducted their rare species and community typing surveys. Provincial weeds of concern and introduced grass species listed as aggressive were specifically targeted and recorded. Alliance found a total of 28 weed species of concern, and five plant species of agronomic concern, in the vicinity of the proposed pipeline route. Alliance submitted that major weed species of concern would include those species recommended for eradication by provincial authorities, such as purple loose strife, leafy spurge, tartary buckwheat, and red bartsia. The most common weeds of concern, as noted during public consultations, were scentless chamomile, toadflax, and tansy.

4.5.1.4 Alteration or Partial Loss of Forest and/or Vegetation Important to Wildlife

During the community typing surveys conducted by Alliance, many forested regions and sections of vegetation important to wildlife were identified that could be potentially affected by the Project.

The loss of forest due to clearing activities would have the potential to affect the forestry industry. The proposed mainline would traverse four sections of land held under FMAs, six sections associated with Coniferous Timber Licenses ("CTLs"), and one section under Consultative Notation ("CNT"). Alliance estimated that approximately 950 ha of forested lands would be affected by the construction of the pipeline. Of these 950 ha, approximately 300 ha of merchantable coniferous and deciduous timber would be affected by clearing activities. The clearing of the mature timber could potentially lead to reduced revenues, while the clearing of the younger timber, which could not yet be harvested,

could potentially lead to a reduction of merchantable timber in the future. In addition, Alliance would plan on construction in the Saddle Hills Area (KP 95 to KP 125) during a time when there would be active timber harvesting by Weyerhaeuser Canada Ltd. This conflict would require consultation between Alliance and Weyerhaeuser to ensure that no merchantable timber would be wasted, and that neither operation would be interfered with by the other.

Of specific concern would be the alteration or partial loss of old growth forests in the vicinities of KP 110 to KP 120, KP 228 to KP 250, KP 315, and KP 450 to KP 465. These forests represent unique and significant ecosystems. As well, forests provide critical vegetation to many species of wildlife. Therefore, clearing large stands of trees could have serious effects on wildlife. Through a letter of comment, a landowner expressed concern with the potential impacts the construction and operation of the pipeline could have on land which is maintained as wildlife habitat. Specific concerns raised were the potential for increased access, the possible reduction in the value of the land, and the permanent loss of forest. In total, with the proposed Alliance Pipeline and the existing Peace Pipeline on the land, 48 m (156 ft) of forest would have to be cleared, of which 30 m (100 ft) would have to remain so for the life of the pipeline. The landowner requested special consideration due to the sensitive nature of his land compared to farm land and Alliance submitted that further consultation would be arranged with the landowner so that a mutually agreeable solution could be reached. Forests are not the only vegetation of importance to wildlife that could be potentially affected by the proposed route. Several survey segments contain vegetation important to wildlife, including: thorny buffaloberry or hawthorn stands, which provide food for loggerhead shrikes; lichens which are used by woodland caribou; and ephemeral wetland used by waterfowl and amphibians. Specific impacts on wildlife are discussed in section 4.8.

4.5.1.5 Impacts on Agricultural Lands

The proposed pipeline route would intersect large amounts of cultivated land, hay fields, and improved pasture. Approximately 72 per cent of the mainline and 39 per cent of the laterals traverse agricultural lands. Potential effects on agricultural lands include: crop damage; the introduction or spread of weeds; property damage; disruption of irrigation systems; safety of livestock; and movement of equipment and livestock in the vicinity of the right-of-way.

Construction on the right-of-way could temporarily interfere with any encountered irrigation systems. The pipeline would not cross any Alberta Irrigation Districts, but it would pass through seven Conservation and Development Areas and three Water Users' Associations in Saskatchewan. The types of irrigation systems that could be used in the vicinity of the pipeline are centre pivot, wheel flow, and flood irrigation.

The proposed pipeline would also traverse 19 grazing management areas where disruption of livestock could potentially occur, including three sections of land in Saskatchewan under the control of the PFRA. Each of these sections contain native prairie. SERM expressed concern over the impacts the Project could have on the native grasslands, specifically the impacts of stripping, and which mitigation measures would be used in these areas. The PFRA did not express any particular concerns regarding the potential impacts of the proposed pipeline, but it did issue a copy of typical measures that are often conditions of a right-of-entry licence such as the one Alliance would have to obtain in order to construct on any PFRA-operated lands. The typical measures described would attempt to mitigate any effects on vegetation on PFRA lands, and attempt to minimize any interference the construction and

operation of the pipeline might cause on any existent operations occurring on the lands. The PFRA would have the right to condition Alliance to any mitigative measures that it felt were necessary to protect its lands from adverse environmental effects potentially caused by the construction and operation of the pipeline.

As well, depending on the potential magnitude of disturbance, harvest crops could be affected for one or more seasons. Potential effects are that crop yields could be reduced, or that the affected lands would produce crops out of sync with the rest of the field. Common crops that would occur along the proposed route are: wheat, oats, barley, canola, sunflower, flax, and mustard.

4.5.2 Mitigative Measures

Alliance submitted a range of mitigative measures but did not identify where each specific measure would be applied. Alliance stated that the environmental effects on vegetation that could be imposed by the construction and operation of the pipeline would best be minimized if mitigation measures were flexible. There would be many variables to be considered when choosing an appropriate mitigative measure(s) including the status of the species involved, the abundance and stability of the species in the area, and the proximity of the species to the area of disturbance. For example, species with S1 or S1S2 status would be considered for more complete protection than those species with a status of S2 or S2S3. Alliance's proposed mitigative measures are outlined in Table 4-6.

Table 4-6
Mitigative Measures for Protection of Vegetation

Mitigative Measure	Description
Extended Field Studies	Often, extended field surveys would precede other measures to determine whether or not the species of concern would be found beyond the right-of-way, or to observe pre-construction conditions, so that afterwards they could be restored. This would be important for irrigated lands.
Re-routing or Re-alignment	These measures would allow the pipeline to go around sensitive or rare species or communities. Re-routing would involve moving the entire right-of-way; re-alignment would involve moving only the pipeline trench within the surveyed corridor.
Narrowing of the Workspace	Successful if doing so means that the species of concern would no longer be disturbed.
Traffic Management Plan	In areas of sensitive vegetation, such as native prairie, travel would be, whenever possible, by foot or all-terrain vehicles. Specific plants and communities would be flagged so that they could be avoided.
Salvage and Transplant Technique	Small shrubs and willows that provide for wildlife along streambanks and riparian areas would be salvaged and replanted after construction. When rare plant species could not be avoided, they would also be salvaged and replanted.

Re-seeding	After construction, native seed mixes, where possible, or commercial seed mixes would be planted. Agricultural lands would be revegetated to the landowner's request, or with an appropriate mix for the ecoregion. Drill seeding would be used whenever possible.
Boring and Ramping	This would involve boring beneath sites containing rare species or significant communities or using ramps, temporary bridges, and mats to protect the vegetation.
Natural Reclamation	At trial locations along the right-of-way, segments would be left to revert back to their natural states on their own. These sites would be monitored after construction to evaluate the technique. The sites would be chosen using criteria such as: sensitivity of species in area; extent of disturbance; and the potential for soil erosion.
Clean Construction Equipment	Frequent inspections, hand cleanings, and weed clean-off stations would be used to help prevent the spread of weeds.
Full ROW Topsoil Stripping	This would be done where known noxious or restricted weed infestations are found.
Certified/High Quality Seed Mixes	All seed mixes would be accompanied by a certificate of analysis for weed content to ensure quality. Where feasible, native seed mixes would be used to ensure only native vegetation regrowth.
Use of Timber Salvage Plans	The objective of these plans would be to minimize the impact of the pipeline on the forestry land base, and maximize any profits that could be made off of the merchantable timber. All merchantable stands of timber would be harvested and salvaged at the time of construction.
Advanced Notification	This would give the owners of agricultural lands time to move livestock away from the areas of activity. It would also allow for meetings with the forestry industry, in order to finalize salvage agreements and other details.

Many of the mitigative measures outlined by Alliance could be applied whether the Company was trying to reduce the loss or disturbance of a rare plant species, of a section of vegetation important to wildlife, or of an entire significant vegetation community (Table 4-7).

Four of the mitigation measures proposed by Alliance were presented as experimental reclamation measures: natural reclamation; native seed collection and planting; rare plant salvage and transplant; and native vegetation restoration in areas adjacent to disturbed areas, in order to prevent the spread of weeds. These mitigative measures are not considered common practice in pipeline construction, or have had limited success in the past, and would be conducted on trial sites and monitored as part of the follow-up programs to judge their success. Trial site locations would be selected according to the following criteria: the status of the species in the area; their propagation methods; their ability to regenerate; their ability to store the plants or their seeds; the expected traffic rate of the area; and the survey results.

Table 4-7
Mitigative Options / Vegetation

Mitigation	Rare Plant Species	Significant Communities	Intro. and Spread of Weeds	Loss of Forest/Wildlife Vegetation	Impacts on Agricultural Land
Re-routing or Re-alignment	X	X		X	
Narrowing down of workspace	X	X		X	
Traffic Management Plan	X	X		X	X
Salvage and Transplanting	X	X		X	
Re-seeding	X	X	X	X	X
Boring and Ramping	X	X			
Natural Reclamation	X	X		X	
Full ROW topsoil stripping					X
Keeping Equipment Clean			X		X
Use of Certified Seed Mixes	X	X	X	X	X
Timber Salvage Plans				X	
Advanced Notice				X	X
Backfills, plugs, and bridges					X
Minimum Depth					X

Conclusions and Recommendations

It is important that the mitigative measures outlined by Alliance for avoiding the loss of sensitive plant species or the loss or alteration of significant vegetative communities be applied properly and effectively on a site-specific basis. Accordingly, it is recommended that any certificate issued be subject to the following condition:

Recommendation 4

The Company shall, at least 30 days prior to the commencement of construction of each construction spread (as identified in the application), submit to the Board, for each previously identified site with a plant species with a designated status and each previously identified significant vegetation community:

(a) the mitigative option selected for that site (from the list of options provided in the GH-3-97 evidence); and

(b) a description of the appropriateness of that option based on site-specific conditions and the suitability of the option for the species or community.

Due to the fact that Alliance surveyed only selected segments of the pipeline route and seasonal variations can make observing plants difficult, it is possible that Alliance could encounter previously unidentified significant plant communities or species with designated status, during the construction phase. In order to ensure protection of rare plants in such circumstances, it is recommended that any certificate issued be conditioned as follows:

Recommendation 5

If any previously unidentified significant plant communities or plants with a designated status are discovered during construction, the Company shall, in consultation with the Board and other appropriate regulatory agencies, avoid, relocate, or restore these features or areas in accordance with the procedures described in its application or as otherwise adduced in evidence before the Board in the GH-3-97 proceeding.

It is noted that Alliance has proposed four reclamation measures which it considers experimental in nature. It is expected that any monitoring program designed pursuant to the recommendations set out in Chapter 5 of this CSR would include measures to evaluate the effectiveness of any experimental reclamation trials.

With the proper implementation of Alliance's proposed mitigative measures and incorporation of the above-mentioned recommendations, the Project is not likely to cause significant adverse environmental effects on vegetation.

4.6 Hydrology

4.6.1 Potential Environmental Effects

The construction, operation, and maintenance of the Project would have the potential to cause adverse environmental effects on ground and surface water. Alliance identified the following potential effects on hydrology:

- the alteration of natural flow patterns;
- the alteration of drainage projects; and
- the interruption of recreational or commercial use of navigable waterbodies.

Effects on watercourses that are related to fish and fish habitat are discussed in section 4.7.

Alliance submitted that pipeline construction activities, such as grading, trenching, and windrowing, would have the potential to alter the natural flow pattern of watercourses, drainages, or muskeg areas. Construction, especially in flat low-lying areas, would also have the potential to destroy or alter drainage projects. Drainage projects consist of a series of ditches and canals that could be easily altered if the ditches were not properly crossed or if the slope of the area was not returned to a pre-construction state.

The DFO-CCG identified that 56 navigable watercourses would be crossed by the mainline and lateral pipeline routes. Recreational or commercial use of navigable waterbodies could be disrupted wherever Alliance conducted instream activities. Alliance identified this as a potential problem for most intermediate to large watercourses, but especially for the Peace, Athabasca, and North Saskatchewan Rivers due to their size and proximity to population centres.

Hydrology can also have effects on the pipeline. Wetlands and muskeg often pose constraints to the routing and construction process. It is not usually desirable to locate a pipeline in such areas because of the increased buoyancy of the pipeline and greater potential for corrosion. Wet areas such as muskeg also limit construction activities to the extent that, in many areas, construction can only take place in frozen ground conditions when work equipment can gain access.

4.6.2 Mitigative Measures

In order to reduce the potential alteration of natural flow patterns or drainage projects that the construction of the Project could cause, Alliance has submitted that the right-of-way would be restored as close as possible to pre-construction conditions. An on-site investigation would be conducted prior to construction in order to determine the drainage pattern and, following construction, all work materials and ramps would be removed. In cases where landowners request that ramps not be removed, culverts would be installed. The trench would be built so as to prevent flow along the trench line using subdrains, trench breakers, diversion berms, and cross ditches to divert surface and groundwater flow away from the right-of-way. Further details regarding these mitigative measures are found in Volume V of Alliance's application. With respect to drainage projects, Alliance has committed to consult with all water conservation groups that may be affected by the pipeline. In order to minimize effects on drainage projects, Alliance has submitted that, wherever feasible, it would bore drainage ditches and canals.

Alliance has submitted that it would apply to the DFO-CCG for approval of any instream activities and would abide by the conditions of any such approval. If Alliance received approval from the Board, the DFO-CCG indicated that it would then consider any application made by Alliance to cross navigable watercourses.

Alliance submitted that it designed the pipeline route to avoid wetlands where practical. In areas where the Project would cross a watercourse, wetland, muskeg, or other wet area, the Company must consider the buoyancy of the pipeline. Swamp weights, concrete coated pipe, or other similar measures would be required to prevent the pipeline from rising to the surface. In order to ensure protection of the pipeline from premature corrosion, the Company would use cathodic protection and ensure that the pipe is properly coated.

Conclusions

Based on the information provided, including Alliance's proposed mitigative measures, it is concluded that the Project is not likely to cause significant adverse environmental effects on hydrology. It is also concluded that the hydrological environment is not likely to cause significant adverse environmental effects on the Project.

4.7 Fish and Fish Habitat

Alliance identified 505 watercourses that would be traversed by the pipeline, more than 70 of which are classified as sensitive. Appendix VII provides a summary description of the proposed sensitive watercourse crossings for the Project. A variety of fish species are found in the watercourses, many of which are sport fish species. Small forage and benthic dwelling fish are common in all regions covered by the Project, whereas coldwater sportfish such as bull trout, rainbow trout, whitefish, and Arctic grayling predominate in the western portion of the route. Coolwater species such as walleye, sauger, and northern pike are common in the eastern portion. Species of special management concern are also found in the Project area. The bigmouth buffalo and lake sturgeon, both of which are of national concern, are listed by COSEWIC. Bull trout have significance at the provincial level in B.C. and Alberta. Species of regional concern are also identified by Alliance in the Aquatic Resource and Habitat Assessment listed in Appendix V.

Detailed habitat assessments and aquatic resource inventories were conducted by Alliance in the vicinity of the proposed pipeline crossings. The assessments included general watercourse characteristics, bank and bed characteristics, erosion, water flow, water quality, land use, and special habitat features. Detailed habitat mapping and fish sampling were also undertaken. Alliance used these features to determine watercourse sensitivity. They are described more fully in Alliance's Aquatic Resource Assessment.

4.7.1 Potential Environmental Effects

The potential environmental effects on fish and fish habitat were summarized by Alliance in five general categories:

- direct habitat alteration;
- increased sediment loads and sedimentation;
- blasting mortality;
- disruption of streamflow; and
- interbasin transfer of aquatic organisms.

For those crossings which would be constructed using an open cut or isolated techniques (flumes or dam and pump methods), the Project could directly alter the fish habitat in the short term. Alteration of the habitat can be persistent if streambeds are not properly recontoured and banks restabilized.

Sediment loading in the water column can cause behavioral, physiological, or lethal effects on fish including: decreased survival of fish and eggs, increased stress, modification of food organisms available during critical life stages, and interference with natural movements. Deposition of sediment can also cause adverse effects, including: reduction of the porosity of the stream bed which could interfere with developing embryos and benthic communities, reduction of the available inter-gravel habitat for juveniles, alteration of invertebrate habitat and populations, and reduction of overwintering habitat.

Alliance has noted that some proposed crossings would likely require blasting where non-rippable bedrock is near the surface. Direct mortality to fish and eggs could occur as a result of blasting, if proper mitigation is not applied.

Disruption of stream flow could occur with the use of open cut or isolated methods, if proper contingencies are not undertaken. Stresses could be put on aquatic organisms if water flows are reduced or even cut-off from the river channel downstream of a crossing site. In winter conditions, where flows and oxygen levels could already be low, the aquatic resources may be even more sensitive than otherwise.

Water withdrawals for hydrostatic testing of the pipeline would be undertaken by Alliance. If water is removed at excessive rates or volumes, particularly in low flow winter conditions, adverse impacts could result on fish resources. If the intake pipes are not screened properly, fish could be entrained as well. The discharge of hydrostatic test water also has the potential to cause erosion, introduce pollutants, and could result in the interbasin transfer of aquatic organisms.

Due to constraints imposed by the environment, mainly inability to work in many muskeg areas during unfrozen ground conditions, Alliance identified several watercourse crossings which would be constructed in winter. Some of the crossings would be constructed during the sensitive time period for fish species. Potential for erosion and sedimentation after completion of construction could also extend into sensitive time periods during the spring if proper short-term reclamation were not undertaken before spring runoff began.

There is also potential for the environment to adversely impact the Project at watercourse crossings. Specifically, downcutting or lateral erosion of rivers could result in exposure of the pipeline, which would make the pipe more vulnerable to damage.

4.7.2 Mitigative Measures

Alliance's stated objectives for the protection of watercourses during crossing activities are to:

- minimize siltation;
- protect fish habitat;
- maintain streamflow; and
- prevent contamination and pollution of the water.

Alliance also indicated that watercourse bed and banks would be restored as close to pre-construction conditions as possible.

The primary methods available for mitigating construction-related impacts would involve isolating construction activities from the watercourse and timing instream work activities to occur outside the sensitive period for fish. The former includes directional drilling, which can eliminate the need for instream work. Further, Alliance provided a summary of 40 proposed measures for the protection of fish and fish habitat. The measures address the following areas:

- schedules and crossing methods;
- vehicle and equipment crossing;
- additional working space requirements;
- clearing;
- siltation control measures;
- pipe installation and testing;
- blasting;

- bank protection; and
- reclamation.

Generic crossing procedures were described for each open cut, isolated, or directionally drilled crossing technique being considered. In an effort to derive site-specific mitigative measures that would enable Alliance to achieve its stated objectives, the Company consulted directly with representatives of DFO-Habitat. The consultations between Alliance and DFO-Habitat continued throughout the Board's hearing process, with numerous meeting summaries and copies of correspondence being filed on the hearing record and in the Public Registry. Partly as a result of these consultations, Alliance produced detailed crossing plans for 63 of the proposed crossings of sensitive watercourses. The plans were based on site-specific information and were designed to be responsive to the requests of DFO-Habitat.

Alliance proposed directional drilling as the preferred crossing method at 24 of the sensitive watercourses. Other isolated methods were proposed at 17 sensitive crossings and open cut was proposed for 22 sensitive crossings.

If blasting is required in any fish-bearing watercourses, Alliance submitted that it would comply with DFO-Habitat's *Guidelines for the Use of Explosives in Canadian Fisheries Waters* to mitigate any potential adverse impacts.

To date, the proposed crossing of the Wapiti River has not been finalized. Alliance indicated that the instream construction window of 15 July to 15 August coincides with historically high water flow periods. Alliance submitted that it is not geotechnically feasible to directionally drill this crossing and the Company proposes to use an open cut technique during the instream construction window. However, Alliance would prefer to undertake instream construction at this crossing outside of the instream construction window in the fall, when water flows are usually lower. Although a possible crossing method has been identified, Alliance has indicated that discussions with DFO-Habitat are ongoing with respect to the timing of this crossing.

Alliance proposes to cross several watercourses in winter, during the sensitive period for certain fish species. Alliance submits that winter construction would be required in muskeg and similar terrain because access and construction on the upland areas would not be feasible in unfrozen conditions. Crossings of this nature would be directionally drilled or isolated using dam and pump, or flume methods. DFO-Habitat expressed concern about these proposed crossings, including a request for further information on how Alliance would mitigate the potential for increased erosion and sedimentation of watercourses resulting from spring runoff. In response to DFO-Habitat's concerns, Alliance proposed the further mitigative measures described in Table 4-8. These measures are detailed in Alliance's submission to DFO-Habitat and the Board, dated 20 April 1998. This submission is also noted in the Public Registry. These measures are focussed on protecting exposed soil and excavated spoil from erosion, and on controlling sediment from entering watercourses.

Mitigation for long-term post-construction protection of fish and fish habitat primarily relates to control of erosion and sedimentation and limiting access. Alliance's plans for reclamation at watercourses include recontouring to the original grade where possible, installation of rip-rap or crib walls for bank protection, reseeding, shrub and willow plantings, and maintenance of berms and silt fences. Access control measures would be put in place to minimize the potential for the Project to

lead to an increase in angling pressure. Specific measures for access control are discussed in section 4.8 of this report.

Table 4-8
Sediment and Erosion Control Measures at Stream Crossings Following Winter Construction

Techniques	Slopes	Banks	Floodplains	Topsoil and Spoil Piles
Erosion Protection Measures				
- Preservation of Existing Vegetation	X	X	X	
- Streambank Protection		X		
- Selective Grading/Shaping	X	X		X
- Roughen Surface				X
- Coverings	X		X	X
- Spoil Containment				X
Sediment Control Measures				
- Preservation of Existing Vegetation	X	X	X	
- Benches	X			
- Berms	X			
- Diversion Ditches	X			
- Rollback	X		X	
- Sumps				X
- Sediment Filters	X			X

Alliance has submitted contingency measures to minimize the siltation of watercourses where there is a threat of an extreme precipitation/streamflow event or other circumstance which may render the existing sediment control measures inadequate. These measures include the following:

- prohibiting operation of construction equipment close to banks of waterbodies where there is a risk of sloughing, failure of the vehicle to cross, or flooding of the work area;
- excavation of cross ditches, and construction of berms to divert runoff away from watercourses; and
- placement of sandbags to help stabilize and add height to banks to prevent flooding.

Alliance identified approximately 30 potential sources of hydrostatic test water. In terms of effects caused by withdrawal and discharge of hydrostatic test water, Alliance has proposed a number of mitigative measures. The primary mitigation would be to limit withdrawal rates to less than 10 per cent of the flow or volume of any source waterbody. Alliance submitted that the Company would undertake an assessment of potential effects if withdrawals of greater than 10 per cent were required. To prevent entrainment of fish, Alliance has committed to screening intakes in accordance with federal and provincial guidelines. In order to minimize the need for further disruption of watercourses with moderate to high fisheries sensitivities, Alliance would test the pipe sections prior to installation. Discharge would be conducted so as to minimize erosion, ensure no interbasin transfer of aquatic organisms, and recover methanol or other potential pollutants.

In order to mitigate the potential impacts of the environment on the pipeline at watercourse crossings, Alliance planned the pipeline route to avoid instabilities and areas of severe downcutting or lateral erosion. Furthermore, sag bends would be placed far enough from watercourses that the risk of lateral erosion and potential for pipe exposure would be minimized. Proper sag bend placement would also ensure adequate depth of cover is achieved at the existing shoreline. The proposed watercourse crossings would also have a minimum depth of cover to mitigate against exposure for at least a one-in-100 year flood event.

Alliance anticipates a low degree of impact to fish and fish habitat overall, primarily because of the following:

- a lack of fish and suitable fish habitat at many of the proposed water crossings, particularly in the North and South Saskatchewan, and Assiniboine watersheds;
- a limited potential for downstream transport of sediment at many crossings;
- proposed use of isolated techniques at many of the sensitive watercourses;
- short construction duration and application of appropriate mitigation at each site;
- construction timing often during low flows;
- minimizing need for new access and paralleling existing linear features; and
- reclamation planned for short- and long-term erosion control.

Conclusions and Recommendations

In general, for watercourse crossings scheduled for the summer season, and outside of sensitive time periods for fish, the proposed scheduling, watercourse crossing methods, and mitigation are acceptable.

It is important to schedule instream construction for sensitive watercourses to occur during non-sensitive periods. However, there can be conflicts between watercourse timing restrictions and the best timing for construction and access in adjacent upland areas. Satisfactory mitigation methods are described by Alliance for the construction of watercourse crossings within the winter instream timing restriction. Therefore, it is recommended that any certificate issued to Alliance be conditioned to ensure use of those methods. It would also be necessary to monitor sediment transport at all sensitive watercourse crossings which are planned for winter construction. This monitoring would need to take place at times when the greatest potential for sediment loading would occur, that is, during construction and during spring run-off. Post-construction monitoring in spring would form part of Alliance's long-term monitoring program and is addressed in the recommendations in Chapter 5. As a result, it is recommended that any certificate issued to Alliance be subject to the following conditions:

Recommendation 6

For all watercourse crossings undertaken in winter which would have the potential to impact any sensitive watercourse, the Company shall ensure proper long-term control of erosion and sedimentation through the appropriate use of erosion protection and sediment control

measures as described in Table 4-8 of the Comprehensive Study Report.

Recommendation 7

For any watercourse crossings to be undertaken in winter which would have the potential to impact any sensitive watercourse, the Company shall submit to the Board, at least 15 days prior to commencement of construction of such watercourse crossings:

(a) a water quality monitoring program to be undertaken immediately prior, during, and after construction of the crossings;

(b) a contingency plan detailing the criteria for any measures that would be implemented as a result of monitoring undertaken pursuant to paragraph (a); and

(c) evidence as to whether DFO-Habitat is satisfied with any programs derived pursuant to paragraph (a) and the measures described in (b).

Although the mitigative measures presently proposed for the Wapiti River crossing, are satisfactory, Alliance has requested that the Board and DFO consider changes to the timing of construction at the crossing. It is noted that discussions are ongoing between Alliance and DFO-Habitat regarding the Wapiti River crossing at this time. The Board would require information on the final proposed technique for this crossing, and therefore recommends any certificate issued to Alliance be conditioned as follows:

Recommendation 8

The Company shall submit to the Board, at least 15 days prior to commencement of construction at the Wapiti River, confirmation of the crossing technique to be used, a detailed construction schedule for the crossing, and any undertakings which the Company has made to DFO in respect of the crossing.

It is also expected that Alliance would obtain any authorizations or approvals for the conduct of watercourse crossings from all appropriate regulatory authorities. Although copies of any permits would be kept on file as part of the requirements of Recommendation 34, it is recommended that any certificate issued to Alliance be conditioned to enable the Board and DFO-Habitat to properly track these other approvals. Such a condition would read as follows:

Recommendation 9

The Company shall submit to the Board and DFO-Habitat, prior to the commencement of construction on each spread, evidence that all

required authorizations, permits, or approvals for the conduct of watercourse crossings along the subject construction spread have been obtained.

Alliance has committed, where possible, to use hydrostatic test water withdrawal rates and volumes that fall within the generally accepted maximum limits. If Alliance encounters a situation where it does not seem possible to stay under the 10 per cent threshold, plans for water withdrawal would need to be assessed. Accordingly, it is recommended that any certificate issued to Alliance be conditioned as follows:

Recommendation 10

Where it is necessary to exceed 10 per cent of the flow or volume of a water body when withdrawing water for hydrostatic testing purposes, the Company shall submit to the Board for approval, at least 10 days prior to commencement of water withdrawal, a hydrostatic test water withdrawal plan that, at a minimum, includes the rationale for the required exceedence, the estimated amount of the exceedence, an environmental effects assessment and mitigation plan, and results of consultation with the DFO and appropriate provincial authorities.

Although Alliance has committed to conduct instream work in accordance with specific federal and provincial guidelines, in order to provide greater clarity, it is recommended that any certificate issued to Alliance be subject to the following conditions:

Recommendation 11

In any fish-bearing watercourses where blasting is to be undertaken, Alliance shall conduct blasting activities in accordance with DFO's 1996 draft document entitled "Guidelines for the Use of Explosives in Canadian Fisheries Waters".

Recommendation 12

For all water withdrawals from potential fish-bearing waterbodies, Alliance shall screen all water intakes in accordance with the 1995 DFO guideline entitled "Freshwater Intake End-of-Pipe Fish Screen Guideline".

Based on the information provided, and with the implementation of the proposed mitigative measures and recommendations, it is concluded that the Project is not likely to cause significant adverse environmental effects on fish and fish habitat.

4.8 Wildlife and Wildlife Habitat

The primary potential environmental effects of the construction and operation of the Project on wildlife and wildlife habitat would be:

- disturbance of feeding, nesting, denning or breeding habitats;
- habitat loss, change, and fragmentation; and
- increased wildlife mortality due to increased access.

Alliance conducted various surveys to determine the nature and magnitude of the impacts that the construction and operation of its pipeline could potentially have on wildlife. The surveys were generally confined to the right-of-way and up to 500 m on either side. The surveys were extended further if the situation identified that there was a high probability of the area containing habitat significant to a sensitive species such as the presence of a nearby wetland. The surveys and research focused on priority species listed as endangered, vulnerable, or threatened by COSEWIC or recognized by provincial authorities (see Table 2.1 of Volume 1 of the Wildlife Assessment). The surveys were conducted in order to assess several segments of each subregion or ecoregion along the route. As well, the surveys were not limited to searching for priority species; rather, they involved surveying critical wildlife habitats, wetland, major creeks and river valleys, and all large blocks of Crown native parkland and grassland in order to determine the potential impacts of the Project on wildlife.

4.8.1 Potential Environmental Effects

4.8.1.1 Disturbance of Feeding, Nesting, Denning, or Breeding Habitats

The construction and maintenance activities that would occur as a result of the Project could potentially disturb wildlife in important habitats such as feeding, nesting, denning, or breeding areas. Disruption of wildlife at or near these sites could cause certain of them, including fall and spring migrants, to abandon the area and potentially suffer a lower survival or reproductive rate. The proposed pipeline could potentially disturb the sensitive habitats of many different species of amphibians, reptiles, ungulates, bears, birds, and waterfowl. Some of the species identified by Alliance as being the most sensitive to the disturbance of nesting, denning, breeding, or migratory sites would be: whooping cranes, prairie ducks, various waterfowl, raptors, grizzly bears, moose, elk, deer, and caribou.

In order to estimate the magnitude of the disturbance that construction and operation could potentially have on birds, including waterfowl, at their nesting, breeding, or migration stop-over habitats, Alliance conducted numerous surveys. To accurately estimate the disturbance, Alliance conducted surveys both directly on the right-of-way and up to 1000 m away. These included a general bird survey, an acoustical bird survey, a raptor nest site location survey, wetland surveys, and waterfowl brood observations. These surveys determined that there could be numerous species of birds and waterfowl potentially disturbed by project activities, including 19 priority raptor individuals, flocks of migrating whooping cranes, and numerous species of songbirds such as warblers. As well, the proposed route could potentially disturb prairie ducks in their nesting habitats in eastern Alberta and throughout Saskatchewan, and could potentially disturb numerous waterbirds at various staging locations which, when surveyed, each individually supported over a thousand waterbirds.

Alliance also submitted that various wildlife species could potentially be disturbed at their denning sites by construction activities. Disturbance could potentially cause the affected individuals to abandon the den and suffer a reduced survival rate, due to factors such as a lack of shelter or food. Though by no means the only denning species, Alliance and various intervenors indicated that the disturbance of grizzly bears at their denning sites would be an issue due to the priority status of the grizzly bear in both Alberta and British Columbia. During bear hibernation season, which usually runs from

October/November to March/May, there is the possibility that construction activities could disturb a bear at its den site. During the survey for general mammal presence, Alliance searched for den sites, potential den sites, and signs of bear presence. On the basis of this search, Alliance indicated that grizzly bear dens would not likely be encountered during construction due to the lack of suitable denning habitat along the route. Intervenors expressed concern with the validity of the methodology used for the grizzly bear study and with Alliance's conclusion that no suitable bear denning areas would be encountered. The Western Canada Wilderness Committee ("WCWC") submitted that the Ante Creek, Bigstone, and Edson Laterals would all pass through known grizzly range and denning areas.

Known ungulate key winter range would also be traversed by the Project during months when the species would likely be present. The potential disturbance of wintering deer, moose, and elk during the construction and operation of the proposed pipeline could potentially cause any individuals disturbed to abandon the area, leading to exhaustion and abandonment of their preferred food source, therefore resulting in a reduced survival rate. Surveys were conducted in the Boreal/Foothills region to determine the use of this key range by moose, deer, elk, and caribou during the previous winter. Winter construction is proposed for four regions of Alberta at times designated as "no construction" zones due to the possible disruption of wintering ungulates. The areas of conflict consist of muskeg, and Alliance submitted that it would be more desirable to construct in these areas while the ground is frozen, which would likely conflict with the ungulate timing constraints. The disturbance of woodland caribou was identified by Alliance and the WCWC as being a sensitive issue due to its priority status.

The disturbance of a woodland caribou herd could potentially have adverse effects on the species due to low herd numbers and their extreme sensitivity to industrial development. A section of the proposed route in Alberta, between KP 318 and KP 337.4, would cross the northern corner of the Western Central Caribou Planning Area; which is inhabited by the Little Smoky Caribou herd. Survey crews did observe woodland caribou and their tracks in the vicinity of the mainline. The WCWC did not propose any specific mitigation measures, and Alliance submitted that direct contact with woodland caribou would be unlikely since construction would only be occurring in the northern periphery of the habitat.

Clearing activities related to the Project would also have the potential to impact caribou by reducing the availability of lichen, their primary food source. The majority of the Caribou Planning Area and surrounding region is composed of mixedwood forest, and therefore contains abundant amounts of lichen. Alliance submitted that the success of caribou populations has been linked to the availability of lichen forage, but did not quantify the amount of lichen which would be lost due to clearing activities.

The construction, operation, and maintenance of permanent facilities would have the potential to cause long-term disturbance to wildlife. Alliance chose compressor station locations that would be unlikely to support priority species due to habitat constraints, but other species could still be affected. The construction and operation of temporary facilities would also have the potential to disturb wildlife or wildlife habitat. The exact sites for the temporary facilities have not yet been chosen, but Alliance submitted criteria by which they would choose the sites in order to minimize any disturbance. These criteria were further outlined in section 4.2.2 on Temporary Facilities.

4.8.1.2 Habitat Loss, Change, and Fragmentation

Habitat loss or change could potentially occur along the entire length of the pipeline due to construction and clearing activities. A significant change or loss of habitat could be detrimental and could potentially lead to a reduction in the survival rate of numerous species. Of main concern would be the potential loss of nest, den, or breeding sites for priority species, since many endangered or vulnerable species are found in precise locations year after year for nesting or breeding. Therefore, should that location be destroyed or changed significantly such that it was no longer useful to the animal, it could be very difficult for the animal to find another suitable location. Although the effect of habitat loss or change would be, to some extent, felt by every species, Alliance focused its surveys on the following species that could be adversely impacted: small mammals, woodland caribou; grizzly bears; sharp-tailed grouse; seven priority-listed species of amphibians and reptiles; and songbirds such as warblers.

In order to minimize habitat loss, Alliance conducted various surveys to locate the critical habitats of priority species. Included were a sharp-tailed grouse lek survey and a songbird survey, which included a survey of the potential effect of clearing a strip of forest for the pipeline in the Saddle Hills area. The results of the songbird survey predicted a 4 per cent loss of preferred warbler and vireo habitat in the area. Recognizing that small mammals would be affected by the construction and operation of the pipeline, Alliance also conducted a ground squirrel tally and an owl pellet collection survey in order to determine small mammal distribution.

One landowner expressed concern over the potential loss of wildlife habitat on his land, which the construction and operation of the pipeline could cause. The forested, poor agricultural land would be traversed by the pipeline as it paralleled the existing Peace pipeline. The combined total loss of forest would be 47.5 m (156 feet), of which 30.5 m (100 feet) would have to remain cleared for the life of the pipeline. Alliance committed to ongoing discussions with the landowner in an effort to arrive at a resolution of his concerns.

The construction and operation of the proposed pipeline could also potentially alter wildlife habitat. For example, the construction and maintenance of the proposed pipeline could result in a reduction in the quality or quantity of wetland and of breeding habitat for priority amphibian and reptile species. Alliance attempted to avoid all ponds and lakes, but the proposed route would still traverse approximately 30 permanent and semi-permanent marshy ponds or lakes, and an estimated 517 temporary basins that could provide habitat for waterbirds and amphibians. In order to estimate the magnitude of the impact any potential habitat alteration could potentially cause, Alliance conducted various surveys including: a wetland survey; an amphibian acoustic survey; an amphibian tadpole sweep; a turtle breeding survey; and an overall herptile presence survey. Some selected wetlands were surveyed for migratory bird use and amphibians. All were surveyed for permanency and water level. The surveys found amphibian species on eight and waterfowl on 12 of the 30 surveyed wetlands. The only amphibian species identified were the wood frog, the striped chorus frog, the northern leopard frog, and the Canadian toad. The most abundant amphibian finding was in a wet meadow, 50 m away from where the proposed right-of-way would be located, where hundreds of northern leopard frog adults were found. Additional surveys indicated seven more possible breeding sites for the northern leopard frog in Saskatchewan, where it has a priority three ranking. Three of these sites were found directly on the right-of-way, and four of them were found within 300 m of the right-of-way. A wildlife ecologist from SERM indicated that the northern frog habitat potentially disturbed by

construction of the Project would quickly recolonize from adjacent areas. However, Alliance was requested to quantify the proportion of leopard frog breeding habitat traversed with respect to the amount of habitat locally available to frog communities in the area.

Alliance submitted that habitat fragmentation could also be a potential problem, since the construction of the pipeline would require the clearing of strips through mature forests. Although the resulting fragmentation could potentially have a negative impact on any species which requires or prefers mature forest habitat, the species Alliance predicts could suffer the greatest impact are some members of the warbler family, other songbirds, and the marten. Fragmentation of the forest interior could provide easier access for predators such as cow birds that parasitize warbler nests, and could result in increased wildlife disturbance, hunting and poaching. Fragmentation could also create longer-term barriers to mustelid (specifically marten) travel. During the winter, martens are reluctant to cross large open clearings such as wide rights-of-way. In this respect, where the Alliance right-of-way parallels another linear feature and clearing has taken place, Alliance indicated that the activities related to the Project would only result in affecting the habitat of less than 10 per cent of the marten population in the Saddle Hills Area.

4.8.1.3 Increased Wildlife Mortality Related To Increased Access

The construction and operation of the pipeline would require the construction of some permanent and temporary roads and trails. These, along with the actual right-of-way, could increase access into remote areas for hunters, all-terrain vehicle ("ATV") users, and other potential recreational users of the forest. The increased access could potentially lead to increased wildlife-vehicle collisions and an increase in wildlife harvest. The effects could potentially be felt by all species, but the species of primary concern are those that would most likely experience an increase in mortality due to increased hunting pressure, such as bears and ungulates, and those which could suffer adverse effects from vehicular movement on the actual right-of-way such as ungulates, ducks, small mammals, amphibians, and reptiles.

Alliance indicated that prairie duck species could also be affected since the pipeline would intersect prairie duck production habitat in eastern Alberta and throughout Saskatchewan, and therefore vehicular activity on the right-of-way during the early summer would potentially destroy duck nests, or cause nests nearby to be abandoned.

4.8.1.4 Other Potential Effects

To provide electrical power for the compressor stations the local distribution company would extend its distribution system. This would involve the construction of an additional distribution line, local transformer platform and meter. The distribution line would likely be constructed along existing roads using single wood pole construction with a height of between 10.7 m and 12.6 m, depending on terrain. The transformer platform and metering facility would be located on a compressor station site outside of the fenced area. These power lines have the potential to increase bird mortality due to collisions during their migration and the electrocution of larger birds such as raptors.

4.8.2 Mitigative Measures

The primary mitigative measures that would be taken by Alliance are outlined in Table 4-9.

4.8.2.1 Timing and Setback Restrictions

Timing and setback restrictions are established to protect animals while they nest, den, or breed. In this case, they would also protect migrating birds. General construction scheduling has been planned with consideration for sensitive periods for wildlife. In some cases, other constraints on the construction schedule may correspond with sensitive time periods and therefore setback restrictions would be required. As an example of the former, construction of the northern portion during winter in the West Central Caribou Range would reduce the risk of encountering caribou during construction. An example of the latter would be the need for Alliance to use setbacks to minimize disturbance to nesting waterfowl. Alliance submitted many restrictions in its Wildlife Assessment Report (Appendices A1-13, A1-15, A1-16, and A1-17), and recognized those identified by Environment Canada, but would not commit to all of them. Instead, Alliance submitted that, where it would not be able to follow the constraints, it would use other mitigative measures to minimize the disturbance. Alliance also submitted that, in cases where it would be forced to deviate from the restrictions, it would resurvey the area for the presence of the priority species the restriction was applied to, and consult with Environment Canada and the appropriate provincial agencies.

Table 4-9
Mitigative Measures Versus Issues (Wildlife)

Issue Mitigation	Disturbance	Habitat Loss or Change	Increased Mortality
Timing and Setback Restrictions	X		
Pre-Construction Surveys	X	X	
Re-routing	X	X	
Contingency Plans	X		
Follow Existing Linear Features	X	X	
Limit Travel Down ROW	X	X	X
Traffic Management Plan	X		X
ROW Brush Crossings		X	
No Dogs, Firearms, or ATVs	X	X	X
Reclamation		X	

4.8.2.2 Pre-construction Surveys

Pre-construction surveys would be conducted on the rationale that, for many species, the nest, den, or breeding site may differ from year to year, and therefore a pre-construction survey could verify or disprove the actual presence of those animals during the year of construction. These surveys would better enable Alliance to minimize habitat disturbance, change, or loss by avoiding confirmed nests, dens, or breeding sites, through mitigative measures such as rerouting or narrowing down the right-of-way. Pre-construction surveys, to determine the presence or absence of any nesting or breeding priority species, would be done at selected lateral and mainline valve sites, lateral compressor stations, access roads and power lines to mainline compressor stations, and temporary facilities. As well, selected locations, most with timing constraints that conflict with the construction schedule, would undergo pre-construction surveys to verify whether a priority species that was noted in previous

surveys was present. Alliance determined that, due to the limited availability of suitable sites along the route, it would not be necessary to conduct pre-clearing grizzly den site surveys.

4.8.2.3 Minor Re-routing and Re-siting

The nests, dens, or breeding sites of priority species would be avoided, if possible, by re-routing and/or re-siting. In order to minimize fragmentation, disturbance in mature forests would be kept to a minimum. If re-routing would not be a feasible choice and a known nest, den or breeding site of a priority species was found, Alliance would implement its Rare and Endangered Wildlife Discovery Contingency Plan (described below). In choosing sites for temporary facilities, Alliance would strive to keep the environmental impacts to a minimum by following the criteria submitted in response to information requests, and would be conditioned as described in section 4.5 on Vegetation.

4.8.2.4 Contingency Plans

The Rare and Endangered Wildlife Discovery Contingency Plan, outlined in Volume V of Alliance's application, lists the measures that would be followed in the event that an endangered or rare animal, or their habitat, were discovered during wildlife studies or construction. This would involve halting any work in the area until proper authorities were notified and initiating mitigative measures. Further, in the event that construction would be delayed and Alliance wished to continue construction into a timing restriction, Alliance submitted that it would consult with the appropriate provincial authorities in order to come up with alternative mitigative measures.

4.8.2.5 Follow Existing Linear Features

For approximately 80 per cent of its total length, the pipeline route would parallel existing linear features. This would reduce fragmentation, additional access, and the amount of habitat disturbance, loss, or change that the pipeline could cause. However, the paralleling of linear features could potentially cause a barrier to marten travel in the winter.

4.8.2.6 Right-of-Way Brush Crossings

Since the paralleling of existing linear features can create a barrier to mustelid movement, right-of-way brush crossings would be built in four locations where the total right-of-way width exceeded 75 m and potential mustelid movement concerns were identified.

4.8.2.7 Traffic Management Plans and Restricted Access

In order to reduce the amount of disturbance and the level of mortality directly related to the Project, Alliance has outlined various mitigative measures which it would implement. To reduce vehicle-wildlife collisions, habitat loss or change, and the disturbance of wildlife along the rights-of-way and associated trails and roads, Alliance would implement a Traffic Management Plan. This plan outlines courses of conduct that should be followed during the construction and operation of the pipeline, such as speed limits and other vehicular restrictions, in order to minimize any detrimental effects. To minimize wildlife mortality due to increased access of humans and natural predators, Alliance would restrict access along the right-of-way using slash, rollback, boulders, or gates. Slash would be rolled onto all new rights-of-way over 500 m in length, and packed snow no longer needed by construction crews would be ripped to prevent easy access by wolves and hunters. Various environmental groups

considered these measures would be insufficient to control access since the slash, rollback, boulders, and gates constructed by pipeline companies are easily gone around or destroyed by hunters and other recreational users of rights-of-way. None of the various groups proposed any other mitigative measures which they felt would be more successful in restricting access. As well, Alliance would attempt to reclaim the right-of-way with seed mixes which were not enticing to bears and ungulates. In order to reduce the effects of the construction and operation of the pipeline on wildlife, Alliance would disallow dogs or firearms on the right-of-way, and the recreational use of all-terrain vehicles would be restricted. These measures are all part of Alliance's planned mitigation to reduce impacts on bears, ungulates and other species susceptible to traffic collision and pressures from increased access.

4.8.2.8 Reclamation

Those areas designated as Key or Critical Wildlife Habitats would be reclaimed to attempt to bring the habitat back to a natural state.

4.8.2.9 Monitoring

The standard design of the 25 kV power lines that would supply power to the compressor stations would not include bird flight diverters or measures to minimize the risk of electrocution to raptors. Alliance submitted that habitat analysis indicates that there are unlikely to be substantial concentrations of waterfowl, and that there are no nests of endangered raptors reported in the vicinity of the proposed power lines. Although there are small to medium sized marshes near the Estlin Compressor Station, large numbers of waterfowl in the area of the power lines are not anticipated.

Alliance submitted that it would request that the utilities consider the incorporation of mitigative techniques if problems with bird collision or mortality were identified.

Conclusions and Recommendations

Alliance did an adequate job of recognizing the different timing and setback restrictions outlined by the various authorities, but was non-committal to many of them. Timing and setback restrictions are critical mitigation tools that protect rare and endangered species, especially during sensitive periods in many species' life histories. These restrictions could have the potential to mitigate much of the impact that the construction and operation of a pipeline, such as the Project, could potentially cause. It is therefore recommended that the following condition be included in any certificate which may be issued:

Recommendation 13

The Company shall:

(a) except as varied in accordance with paragraph (c) hereof:

(i) comply with all the timing and setback restrictions as outlined in Appendices A1-13, A1-15, A1-16, and A1-17 of the Wildlife

Assessment, the Alliance Pipeline Project, Volume 2 - Appendices, dated June 1997;

(ii) *comply with all the timing and setback restrictions, including those outlined for specific species and construction spreads, as identified by Environment Canada in its letters to the Board dated 29 October 1997 and 29 January 1998; and*

(iii) *where the Company proposes construction activities within the timing and setback restrictions for locations KP 1388.5 to 1389, KP 1401.5 to 1402.5, and KP 1639 to 1641.5, the Company shall, at least 15 days prior to the commencement of construction for those locations, file correspondence from Environment Canada indicating its views on whether conditions are suitable in those locations for a waiver of the timing and setback restrictions;*

(b) *cause no variation to the construction schedule that would result in conflict with the timing and setback restrictions concerning any species protected under the Migratory Birds Convention Act;*

(c) *for those wildlife species not covered under the Migratory Birds Convention Act, cause no variation to the construction schedule that would result in conflict with the timing and setback restrictions without prior approval of the Board; and*

(d) *for any variation sought under paragraph (c), submit to the Board, at least 15 days prior to the commencement of construction in locations affected by the timing and setback restrictions, correspondence from Environment Canada and appropriate provincial authorities identifying any previously unaddressed timing and setback restrictions, and indicating their views on whether conditions are suitable in those locations for an amendment of the restrictions.*

For those areas which would not involve restrictions, it is recommended that the following condition apply:

Recommendation 14

The Company shall adhere to the seasonal timing of construction activities as described in its application or as otherwise adduced in

evidence before the Board in the GH-3-97 proceeding. Seasonal times should differentiate between frozen and non-frozen soil conditions.

Timing and setback restrictions are also important for the construction and operation of the temporary facilities. It is therefore recommended that the following condition apply:

Recommendation 15

Unless the Board otherwise directs, the Company shall ensure that all work and activities associated with temporary facilities are conducted in accordance with provincial and federal fisheries and wildlife setback and timing restrictions.

The pre-construction wildlife surveys Alliance has undertaken to conduct would assist the Company in finalizing its detailed routing and mitigation measures with respect to wildlife and wildlife habitats. These surveys, if conducted properly, have the potential to further reduce possible impacts which the pipeline and related facilities could have on wildlife or wildlife habitat. Alliance should conduct a pre-clearing grizzly bear den survey and ensure that grizzly den sites are avoided. Therefore, any certificate issued should be subject to the following conditions:

Recommendation 16

The Company shall submit to the Board for approval, at least 30 days prior to the conduct of pre-construction wildlife surveys:

(a) the proposed survey methodologies;

(b) for the surveys to be conducted in respect of rare and endangered species, a comprehensive list of survey locations, which also identifies the species for which each survey is being undertaken; and

(c) comments from Environment Canada regarding the survey methodologies.

Recommendation 17

The Company shall submit to the Board for approval, at least 30 days prior to the commencement of construction activities for each spread included in the pre-construction wildlife survey:

(a) the results of the survey;

(b) any additional measures that the Company intends to use to minimize any additional effects identified as a result of the survey; and

(c) comments from Environment Canada on the results of the survey and any additional measures proposed by the Company.

Recommendation 18

The Company shall:

(a) conduct a pre-clearing grizzly den site survey in suitable denning habitat locations prior to clearing activities taking place in those locations;

(b) submit to the Board, at least 60 days prior to clearing in grizzly habitat areas, the methodology (including timing and locations) for the pre-clearing grizzly den site survey; and

(c) submit to the Board at least 10 days prior to clearing, the results of the pre-clearing grizzly den site survey including the results of consultations with the provincial biologist(s) and the identification of any additional mitigation measures the Company would undertake.

It is noted that, in most cases, Alliance has proposed to mitigate effects on northern leopard frogs and other amphibians by rerouting and use of set-backs. However, at some locations there is still potential to directly affect northern leopard frogs. A wildlife ecologist from SERM is of the view that any northern leopard frog breeding habitat which may be disturbed by pipeline construction would recolonize quickly; however, SERM has still requested further survey information on northern leopard frog breeding habitat. In this regard, Alliance is expected to include, in the preconstruction wildlife survey conducted pursuant to Recommendation 16, a quantification of the proportion of northern leopard frog breeding habitat potentially affected by the Project with the amount of habitat locally available to frog communities.

It is considered that, since the Caribou Planning Area which would be intersected by the Project consists of, and is surrounded by, mixedwood forest abundant with lichens, there would be no significant adverse effects on caribou as a result of the decrease in lichen availability potentially caused by vegetation clearing along the right-of-way. It is also anticipated that lichens would recolonize the right-of-way following disturbances from construction activities.

The Rare and Endangered Wildlife Discovery Contingency Plan outlined by Alliance in its application describes contingency measures which would reduce impacts of the Project on wildlife. Alliance should be committed to proper employment of the appropriate measures. Accordingly, it is recommended that any certificate issued in respect of the Project be subject to the following condition regarding the protection of any previously unidentified wildlife or wildlife habitat:

Recommendation 19

If any previously unidentified significant habitat features, specialized habitat for wildlife with a designated status, or nesting habitat for song birds or raptors are discovered during construction, the Company shall, in consultation with the Board, Environment Canada, and other appropriate regulatory agencies, avoid, relocate, or restore these features or areas in accordance with the procedures described in its application or as otherwise adduced in evidence before the Board in the GH-3-97 proceeding.

It is considered that, with these conditions, any unexpected confrontations would result in insignificant effects.

Traffic should be confined to the right-of-way and speeds should be reduced so that disturbance of wildlife along the right-of-way and mortality due to vehicle-wildlife collisions are minimized. Furthermore, it is important to ensure that all personnel working in the field are aware of these restrictions. To enhance the safety of wildlife and their habitats from traffic related disturbances, any certificate issued for the Project should be subject to the following condition:

Recommendation 20

The Company shall implement a worker awareness program in regard to the potential for wildlife mortalities along roads, and its workers shall maintain reasonable reduced speeds along the right-of-way, along access roads, and, where feasible, along secondary roads. Off right-of-way traffic shall be prohibited, except for designated access routes.

It is considered unlikely that Alliance would become aware of problems of collision or mortality associated with power lines in the absence of a monitoring program. Given that mitigative measures have not been incorporated in the design of the power lines, a monitoring program for COSEWIC listed raptors should be developed, filed for Board approval, and implemented. Accordingly, any certificate issued should be subject to the following condition:

Recommendation 21

Unless the Board otherwise directs, the Company shall submit to the Board for approval its program for monitoring and reporting COSEWIC listed raptor mortality resulting from the new power lines associated with the Project facilities, the measures that the Company will take to reduce raptor mortality, and the criteria that the Company will use in applying these measures.

In conclusion, the effects of the construction and operation of the proposed Alliance pipeline and related facilities on wildlife and wildlife habitat would be mitigable subject to the recommended conditions, and the Project is not likely to cause significant adverse environmental effects on wildlife and wildlife habitat.

4.9 Environmentally Significant Areas

Alliance has defined Environmentally Significant Areas ("ESAs") as those areas that contain unusual or significant environmental features, or are environmentally sensitive and could be easily disturbed, and for which federal, provincial, or municipal governments have recognized the need for special management or conservation priorities. ESAs often provide habitat for rare and endangered species, or consist of rare or remnant vegetative communities. The mainline of the proposed pipeline would traverse 18 ESAs, and the laterals would traverse 12. Combined, the mainline and laterals would cross approximately 20 km of provincial and national ESAs, 66 km of local and regional ESAs, and 6 km of municipal ESAs. For further details regarding the various ESAs crossed by the proposed pipeline, refer to Table 4-10 and Figure 4-4 (latter confined to central Alberta).

The construction, operation, and maintenance of the proposed pipeline and related facilities would have the potential to cause adverse effects on ESAs. The effects identified by Alliance as being the most probable, and potentially the most detrimental to the ESAs are the:

- loss or alteration of rare, or ecologically significant vegetation;
- disturbance or loss of wildlife or wildlife habitat;
- loss of heritage resources;
- loss or reduction of recreational lands; and
- sedimentation of watercourses, and alteration of aquatic habitats.

4.9.1 Potential Environmental Effects

4.9.1.1 Loss or Alteration of Rare or Ecologically Significant Vegetation

Several of the traversed ESAs contain rare or ecologically significant vegetation that could be potentially destroyed or altered by the construction and operation of the pipeline. During Alliance's pre-application vegetation surveys, all ESAs were surveyed for rare or unique plant species and significant vegetation communities. Alliance submitted that, out of the 28 ESAs that would be crossed at least once, 18 could potentially lose part or all of a significant plant community.

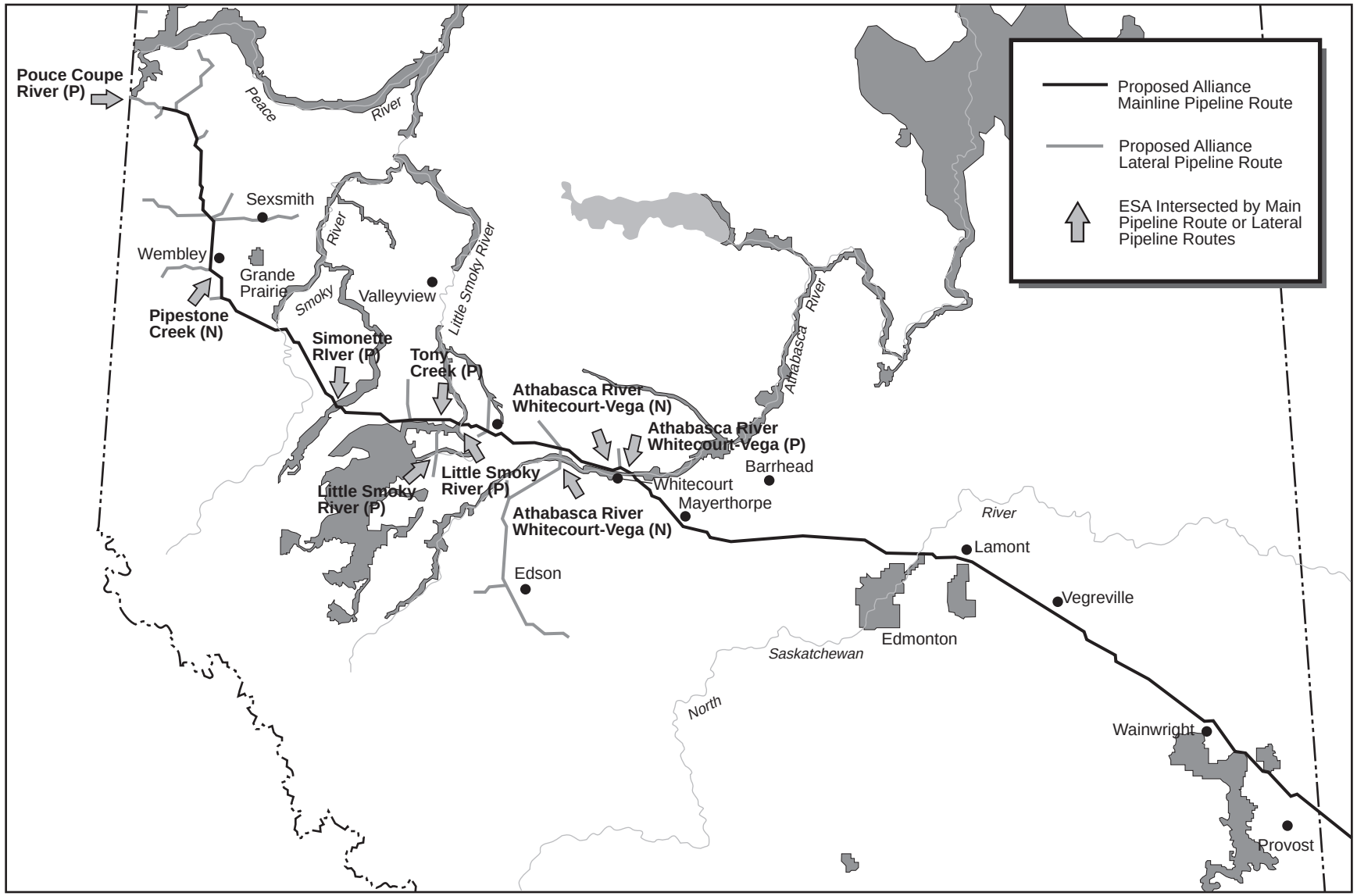
4.9.1.2 Disturbance, or Loss of Wildlife or Wildlife Habitat

The construction and operation of the pipeline would have the potential to disturb wildlife, or cause the loss or alteration of wildlife habitat. Alliance indicated that several of the ESAs provide significant habitat for various wildlife, either seasonally or year round. Representative of the wildlife habitat that could potentially be disturbed by the construction and operation activities is the deer habitat that would be traversed in the Astotin Creek ESA. Construction activities in that area would have the potential to disturb the animals, and clearing activities would potentially cause a loss of habitat. For specific effects on wildlife, refer to section 4.8.

Table 4-10
Environmentally Significant Areas

ESA	Location (KP) (laterals identified)	Authority	Underlying Concerns
Pipestone Creek	186.1 to 187.5	National	Dinosaur remains
Simonette River	291.9 to 295.4	Provincial	wildlife habitat, and riparian vegetation
Little Smoky River	362.8 to 366.0 Bigstone 20.5 to 22.1	Provincial	wildlife habitat, archeological resources
Athabasca River-Whitecourt-Vega	478.5 to 481.3 469.9 to 437.9 Edson 4.0 to 6.5	Provincial National	diverse landforms and vegetation recreation, wildlife corridor movement
Wapiti River	187.8 to 188.1	Regional	wildlife habitat, recreation, fishing
Chickadee Creek	437.0 to 437.9	Local	significant hydrological feature, wildlife
Sakwatamau River	470.4 to 470.8	Regional	diverse landforms and vegetation, wildlife
Kakina Lake	587.8 to 590.3	Regional	peatland, various waterfowl and birds
Astotin Creek	664.3 and 669.6	Local	rare landscape, waterfowl and deer habitat
Vermilion River	743.0 to 743.1	Regional	recreational, scenic, wildlife and fish
Alice Lake	785.0 to 787.0	Regional	waterfowl staging
Ribstone Creek	868.5 to 871.8	Regional	wildlife, waterfowl staging
Bear River	144.0 to 145.0	Municipal	objective to conserve river in a natural state
Riviere Qui Barre	603.2 to 604.1	Municipal	environmentally sensitive
Sturgeon River	639.3 to 639.8	Municipal	environmentally sensitive
Unnamed Creek	1294.5 to 1294.8	Municipal	sensitive land
Qu'Appelle River	1334.0 to 1337.0	Municipal	heritage area, environmentally sensitive
Fox Creek	375.0 to 378.0 Fox Creek 5.6 to 18.2	Regional	unique geological and vegetative features
Redwillow River	Elmworth 24.0 to 24.9	Regional	wildlife habitat, and palaeontological sites
Beaverlodge River	Elmworth 7.9 to 8.7	Local	wildlife habitat, and uncommon fish species
Tony Creek	Bigstone 3.5 to 10.0	Provincial	diverse riparian and vegetative communities
Pouce Coupe River	Fort St.John 17.5 to 18.5	Provincial	fragile slope hazard
Kaybob Marl Bog	Kaybob 1.8 to 4.8	Regional	unusual wetland feature
Windfall Creek	Edson 6.5 to 9.1 Edson 17.0 to 19.5 Edson 27.0 to 29.5	Regional	high diversity of landforms and vegetation
Pine Creek	Edson 46.0 to 57.0 Kaybob South 3.0 to 7.9	Regional	mature spruce, beaver ponds, and meadows
Edson River Wetland	Edson 76.0 to 78.9	Regional	large wetland, wildlife habitat
Edson River	Edson 79.5 to 81.5	Regional	diversity of fish species, key fishery
Lower McLeod River	Edson 101.0 to 106.3	Regional	wildlife, and diverse vegetation

Figure 4-4
Environmentally Significant Areas (ESA's) of Central Alberta



4.9.1.3 Loss of Heritage Resources

A few of the ESAs are designated because they contain, or have the potential to contain, heritage resources (Table 4-10). Along the mainline the Pipestone Creek ESA contains dinosaur remains, the Simonette River ESA contains archeological resources, and the Qu'Appelle River and Area ESA has a moderate to high potential of containing heritage materials. For more details refer to section 4.12 on Heritage, Archeological, and Palaeontological Resources.

4.9.1.4 Loss or Reduction of Recreational Land

At least three ESAs have maintenance of recreational or aesthetic values as key objectives (Table 4-10). Construction activities such as the clearing of trees, grading of slopes, and installation of watercourse crossings could reduce these values.

4.9.1.5 Sedimentation of Watercourses and Alteration of Aquatic Habitats

Construction and clearing activities at watercourse crossings would have the potential to cause sedimentation, and therefore the alteration of the habitat of many aquatic species. For more specific information on water crossings, refer to section 4.7 on Fish and Fish Habitat.

4.9.2 Mitigative Measures

Alliance submitted that, when routing the pipeline, it attempted to avoid as many ESAs as feasible. Alliance submitted that its general mitigation strategy would be to minimize disturbance as much as possible using measures such as narrowing the workspace, realigning around significant features, and employing appropriate restoration and reclamation techniques to ensure that these sensitive areas would not be lost or significantly altered.

ESAs have been deemed so for specific reasons and it is therefore important that the mitigative measures comply with the objectives of each ESA. Thirteen of the ESAs, all of municipal significance, are controlled by specific management plans. The objectives of the management plans are similar in that they all focus on the protection of sensitive areas and preservation of the environment in a natural state.

As shown by Figure 4-4, watercourses traverse several ESAs. Alliance would attempt to minimize the disturbance at the water crossings by minimizing the removal of shrubby vegetation from the banks, and using reclamation techniques to ensure revegetation of the banks. Routing has been planned so as to reduce the amount of clearing and grading necessary at each crossing. Willow transplants and stakes would be used as another mitigative option to ensure the areas return to their natural states. Alliance submits that for the Bear River, Wapiti River, and Vermillion River ESAs, directional drilling would not be necessary to protect the riparian areas and water channels because the reclamation methods used would be sufficient to restore the areas back to their natural state. Directional drilling would be conducted at one of the managed sites, the Little Smoky River ESA. For more information on the water crossing techniques that would be used at each crossing, refer to section 4.7 on Fish and Fish Habitat.

Mitigation within ESAs is related to specific effects on vegetation, wildlife, heritage resources, and aquatics. Refer to the Vegetation, Fish and Fish Habitat, Wildlife and Wildlife Habitat, and Heritage,

Archeological, and Palaeontological Resources sections (4.5, 4.7, 4.8, and 4.12) for discussions on specific mitigative measures that would be taken to protect each resource.

Conclusions

It is important to plan mitigation and reclamation strategies in the context of the management objectives, where specified, for each ESA. Based on the information provided by Alliance, proper application of the proposed mitigative measures and recommendations with respect to wildlife, vegetation, fish, and heritage resources should adequately address the potential effects that could result from the Project on ESAs. Therefore, it is concluded that the Project is not likely to cause significant adverse environmental effects on ESAs.

4.10 Air Quality

4.10.1 Potential Environmental Effects

The compressors would be driven by natural gas-fired turbines which would result in emissions of oxides of nitrogen ("NO_x"), carbon monoxide ("CO") and greenhouse gases ("GHGs") such as carbon dioxide ("CO_2"), nitrous oxide ("N_2O"), and methane ("CH_4"). NO_x consist of nitrogen dioxide ("NO_2") and nitric oxide ("NO"). Fugitive emissions of CH_4 and other non-methane hydrocarbons would occur from compressors, valves, and meter stations as a result of small leaks from valves, flanges and other connections. Emergency and maintenance operations that involve blowdown of a pipeline or compressor station would also result in emissions of hydrocarbons to the atmosphere. There would also be temporary atmospheric emissions associated with the construction of the pipeline.

Potential air quality effects such as dust associated with construction activity were not assessed in detail as these effects are anticipated to be relatively small and localized, and would cease once construction was completed.

The federal and provincial governments have established ambient air quality objectives for NO_2 and CO. Emissions of CO from the proposed compressor stations were found to be less than the corresponding NO_x emissions. Since ambient air quality objective thresholds for CO are higher than those for NO_2, CO objectives would be met if NO_2 objectives were satisfied. Accordingly, separate modelling of CO emissions was not conducted.

Plume dispersion modelling for the NO_2 emissions that would result from the project was conducted using the U.S. Environmental Protection Agency Industrial Source Complex Short-Term Model. Modelling was undertaken to determine the maximum cumulative effects associated with compressor station emissions in combination with existing regional airshed emissions. Ambient air quality in the vicinity of each mainline and lateral compressor station would be primarily influenced by emissions from existing industrial and human activity within the airshed. Ambient air quality was evaluated by compiling an emissions inventory for existing emission sources, including oil and gas operations, within the 20 km by 20 km area defined as the regional airshed for the compressor stations.

The maximum ground level effects of NO_2 emissions predicted would be limited to within 1 km of each compressor station and would be below the federal maximum acceptable ground level concentration of 400 micrograms per cubic metre. This level was designed to provide long-term

protection of human health. Transport of emission plumes would cause ambient levels to increase incrementally on a regional scale and would result in a contribution to the overall level of GHGs.

Modelling did identify two locations (Taylor and Bigstone) where air quality guidelines could be exceeded due to existing emission sources. The construction and operation of the lateral facilities at these locations is not predicted to result in any increase beyond the exceedences from the existing emission sources.

At the request of Environment Canada, Alliance committed to investigate further modelling of the emissions that would be associated with the Morinville and Estlin mainline compressor stations using urban ozone data for Edmonton and Regina. Given the existing concerns with the emissions levels in the Taylor, B.C. airshed, Alliance committed to investigate further modelling of the Taylor Lateral Compressor Station. The results of the additional modelling predicted ground level concentrations that were less than or equal to those originally predicted.

Total GHG emissions in terms of equivalent CO_2 amounts, incorporating the global warming potentials ("GWP") of CH_4 and NO_2, would be 524 kt per year for the mainline stations and 262 kt per year for the lateral compressor stations. The 1995 baseline emission inventory for Alberta's upstream oil and gas sector in terms of GWP is 72,500 kt and the GWP for man-made sources in Canada is 619,000 kt. The Project would be responsible for an increase of about 1.1 per cent for the Alberta upstream oil and gas sector emissions and 0.12 per cent for all of Canada.

Alliance submitted that GHGs are a significant matter of public policy but was not prepared to say that GHGs are causing a significant environmental impact.

The Green Alternatives Institute of Alberta raised the issue of whether, as a consequence of Canada endorsing the Kyoto Agreement, it may be necessary and advisable for Canadians, and particularly Albertans, to substitute natural gas for other fuel sources in order to reduce national and provincial carbon dioxide emissions. The RMEC further pursued questioning on factoring the Kyoto Agreement into impacts on demand for natural gas and further questioned whether public policy regarding the existing level of GHGs should be used as a criterion for significance.

The Native Canadian Petroleum Association inquired into whether carbon sequestration (reinjecting carbon and removing it from the carbon cycle) had been evaluated and questioned the Company's reason for not proposing to capture and re-use the carbon dioxide.

4.10.2 Mitigative Measures

Alliance submitted that, since the pipeline is designed to operate at a maximum of 12,000 kPa, the amount of fuel gas consumed per unit of energy transported would be reduced. In addition, proven dry low NO_x emissions gas turbine drivers would be installed at the mainline compressor stations and high efficiency lean burn gas engines would be installed at the lateral compressor stations.

Alliance indicated that it would develop, with input from regulatory agencies and interested parties, an air quality monitoring program to monitor the emissions from the Windfall Compressor Station in addition to one other mainline compressor station. The measurement and monitoring of the compressor units at the Windfall Compressor Station would be conducted in accordance with the

Canadian Council of Ministers of the Environment *Guidelines for Stationary Gas Turbines* (December 1992).

Environment Canada suggested several candidate sites for the establishment of an air monitoring program based on the predicted air emissions or the location of the compressor stations near urban or industrial sites. Environment Canada identified the Taylor and Bigstone Lateral Compressor Stations and the Morinville Compressor Station. Monitoring of air emissions at the Taylor Lateral Compressor Station would allow for the verification of modelled results that predict that the station would not contribute to emissions above the National Ambient Air Quality Objectives.

Fugitive emissions from the Project would be controlled through:

- welding-in fittings and seal welding aerial gas cooler tubes;
- welding-in large pipeline connections in facilities;
- designing system control shutdown logic to eliminate extraneous shutdowns;
- development of operating and maintenance strategies which minimize fuel gas usage;
- installation of dry gas seals;
- utilizing electric motors or compressed air for starting the gas generator; and
- use of a pulldown compressor during scheduled maintenance requiring the depressurization of a pipeline segment.

GHG emissions would be managed through a number of measures including:

- registering with the Voluntary Challenge and Registry ("VCR"), development of an Action Plan within six months of start-up and submission of annual progress reports; and
- participation as a member of the pipeline industry in initiatives including: supporting and encouraging GHG emissions research; and attending and/or co-sponsoring technical workshops on GHG emission reduction procedures.

Based on preliminary work, electrical drivers would not be economical for the Taylor Lateral Compressor Station and are not being further evaluated. Use of electrical drivers for the Bigstone Lateral Compressor Station requires further evaluation.

Conclusions and Recommendations

Satisfactory modelling has been undertaken to evaluate the potential effects of the Project on the ambient air conditions in the regions where its proposed compressor stations would be located. However, comments from both Environment Canada regarding the further modelling conducted at the proposed Morinville, Estlin, and Taylor Compressor Stations, and the British Columbia Ministry of Environment, Lands and Parks ("MELP") regarding the Taylor Compressor Station have not been provided. Accordingly, any certificate issued should be conditional on such comments being filed with the Board.

Recommendation 22

The Company shall provide any comments received from Environment Canada and MELP on the results of the emissions modelling using the USEPA (1997) ISC3-OLM Model for the Morinville, Estlin, and Taylor

Compressor Stations including the need for further modelling or monitoring in respect of these stations.

Air quality monitoring would assist in verifying the accuracy of the modelling undertaken. Accordingly, any certificate issued should be conditional on Alliance filing its air quality program.

Recommendation 23

(a) The Company shall develop, with input from regulatory agencies, including Environment Canada, and interested persons, an air quality monitoring program.

(b) The Company shall submit to the Board a description of the air quality monitoring program referred to in paragraph (a) together with any comments received from regulatory agencies (including Environment Canada and MELP) and interested persons.

Recommendation 24

Unless the Board otherwise directs, the Morinville Compressor Station and the Taylor Lateral Compressor Station, in addition to the Windfall Compressor Station, shall be subject to the Company's air quality monitoring program. In the event that electric motor drivers are not used at the Bigstone Lateral Compressor Station, the Company shall, at least 15 days prior to the commencement of operation, file with the Board any comments from regulatory agencies, including Environment Canada, and interested persons, and Alliance's response on the question of whether this station should be subject to the Company's air quality program.

Recommendation 25

The Company shall, in accordance with the reporting schedule to be set out in its air quality monitoring program, submit to the Board the results of its emissions monitoring including a comparison to the modelled values for the stations and any comments received from Environment Canada, MELP, and interested persons regarding the results.

A key element of the National Action Program on Climate Change is the Climate Change VCR. Alliance committed to register in the VCR. Accordingly any approval should be conditioned to require the filing of the Company's VCR Action Plan with the Board and Environment Canada.

Recommendation 26

The Company shall submit to the Board and Environment Canada, as soon as available, a copy of the Company's action plan under the federal Voluntary Challenge and Registry Program to deal with greenhouse gas emissions arising directly from the operation of the pipeline.

Given that the predicted effects of the Project, together with the emissions resulting from other activities in the regions, would not exceed the federal and provincial ambient air quality guidelines, air emissions from the Project are not likely to result in significant adverse environmental effects.

4.11 Acoustic Environment

4.11.1 Potential Environmental Effects

The compressor stations could potentially increase the existing ambient noise levels and impact the quality of life for persons in proximity to the stations. Aerial patrols undertaken for visual observation as part of the right-of-way monitoring program would also have potential noise effects. Concerns with noise affecting quality of life were raised by persons potentially affected by the proposed compressor stations. Mr. Alex Banga, a landowner directly adjacent to the proposed location of the Estlin Compressor Station, noted that the Regina Plains is a very beautiful, quiet, and peaceful setting in which agricultural operations are carried out and that the compressor station would be an intrusion on that environment. The visual impact of facilities is addressed in section 4.14.

Alliance committed to meet the Alberta Energy and Utilities Board ("EUB") Noise Control Directive, ID-94-4 and assessed the potential noise effects from the proposed seven mainline compressor stations. The EUB Noise Control Directive is complaint-based. Accordingly, noise levels were assessed for proximate residences and, in the absence of residences, for a potential residential site at 1.5 km from the station. With regard to impacts of the mainline compressor stations, the predicted combined sound levels would be less than 5 dBA above measured ambient sound levels. Further, in all but four cases, the change in sound levels would be less than 3 dBA which should not be noticeable to the average person.

The existing ambient noise levels at each of the proposed lateral compressor stations were not measured. Since the lateral compressor units would be smaller than those at the mainline compressor stations, default Permissible Sound Levels, as provided for in the EUB Noise Control Directive, were applied. These levels have been found to be acceptable by the EUB for rural residences and vary based upon factors including residence density and proximity to highways.

All potential compressor station sites would be located in rural areas and would have the potential to be located in proximity to wildlife and livestock. However, noise effects upon wildlife and livestock have received less attention than the effects of noise on human receptors. In addition, previous studies have been undertaken to determine the effects of extreme noise exposures rather than the effects of continuous exposure at lower sound levels.

4.11.2 Mitigative Measures

Potential noise effects and maximizing the separation to the nearest residence were important considerations in siting the compressor stations. Given that the sound footprint for the compressor equipment can be directional with sound radiation characteristics differing, based upon the proximity and location of a receptor, the locations of coolers and other equipment at compressor stations may be changed prior to construction to assist residents from a noise perspective. In addition, various noise control features would be included in the design of the compressor stations including:

- turbines which would either be fitted with acoustical enclosures or installed within an acoustically rated building;
- silencing which would be specified for gas turbine exhausts and air intakes;
- variable speed drives for discharge aftercoolers to allow reduction of fan tip speeds and sound levels during nighttime operations when ambient temperatures are lower; and
- minimizing the amount of above ground yard piping.

Post-construction noise monitoring at mainline compressor stations would be conducted once the compressor stations were operating at capacity. Conducting these surveys during the spring or summer would allow direct comparison with the ambient noise surveys conducted.

In the event of a noise complaint the following steps would be undertaken:

- investigate the complaint to determine the cause;
- conduct noise monitoring if the project is the source of the noise concerns;
- compare the monitoring results to the EUB Permissible Sound Level Criteria;
- initiate remedial action if the station noise is not consistent with the EUB Noise Control Directive; and
- discuss the results of the monitoring and noise levels with the concerned person(s).

Observations of local residents would be relied upon for monitoring the effects of noise upon wildlife and livestock. Mitigation of any noise effects from the compressor stations on wildlife and livestock would be undertaken in consultation with local residents.

Conclusions and Recommendations

It would be reasonable to verify site conditions and design assumptions made prior to construction. This would also establish a benchmark in order to make a meaningful comparison of predicted and measured effects. It would not be appropriate to place the burden of identifying problems resulting from the operation of the Project on area residents. Further, there would be no human receptors present at all of the proposed facility locations to complain or witness potential effects on wildlife or livestock. Accordingly, pre-construction ambient noise level monitoring should be undertaken at the lateral compressor station sites and follow-up monitoring should be undertaken at all compressor station sites once in operation as set out in the following proposed conditions:

Recommendation 27

The Company shall submit to the Board, at least 30 days prior to the commencement of construction of each lateral compressor station, an ambient noise assessment for the proposed lateral compressor station site.

Recommendation 28

Unless the Board otherwise directs, the Company shall:

(a) file with the Board, within 12 months after the commencement of each of the mainline and lateral compressor stations, a monitoring report for each compressor station detailing the results of an appropriate noise monitoring program, including, but not limited to, the noise emission levels at the source, the fenceline, and the three closest residences, or an assessment site within or near 1.5 km from the station if no residences are within this radius, at the maximum operating level;

(b) notify the Board in writing of any noise complaint(s) received in respect of the operation of its compressor stations and apprise the Board of the results of any further noise monitoring undertaken in response and any measures that have been taken to address the complaint(s); and

(c) in the event that the noise complaint identified in response to (b) is substantiated as an increase in noise levels of 5 dBA or more, or is attributed to a specific frequency range, the Company shall undertake remedial measures within four months of receipt of the noise complaint, and in the event that implementation of the measures will take longer, or in the Company's view is not warranted, the Company shall file with the Board its justification and the results of further consultations with the affected person(s).

In respect of the potential impacts of aerial patrols, the timing of flights for wildlife considerations and landowner requests should be incorporated in the Operations and Maintenance Manual, should a certificate for the Project be issued.

As the predicted increase to noise levels is 5 dBA or less, the noise from the stations may be audible, but should not constitute a nuisance. Taking into consideration the predicted noise levels and the above-noted conditions, the Project noise levels are not likely to cause significant adverse environmental effects.

4.12 Heritage, Archaeological and Palaeontological Resources

4.12.1 Potential Environmental Effects

Archaeological, historical, and palaeontological resources may be disturbed or destroyed by construction and operation activities, as a result of compaction or disturbance of surficial and shallowly buried sites, disturbance of deeply buried sites, mixing of stratigraphic levels and, consequently, a loss of site-specific data and through increased access, unauthorized collection and vandalism.

Due to the non-renewable nature of historical resources and the importance of undisturbed site context to the understanding of the resources, the effects of development on these resources is a concern. Effects on these resources may result in a loss of data in the form of in-situ information, site specific artifacts and features, and spatial relationships. This loss may be offset in part by inventory and data studies which contribute to the provincial database.

Recognition of the effects of development on these resources aids in retarding the process of loss. Loss of data on a site-specific basis was viewed in the context of the regional Borden Block with the level of impact determined based on the provincial data base. In terms of sites previously identified, most were identified as a result of conflicts with earlier developments. The results of industrial development, combined with cultivation, has resulted in almost complete elimination of site evidence. Accordingly, no additional primary impact would occur to these sites as a result of the construction of the Project. Sites of a particularly sensitive nature, such as burials, effigies, petroglyphs, and medicine wheels, were not identified in association with the proposed right-of-way and no effects on these particular features are anticipated.

To assess potential impacts to recorded and unrecorded archaeological resources, assessments of these resources were conducted under permits from the respective provinces. The thirteen sites of sufficient heritage resource significance to warrant further attention in British Columbia are set out in the following section on mitigation.

Of the sites assessed along the Alberta mainline, three sites are of sufficient heritage resource significance to warrant either avoidance or further study. These precontact sites consist of a workshop and two buried campsites. A further seven sites warranting avoidance or further study were identified along the Alberta laterals. These sites consisted of a workshop, a campsite associated with the Cody Complex, four precontact campsites, and a newly recorded precontact artifact scatter.

Within Saskatchewan, 12 sites that could be affected are of sufficient heritage resource significance to warrant either avoidance or further study. These sites consist of six groupings of stone circles, the disturbed remains of a stone circle, a stratified deeply buried campsite with multiple occupations, three early 20th century homestead remains, and a commemorative marker for a school house (EfN1 10).

Although survey assessments have been conducted, it is possible that unidentified sites could be encountered during construction activities. These sites could consist of artifact scatters or campsites in a deeply buried context and would only be exposed during grading or trenching.

Within Alberta, a previously recorded palaeontological locality containing dinosaur remains of possible international significance is located on Pipestone Creek within 500 m of the proposed mainline.

Bedrock exposures were observed during the field assessment for the Alberta portion of the Project at or near crossings of the Wapiti and Smoky Rivers. Dinosaur fossil remains were identified in association with the Wapiti Formation on the Wapiti River. No bedrock exposures were noted during the assessment of the Saskatchewan portion of the route; however, palaeontological specimens from both the Judith River Group and Quaternary deposits may potentially be impacted.

Field observations indicate that palaeontological remains could be encountered at five localities in Alberta consisting of the Wapiti, Athabasca, North Saskatchewan, Latornell, and Battle rivers. Field indications further indicate that palaeontological remains could be encountered at eight localities in Saskatchewan consisting of Kerrobert (KP 1006.0-1012.00), Eagle Creek (KP 1067.0-1070.0 and KP 1095.0-1098.0), South Saskatchewan River, Iskwao Creek, unnamed creek (KP 1294.0-1296.0), Qu'Appelle River, and all crossings of the Moose Mountain Creek and the Shepherd Ravine.

4.12.2 Mitigative Measures

At the majority of sites with low historical resource significance values, mitigative requirements have been satisfied through the recording of the site and collection of artifacts. Avoidance is the recommended mitigative measure for the significant historical resource sites noted above. Avoidance may involve either the realignment of the right-of-way or restriction of vehicular traffic and other activities to the right-of-way. In situations where avoidance is not feasible, additional studies would be undertaken. Usually these would include detailed feature and site mapping, surface collection, and excavation. The scope of the studies recommended is based on the significance of the site and the possible information to be gained or lost. In isolated instances, verification of the position of specific features to the final right-of-way would also be recommended. Public consultation may also be undertaken to establish the public value of a site. Specified mitigative measures appear on the alignment sheets. As described by Table 4-11, further specific measures have been recommended for the portion of the Project that would be located in B.C.

All locations of palaeontological concern would be monitored. In addition to the above-noted sites, palaeontological monitoring was also identified for the proposed crossing of the McLeod River (KP 103-106) on the Edson Lateral, and the Redwillow River (KP 22-25) on the Elmworth Lateral. In the event that palaeontological resources are encountered, construction would be halted until a mitigative strategy is developed with the respective provincial agency

Archaeological monitoring has been recommended for the Alberta and Saskatchewan portions of the Project. The purpose of monitoring would be to identify additional heritage resources in areas where visibility or access may have been restricted by natural or cultural factors (i.e. deeply buried river bank deposits, cultivation, limited access). Monitoring would also provide on-site expertise in the event heritage resources of a sensitive nature are inadvertently uncovered or impacted during construction activities, as in the case of a burial or previously undiscovered traditional cultural property.

In the event of a heritage resource discovery during construction, work in the proximity of the site would be suspended until an appropriate mitigation plan was developed and permission granted by the provincial heritage resources agency to resume construction.

Table 4-11
British Columbia - Recommended Mitigation for Heritage Resources

Lateral	Site Number	Site Specific Issue	Mitigation
Highway Lateral	HfRm 8	Buried archaeological resources having potential scientific significance, grey banded black chert projectile point recovered.	Reroute the Project to avoid impact.
Aitken Creek Lateral	HdRh t3 HdRh t5	Buried archaeological resources.	Reroute the pipeline 10 m to the east to avoid impact.
	HcRg t20	Black chert flake. Buried archaeological material.	Reroute the pipeline 5 m to the north to avoid impact.
	HcRg t21	Site consists of a teepee frame, hide stretching rack, possible cache feature and a pack trail. Not located on the right-of-way but requires protection from disturbance.	Flag and monitor site during construction to avoid disturbance.
	HbRe t34	Site characterized by three lean-to, teepee poles and a number of cut poles. Part of the site would be located within the proposed right-of-way.	Consultation with the Blueberry River and Doig River First Nations to establish mitigation for this site.
	HbRe t35	Site contains a subterranean cabin, two cellars, and miscellaneous debris. The site may fall within the proposed right-of-way.	Reroute the pipeline 5 m to the north to avoid impact.
Fort St. John Lateral	HaRc t32 HaRc 10 HaRc t34 HaRc 11	Lithic scatters.	Flats should be re-inspected during non-winter conditions following surveying.
	GlRb 2	Small siltstone and mudstone lithic scatter.	Mitigation of site after proposed construction. Materials uncovered would be mapped, collected and curated.
Boundary Lake Lateral	HbRa 1	Mr. Bill Brayham homestead and burial.	Site should be avoided.

Conclusions and Recommendations

Although archaeological monitoring has been recommended for Alberta and Saskatchewan, a similar recommendation for the portion of the Project that would be located in B.C. was not put forward. It is recommended that archaeological monitoring be implemented for the entire Project. Archaeological, historical, and palaeontological resources are protected pursuant to legislation within the respective provinces. Accordingly, any certificate issued should be conditioned to ensure that the respective provincial agencies are afforded an opportunity to review and comment on the assessments and the recommendations contained therein. It is accepted that for the sites that would be affected, loss of data would be offset by the information gained. It is noted that the assessments identify sites for which further work, consultations, or specific reroutes are recommended. Further information on these sites should also be provided to the Board prior to the commencement of construction.

Recommendation 29

With respect to archaeological, palaeontological, and heritage resources, Alliance shall, at least 30 days prior to the commencement of construction:

(a) file with the Board confirmation that consultations with the local historical society and school board regarding the mitigation at site EfN1 10, school house memorial have been completed and provide a description of the mitigation proposed;

(b) advise the Board in writing how concerns at the following sites have been resolved:

(i) site HfRm 8 on the Highway Lateral;

(ii) sites HdRh t3, HdRh t5, HcRg t20, HcRg t21, HbRe t34, and HbRe t35 on the Aitken Creek Lateral;

(iii) sites HaRc t32, HaRc 10, HaRc t34, HaRc 11 and GIRb 2 on the Fort St. John Lateral; and

(iv) site HbRa 1 on the Boundary Lake Lateral;

(c) provide the Board with a copy of any revisions or amendments to the Historical Resource Impact Assessment/Archeological Impact Assessment ("HRIA/AIA") reports for the provinces of British Columbia, Alberta and Saskatchewan;

(d) advise the Board in writing as to whether the HRIA/AIA reports, including any revisions or amendments thereto, and

any recommendations contained therein are acceptable to the Cultural Facilities and Historical Resources Division of Alberta Community Development, the Saskatchewan Heritage Branch, and the Archaeological Branch, British Columbia Ministry of Small Business, Tourism and Culture;

(e) provide the Board with any comments received from the above-noted provincial agencies in respect of the reports, including any further mitigation; and

(f) confirm whether Alliance will comply with the mitigative measures and recommendations set out in the reports referred to in (c) and any further mitigation identified in response to (e).

Recommendation 30

Alliance shall submit to the Board copies of the reports on the mitigation programs completed at the historical, archaeological, and palaeontological sites encountered during construction together with any comments received on these reports from the Cultural Facilities and Historical Resources Division of Alberta Community Development, the Saskatchewan Heritage Branch, and the Archaeological Branch, British Columbia Ministry of Small Business, Tourism and Culture and the respective First Nations.

Potential reroutes and realignments may result in the Project encountering sites that were not part of the assessments conducted. Accordingly, any provisions that pertain to potential reroutes should be conditioned to ensure that potential effects on these sites are assessed.

Considering the proposed mitigative measures, together with the above noted recommendations, changes to the environment resulting from the Project are not likely to result in significant adverse effects on archaeological, historical, or palaeontological resources.

4.13 Waste Management

4.13.1 Potential Environmental Effects

The improper transportation, storage, handling, or disposal of potentially hazardous products used during the construction and operation of the Project could harm the environment and pose risks to animal and human health.

4.13.2 Mitigative Measures

Alliance prepared a Waste Management Plan which outlines specific measures to be followed to reduce the likelihood of an accidental release of potential hazardous products being generated or utilized during construction.

Alliance classified waste streams and hazardous materials into three categories for the consideration of proper storage, handling, and disposal procedures. Solid wastes include garbage and debris generated through activities of personnel during pipeline construction and right-of-way reclamation. Although non-toxic and unlikely to result in any harmful effects on humans, animals, or the environment, these materials are aesthetically unpleasant and may become a nuisance. Industrial wastes may contain small quantities of residual substances (e.g. oil, antifreeze, fuel, lubricants) which, if released into the environment, may cause localized contamination of soil, surface water or groundwater. Liquid products and wastes (e.g. used lubricating oil, methanol, and antifreeze) pose the greatest threat to the environment due to their ability to flow and seep into porous material, if not properly contained. Should these products enter the environment, any contamination would require either removal of any contaminated soil and vegetation or in-situ remediation.

Alliance stated that its Waste Management Plan applies to the pipeline right-of-way, other construction areas, all staging areas, construction yards, and public roadways being used to transport materials associated with the Project.

Alliance also stated that the plan applies to all Alliance employees and contractors during construction of the Project. All employees and contractors will also be required to abide by federal, provincial, and local requirements for the storage, handling, transport, disposal and spill reporting requirements of all products and waste materials which are potentially hazardous to the environment. Alliance's environmental inspectors will be responsible for ensuring compliance with all regulatory requirements and implementing the Spill Contingency Plan in the event of a spill.

Alliance has contacted and is continuing discussions with provincial and municipal resource management administrators regarding waste management issues related to the Project.

Conclusions

Alliance has committed to adhere to the principles and provisions of its Waste Management Plan and to ensure that all employees and contractors abide by federal, provincial, and local requirements for the storage, handling, transport, disposal and spill reporting requirements for all products and waste materials which are potentially hazardous to the environment. Given Alliance's commitment to implement the waste management practices and procedures which have been developed for the Project, waste related to the Project is not likely to cause significant adverse environmental effects.

4.14 Socio-Economic Matters

The *CEAA* defines environmental effect, in part, to be "any change that the project may cause in the environment, including any effect of any such change on health and socio-economic conditions". Socio-economic effects, other than those directly resulting from changes in the environment, would be

addressed, pursuant to the Board's mandate under the *NEB Act*, in any reasons for decision that may be issued for the Project.

Matters pertaining to the disruption of farming and ranching, forestry, trapping and fishing, outdoor recreation, and water use are addressed in the Vegetation, Hydrology, Fish and Fish Habitat, Wildlife and Wildlife Habitat, and Renewable Resources sections (4.5, 4.6, 4.7, 4.8, and 4.16).

4.14.1 Quality of Life

Construction activities can result in increased traffic, deterioration of local roads, dust, noise and visual impacts. Rural jurisdictions have identified concerns regarding road crossings and road damage resulting from the construction of the Project.

Increased traffic volume, noise and dust of gravel surfaced roads used by construction crews are largely unavoidable. However, the traffic and noise would generally last less than two months and would be largely confined to the early morning and early evening when crews would be travelling to and from work. Noise and visual concerns are similarly short-term in nature. Increased traffic volume and resultant noise and dust would be somewhat alleviated through the provision of buses, vans, and crew cabs to transport workers between marshalling areas and work sites. Access roads and rights-of-way would be watered during construction if traffic and wind conditions result in dust being a problem for residents.

Road crossing specifications would be met or exceeded, road bans would be adhered to, and roads would be left in the same, or better, condition as they were prior to construction.

Public works managers, in municipalities where construction activity is scheduled, would be contacted to discuss the type and quantity of non-hazardous garbage and waste that would be produced, and to identify suitable disposal sites.

Fugitive dust resulting from construction on dry pulverized soils, especially in windy conditions, can also adversely affect local residents, communities, and traffic on adjacent roads.

To address health considerations, the Project would comply with existing noise and ambient air quality guidelines. Safety features and considerations would be incorporated into the pipeline and compressor station design, site selection, construction and operation. Emergency response plans would be put in place and spill contingency plans would prevent contamination of drinking water and shallow aquifers.

4.14.2 Visual or Aesthetic Environment

In areas of high scenic value, pipeline rights-of-way may be seen as a visual intrusion. The Alaska Highway has visual impact guidelines which limit the amount of new development and clearing at certain locations adjacent to the highway.

The route selection process for the proposed Aitken Creek Lateral has taken into consideration the visual impact guidelines which limit the amount of new clearing at certain locations near the Alaska Highway, especially those visible from Alaska Highway viewpoints. The proposed route would follow existing linear disturbances for all Visual Landscape Units with the exception of approximately 1 km which is a new-cut through a Modification Unit. Alterations that dominate the original characteristic

landscape are permitted within the modified unit providing the alteration borrows from natural line and form. As a result the visual impact on travellers of the Alaska Highway would be minimal.

Potential visual effects are important considerations in the siting of compressor stations. When it is not possible to locate the station out of sight of all residences, efforts would be made to minimize the visual impact. This could be achieved through contoured landscaping and the use of trees and other vegetation, colour, and choice of siding that would conform with the surroundings, landscaping, and station configuration that would reduce the visual impact. These measures would also be applied to the proposed meter stations. While Alliance wants some conformity in the appearance of its stations, it noted that there is latitude for some customization and would consult with surrounding landowners to get their views.

4.14.3 Resource-Based Activities

The laterals and mainline would cross and parallel numerous natural gas field gathering systems and transmission pipelines. In order to minimize potential disruptions to oil and gas exploration and development, energy companies with dispositions that would be intersected by the rights-of-way would be contacted. In addition, the use of shared rights-of-way without interfering with existing operations would be maximized.

No operating leases or abandoned coal mines would be impacted by the Project. Undeveloped coal leases, lease applications, and deposits would be encountered.

Sand and gravel deposits would be traversed by the Project. These include one privately owned and inactive gravel pit near the Wapiti River at KP 187.5 and one privately-held gravel operation at KP 1263. Alliance submitted that the Project is unlikely to sterilize or adversely affect the reserves.

All disposition holders of coal and aggregate sources would be contacted to discuss the best methods to minimize loss or sterilization of the materials.

Conclusions and Recommendations

Consultation with landowners regarding the visual appearance of the compressor stations is ongoing. Accordingly, any certificate should be conditioned to require that the Board be provided with the design solutions identified to mitigate concerns with the station appearance.

Recommendation 31

The Company shall submit to the Board, at least 30 days prior to the commencement of construction of each compressor and meter station, a description of the measures that would be incorporated in the design to address the visual impact of the station including:

(a) the rationale for proposing those measures; and

(b) the results of consultations undertaken with respect to those measures and an indication as to whether the persons consulted are satisfied with the use of those measures.

The information provided in respect of potential changes to health and socio-economic conditions resulting from environmental effects is satisfactory. Taking into consideration the mitigation proposed and the above-noted conditions, it is concluded that changes to the environment resulting from the Project are not likely to result in significant adverse environmental effects on health and socio-economic conditions.

4.15 First Nations

4.15.1 Consultation

Alliance initiated its Aboriginal consultation program in June 1996 with letters to approximately 50 Chiefs and Band Councils. Meetings and discussions were held, and consultation is continuing, with interested communities and groups including: Horse Lake, Doig River, Blueberry River, Sturgeon Lake, Kelly Lake, Alexander, Alexis, the Federation of Saskatchewan Indian Nations ("FSIN"), and Treaty 4 and 6 in Saskatchewan.

The proposed mainline route would cross the Alexander First Nation Land Claim Areas near Fox Creek from KP 403.4 to KP 405.2 as well as the Alexis First Nation Land Claim from KP 462.8 to KP 467.3.

Issues identified during consultations, field reconnaissance, and interviews with First Nations included:

- potential employment opportunities for Aboriginal contractors and individuals;
- land claims and potential land use;
- replacement of traditional names;
- incorporation of Aboriginal values into the assessment process and methodology;
- participation of the community, including elders, in traditional land use studies;
- use of herbicides and the effect on the food chain;
- contamination of water supplies such as streams;
- inadequate reforestation/reclamation and a lack of consultation regarding this matter;
- destruction of birch trees;
- deforestation and the effect on fur bearing animals such as marten, increased access for hunters, and corresponding decline in game;
- destruction of moose licks and medicinal plant collection areas;
- destruction of beaver ponds; and
- effects on traplines and associated compensation.

During the hearing, Alliance announced that Memoranda of Understanding ("MOUs") had been entered into between Alliance and the Horse Lake Band, the Sturgeon Lake Band, the Alexander Band and the FSIN, and Treaties 4 and 6. Alliance noted that the purpose of the MOUs is to establish and maintain relationships with the First Nations and noted that these agreements address matters such as:

- identification of short- and long-term business joint ventures and employment opportunities and ongoing maintenance and operational opportunities;
- identifying investment opportunities;

- working together to establish a sense of understanding, trust, and mutually-shared responsibility;
- using "reasonable efforts to involve the First Nations in the construction and ongoing maintenance and operation of the pipeline";
- development of a process of mutual co-operation, consultation, and training to achieve short- and long-term business joint ventures and employment opportunities for the First Nations, and to jointly assign responsibility for such initiatives;
- ensuring that there are identifiable economic benefits to both Alliance and the First Nations;
- assisting Alliance in meeting its business objectives;
- continuing to discuss the issue of revenue resource sharing;
- undertaking discussions to achieve the objectives, establishing an Implementation Plan, carrying out the Plan, and producing the results necessary; and
- traditional site investigations and environmental protection measures.

Alliance noted that the MOUs are subject to the ongoing mutual agreement of the parties. Alliance submitted that the intention would be to continue to work with the Aboriginal communities to look for opportunities for First Nations throughout the life of the Project.

Alliance noted that in addition to the three MOUs signed in Alberta and the one signed in Saskatchewan, it anticipated being able to sign an additional one to two in Alberta and two in British Columbia.

Alliance is working towards the establishment of working agreements with the Blueberry River and Doig River First Nations. These agreements are anticipated to include measures that would ensure traditional aboriginal interests are protected and assist in the identification and implementation of business, employment, and community development initiatives relevant to the First Nations.

Alliance stated that it is keenly aware of the First Nations concerns and aspirations and noted that its work with First Nation communities illustrates Alliance's commitment to work with First Nations communities to identify mutually beneficial opportunities.

Aboriginal Pipelines, during the prehearing conference, brought a motion which, in part, requested that the Company be required to address the issue of employment of Aboriginal persons in a meaningful way.

The Indigenous Ecology Alliance questioned whether the consultations that Alliance conducted were properly designed to involve First Nations, the sufficiency of the consultations undertaken, and whether the consultations that had been conducted were consistent throughout the communities.

Chief Judy Maas, on behalf of the Treaty 8 Tribal Association, appeared conditionally at the Fort St. John regional hearing and stated that its intervention was to argue that the hearings were premature based on its submission that federal and provincial consultation obligations had not been met. Chief Maas submitted that Alliance's contact with some of the First Nations represented by this intervention does not address its concerns with the full scope, nature, and extent of the impact of the Project on all Treaty 8 First Nations People. Chief Mass further submitted that Alliance's efforts were not intended to replace a consultation process which is a constitutional and fiduciary obligation of Her Majesty the Queen in Right of Canada and Her Majesty the Queen in Right of British Columbia. The Treaty 8

Tribal Association, on behalf of the Blueberry River Indian Band, Doig River Indian Band, Halfway River First Nation, Prophet River Indian Band, and Saulteau First Nations, subsequently filed a motion which contended that federal and provincial consultation obligations had not been met with respect to the Project and that, as a result, the hearing should be adjourned. This motion for adjournment was denied. The Treaty 8 Tribal Association, in its closing argument, addressed similar issues and suggested the CSR for the Project could only be released after these consultations have taken place. The Treaty 8 Tribal Association also suggested that the issue of adequate consultation could be addressed through conditions to the certificate, if one were issued.

During the Regina regional hearing session, Chief Quewezance stated that the First Nations of Saskatchewan have forged an excellent relationship with Alliance and that the FSIN supports the Project because Alliance has satisfied the FSIN that Alliance will be sensitive to the FSIN's traditional territories in terms of environmental impact and respect its heritage resources, such as archaeological sites, sacred grounds, and burial sites. Chief Lindsay Cyr further stated that the FSIN and Treaty No. 4 and Treaty No. 6 support the Alliance proposal because of the Company's respect and openness to provide opportunities to First Nations.

Mr. Brian Fayant, President, Métis Regional Council Zone IV of the Métis Nation of Alberta Association appeared at the Edmonton regional hearing to ask questions of Alliance's witnesses on matters including Alliance's contractors, opportunities to participate in the Project, and training opportunities. Mr. Fayant noted that his appearance was to speak on behalf of the Métis Community, which together with the First Nations is the fastest growing population in Canada, and needs opportunities for its young people and members. Mr. Fayant further noted appreciation for the commitments from Alliance and noted that their appearance was to express for the record, the Métis Community's needs.

At the Edmonton regional hearing session, Chief Arcand, on behalf of the Alexander First Nation noted that they would be affected by the Project as the pipeline would cross lands in the Fox Creek area that are the subject of a land agreement with the Federal Government. Chief Arcand appeared at the hearing to speak to the Alexander First Nation's support of the Project. Chief Horseman, on behalf of the Horse Lake Band, also appeared at the hearing to support the Project. Both Chief Arcand and Chief Horseman noted this support was a result of Alliance involving the First Nations in the Project, economic spin-offs, and long-term employment.

4.15.2 Current Use of Lands and Resources for Traditional Purposes

The *CEAA* defines environmental effect, in part, to be "... any change that the project may cause in the environment, including any effect of any such change on ... the current use of lands and resources for traditional purposes by aboriginal persons..."

Project activities could potentially affect traditional sites having both a social and economic importance. Specific site types that could be affected include cabins, trails, unrecorded and traditional burial sites, sites used for spiritual purposes, medicinal and other plant collection areas, potable water supply areas, fishing, hunting and trapping activities. Sites of traditional use and concern can be affected during all aspects of project development from assessment to reclamation. Aesthetic values and proximity of development zones to significant traditional spiritual sites are also of concern to First Nations peoples.

Alliance contacted First Nations groups to identify their issues and concerns with respect to the Project route across their traditional territory. In these contacts, the confidential nature of the sites was acknowledged and Alliance stated that its goal was the preservation of any sites that may be affected by the Project. Additional studies were conducted with the Kelly Lake Cree, Sturgeon Lake, Alexis, and Alexander First Nations. Alliance also noted in its supplementary information that it had reached an agreement with the Blueberry River and Doig River First Nations to assess potential effects on archaeological and traditional use sites. The specific program for identifying issues of concern was developed individually with each band.

Concerns relating to traditional activities were expressed by the Sturgeon Lake and Kelly Lake First Nations. Specific traditional use sites of concern potentially affected by the Project are set out in Table 4-12.

No concerns relative to traditional activities were expressed by the First Nations groups contacted within Saskatchewan. The FSIN requested participation in a construction monitoring program to ensure that proper protocol was observed in the event that burial sites were encountered during ditching operations.

Consultation is continuing with regard to the above-noted sites and Alliance noted that it would continue dialogue with Aboriginal communities until such time as concerns are resolved. Alliance further noted that part of ongoing consultations include discussions with First Nations communities to assess potential effects on traditional use sites.

Table 4-12
Traditional Use Sites Potentially Impacted by the Project

Traditional Use Site	Site-Specific Issue
GdQn T1	Otin Meta wiwin (Wind's Playground), named Misery Mountain by settlers, would be crossed by the mainline right-of-way. The site is currently used by the Sturgeon Lake First Nation as a major focus for hunting activities. The site is of high traditional value as a traditional hunting area, a cultural landmark and the focus of traditional stories.
GdQn T3	Moose lick within the mainline right-of-way. This site is currently used by the Sturgeon Lake First Nation and is a major focus for hunting activities.
GcQj T1	Pack trail intercepted by mainline right-of-way. The site is of ethnic significance to the Sturgeon Lake First Nation and the Project would impact the trail and the associated activities.
Sardine Lake	The specific location of this site and its relationship to the Project is unknown. This locality is identified as having been used in the past by the Beaver Indians as a winter fishing camp and is of high traditional and ethnic value as a traditional fishing station, landmark, and spiritual site.
Little Smoky Village	The specific location of this site and its relationship to the Project is unknown. This Sturgeon Lake First Nation settlement is assumed to have graves associated with it and it is of high traditional and ethnic value as a traditional fishing station, landmark, and spiritual site.

Conclusions and Recommendations

Aboriginal groups were among the key stakeholders identified by Alliance in respect to the Project. Commencing in June 1996, Alliance contacted First Nation communities located along the proposed Project. Its purpose was to establish long-term relationships with interested communities and to encourage involvement in the environmental process, particularly as it pertained to impacts on traditional resource uses and sites. Alliance submitted that key stakeholders were contacted to provide an opportunity to provide input on decisions that may directly affect them and their communities. In addition, Alliance identified means by which First Nations communities could take advantage of economic opportunities associated with the Project and entered into MOUs to work with several of the First Nation communities along the Project to this end.

Representatives of several of the First Nation communities potentially affected by the Project in Alberta and Saskatchewan spoke at the Heating in support of the Project. These representatives noted that, in part, their support was a result of Alliance's efforts to involve their communities in the Project. The dominant issues identified by these First Nations were respect for their communities and the need for meaningful participation by their communities and members in projects such as the Alliance Pipeline.

Environmental changes that may have an effect on First Nation communities can be identified by undertaking traditional use studies. Traditional use studies may cover lands beyond those that would be affected by the Project. Alliance, in its contacts with First Nation communities and groups, noted the confidential nature of traditional use sites and alluded to the sensitivity that can be associated with the public disclosure of these sites.

Beyond the traditional use sites identified by the Sturgeon Lake and Kelly Lake First Nations, no concerns regarding specific sites or resources that would be potentially impacted by the Project were identified. However, further consultations were recommended for those sites identified. In addition, Alliance stated that it is continuing to work with First Nation communities regarding the issue of traditional use sites. It is observed that future concerns may arise in the event that variations to the Project routing are proposed. In addition, although the community-led Archaeological Assessment for the portion of the Project that would be located in British Columbia was provided, the results of work with First Nations communities regarding traditional use sites within the province were not submitted during the public hearing. Accordingly, it is recommended that Alliance be required to file any issues of concern identified in British Columbia, any issues of concern identified as a result of Alliance's ongoing work, and the results of discussions pertaining to the specific sites identified, including any measures that would be undertaken to address the concerns identified.

Recommendation 32

Unless the Board otherwise directs, the Company shall file with the Board, at least 30 days prior to the commencement of construction:

(a) confirmation that identification of issues of concern in respect of traditional use sites has been completed with First Nations communities including, but not limited to: Doig River, Blueberry River, and Halfway River including:

(i) a listing of issues by First Nation;

(ii) the measures proposed to mitigate the issues identified in response to (i); and

(iii) any comments from the respective First Nations on the measures identified in response to (ii);

(b) confirmation that the following consultations regarding traditional use sites have been completed and a description of the mitigation proposed:

(i) with the Chief and Council of the Sturgeon Lake First Nation regarding the mitigation at sites GdQn T1, Otin Meta wiwin, GdQn T3, moose lick, GcQj T1, pack trail, Sardine Lake, and Little Smoky Village;

(ii) with the Sturgeon Lake and the Kelly Lake First Nations regarding land use practices which may be affected by the construction of the pipeline; and

(iii) with the Saskatchewan Federation of First Nations in respect of monitoring burials potentially encountered during ditching operations.

In addition to the evidence on potential conflicts with traditional use sites filed in support of the Project, evidence on land use and the resources in the area, including wildlife, fisheries, vegetation and the general topography was also submitted. The environmental effects and proposed mitigation measures pertaining to vegetation, fisheries, wildlife, and trapping and hunting are addressed in sections 4.5, 4.7, 4.8, and 4.16 respectively. Alliance's ongoing public involvement program that was utilized in issue scoping and the collection of baseline information is described in Chapter 3.

The Treaty 8 Tribal Association took a different view in relation to the proposed pipeline. It argued that both the Board and other federal and provincial government departments have a duty to consult broadly in relation to the proposed project. Counsel for the Treaty 8 Tribal Association also pointed out the requirement under the *CEAA* to consider the effects of environmental change on the current use of lands and resources for traditional purposes by aboriginal persons. Counsel referred to the case

of *Union of Nova Scotia Indians* v. *Canada* (Attorney General) [(1997) F.C.R. 325 (F.C.T.D.)]. In that case, within the context of the *CEAA*, consultation was tied to the requirement to consider the effects of the environmental changes resulting from the project on the current use of lands and resources for traditional purposes by Aboriginal persons.

In its ruling issued under covering letter dated 16 April 1998, the Board addressed the question of the role of the Board with respect to the issue of consultation between the Crown and First Nations. Therefore the views set out below relate to the arguments of Treaty 8 on the question of consultation within the framework of the *CEAA*.

As an RA, the Board has a statutory obligation to ensure that appropriate consideration is given to the effects of the environmental changes resulting from a project on the current use of lands and resources for traditional purposes by Aboriginal persons. In the course of carrying out this obligation under the *CEAA*, when it appears that such effects could occur, an RA should ensure that an opportunity for consultation with Aboriginal persons on these effects takes place. The kind, nature, and degree of consultation can vary depending on the facts of each particular situation.

In this case, other than the intervention by the Treaty 8 Tribal Association, none of the Aboriginal communities participating in the environmental assessment of the Project expressed concerns with the consultation processes undertaken, including the public hearing process used to gather the information necessary to complete this CSR. The Treaty 8 Tribal Association chose to intervene conditionally in the public hearing process for the limited purpose of arguing its motion seeking an adjournment of the hearings and to make final argument. It did not otherwise participate in the public hearing process leading to the preparation of the CSR. It filed no evidence nor did it question the proponent or other parties. Despite being afforded the opportunity to do so, it did nothing during the course of the public hearing to raise any issues it might have about the effects of the Project above the level of mere concern and speculation.

The Treaty 8 Tribal Association represents a number of First Nation communities. Of these, the three Treaty 8 First Nation communities with lands in British Columbia closest to the proposed pipeline are the Halfway River, Blueberry River, and Doig River First Nations. The Halfway River First Nation has lands approximately 20 km south of the proposed Aitken Creek Lateral. The Blueberry River First Nation has lands about 10 km from the lateral and the Doig River First Nation has lands about 25 km from both this lateral and the Boundary Lake Lateral. Alliance has met with the Halfway First Nation. The Blueberry River and Doig River First Nations have had ongoing meetings with Alliance representatives and entered into an agreement with Alliance which allowed them to both choose and work with a consultant to identify archaeological sites. An agreement has also been reached with the Blueberry River and Doig River First Nations which provided for a community liaison worker to be employed in their communities. This Archaeological Assessment study was undertaken by Heritage Resources North Consulting Limited with the assistance of First Nations members, completed and filed in evidence. In this Assessment, part of the working hypothesis for delineating archaeological sites was that if a terrain feature

were interpreted to be useful today for a specific hunting or camping purpose that it has a predictable potential to contain archaeological resources. No evidence of current use was reported for any of the archaeological sites identified.

Over 30 per cent of the land along the Aitken Creek Lateral has been modified for use as pasture, hay, or is cultivated. Seventy per cent of the land along the approximately 51 km Boundary Lake Lateral has similarly been modified. Alliance further estimated that 8.2 km of right-of-way not parallel to existing rights-of-way would be required for the approximately 132 km long Aitken Creek Lateral.

In view of these facts, the Board, as lead Responsible Authority, is satisfied that appropriate environmental assessment consultation with First Nations has occurred in this instance. It has adequate evidence to consider the effects of any changes in the environment caused by the proposed project on the current use of lands and resources for traditional purposes by Aboriginal persons.

As is set out in the sections pertaining to vegetation, fisheries, wildlife, and trapping and hunting (sections 4.5, 4.7, 4.8 and 4.16 respectively) the Project is not likely to result in significant adverse environmental effects on these resources. Accordingly, significant adverse effects of changes in the environment on the current use of lands and resources for traditional purposes by Aboriginal persons are unlikely unless there is a direct conflict between the Project and locations that are subject to current use for traditional purposes. Alliance noted that discussions pertaining to the potential effects on traditional use sites were ongoing. Given the nature of the Project, a linear development, largely paralleling existing linear developments, the topography of the area, and the information known about both the lands and the resources traversed by the proposed pipeline, appropriate mitigation measures are available to ensure that no such significant effects could result from the proposed Project. In the event that a conflict is identified, measures to mitigate these effects, including avoidance, have been identified in this and the above-noted sections.

Considering the evidence, changes in the environment resulting from the Project are not likely to result in significant adverse effects on the current use of lands and resources for traditional purposes by Aboriginal persons. This conclusion is based on the implementation by the Company of its proposed mitigation measures and the recommendations set out in this CSR.

The question of meaningful participation by Aboriginal persons in the business and employment opportunities offered by the Project will be addressed in any Reasons for Decision that may be issued in relation to Alliance's application for a certificate of public convenience and necessity.

4.16 Renewable Resources

4.16.1 Potential Environmental Effects

4.16.1.1 Farming and Ranching

Landowners identified a number of potential concerns regarding ranching and farming practices that could be directly affected by construction of the Project. Specific concerns pertain to crop damage, weed problems, property damage, disruption of irrigation systems, damage to fences, gates being left open, isolation of livestock from their water supply, safety of livestock near open trenches, and movement of farm equipment over and around right-of-way and road crossings.

4.16.1.2 Forestry Industry

An estimated 192.6 ha and 208 ha of merchantable timber would be removed from the Forest Management Areas ("FMAs") for the mainline and lateral pipelines respectively. Of primary concern to the FMA holders is the cumulative loss of land base as a result of permanent land withdrawals such as pipelines, oil and gas wells, compressor stations, gas plants, power lines and roads, and the potential reduction to Annual Allowable Cut in order to maintain sustainable forests.

The only location in the Alberta Green Area where Alliance is expected to encounter active timber harvesting during mainline construction is the Saddle Hills (KP 95 to KP 125). The pipeline would encounter several permanent sample plots along the mainline and laterals in addition to an experimental tree thinning site. During consultation, the FMA holders and resource management agencies identified some sites as critical to long-term research, while others were identified as having no long-term significance.

4.16.1.3 Trapping, Hunting, and Outfitting

Short-term disturbance of furbearing animals and trapping activities would occur in the immediate vicinity of the construction work due to the presence of heavy equipment and workers in the area. Effects would be restricted to the winter.

As construction would occur outside of the big game hunting season in the Alberta Green Area, wildlife dispersion would not be an issue. However, where construction is scheduled during the summer and fall (June to November), it could overlap two to three months of hunting and fishing seasons. Big game, game birds, and sport fish are likely to be disturbed in the areas adjacent to construction.

4.16.1.4 Outdoor Recreation

With the possible exception of the Whitecourt family boating event on the Athabasca River, the construction schedules for the major river crossings would not impact any annual water sport events.

Winter construction on the mainline and laterals could result in trails being inaccessible for up to six weeks during construction. The mainline would traverse designated cross-country ski trails east of Whitecourt, and the Two Creeks, Edson, and Edson West Laterals would cross designated snowmobiling trails.

The mainline would traverse a local golf course at the Town of Kerrobert, Saskatchewan, and summer construction would disrupt the golf season.

In addition, use of designated recreation areas could be adversely impacted by the proximity to mainline and lateral construction activities. The areas affected would be: Big Mountain Creek Forest Recreation Area; Smoky Flats Forest Recreation Area; Iosegun Lake Provincial Recreation Area; Two Creeks Provincial Recreation Area; Carson-Pegasus Provincial Park; and Paddle River Dam Provincial Recreation Area.

4.16.1.5 Downstream Water Users

Instream activities have the potential to raise the suspended sediment load to a level where the water is not suitable for use by downstream water users.

4.16.2 Mitigative Measures

4.16.2.1 Farming and Ranching

Landowners, range improvement lease holders, and PFRA managers have been, and would continue to be, provided advance notice of construction to provide them with an opportunity to relocate livestock. If this is not possible, the Company would ensure that all gates are kept closed, access plugs are provided to access water supply, and, in the event livestock is reluctant to cross the trench, arrangements would be made to provide a temporary water supply.

The mainline and laterals would be installed at a depth of 1.1 m in cultivated areas, which would be below the normal depth that farm machinery would penetrate the soil during tilling, planting, and harvesting.

Irrigation canals and large ditches would be bored. Flood irrigated land would be surveyed to ensure that original grades are retained. Where an irrigation pivot wheel intersects the trench, the trench would be backfilled, plugged, or bridged.

Temporary fences would be erected, as required, to prevent livestock from entering the right-of-way if alternative pastures are not available. Pasture and hay land would be revegetated to the landowner's request or with the appropriate mix for the ecoregion. Landowners would be compensated for movement of irrigation systems, crop loss and disruption of farming activities. Trenching and backfilling equipment would be cleaned daily in weed infested areas. Pre-construction activities would be restricted to the vicinity of the right-of-way.

4.16.2.2 Forestry Industry

Alliance will meet with FMA holders prior to construction to identify potential conflicts such as road and harvest block crossings and appropriate mitigation.

The Company will continue to seek permission from existing pipeline and utility companies to use a portion of the adjoining right of way to reduce the overall right-of-way requirements.

The issue of permanent sample plots and tree thinning projects is being discussed with the appropriate forest companies and agencies. If the site is critical to long-term research, narrowing of the right-of-way or rerouting would be considered.

4.16.2.3 Trapping, Hunting, and Outfitting

Holders of registered traplines would be contacted prior to construction to permit relocation of trap sets, fur caches and other equipment as necessary. Registered trappers would be compensated for the short-term disruption, inconvenience, costs associated with moving traplines, reduced harvest, and repair of trails.

Existing access for hunting and fishing would be maintained. No mitigation measures, other than those identified in section 4.7 on Fish and Fish Habitat and section 4.8 on Wildlife and Wildlife Habitat, are planned for temporary disturbance.

Outfitters with big game allocations in wildlife management units traversed by the right-of-way would be contacted prior to construction.

4.16.2.4 Outdoor Recreation

Contact would be maintained to minimize impacts to the Kerrobert golf course. The construction and reclamation plan would be prepared in conjunction with the golf course to minimize disturbance and compensation would be discussed in the event of inconvenience and lost revenues.

Actively used skiing, snowmobiling, or walking trails would not be blocked for more than five days and attempts to restore trails for weekend use would be made where possible. Trench plugs, gaps, or other methods would be utilized to provide continued passage.

Construction would be restricted between 7:00 p.m. and 7:00 a.m. within 1.6 km of any designated campground.

Known user groups which may be affected would be contacted. In accordance with navigable water permits, notification of construction schedules would be placed in local papers and warning signs would be placed upstream and downstream.

Alberta Environmental Protection, SERM, and MELP would be contacted prior to construction.

4.16.2.5 Downstream Water Users

Licensed water users would be identified and contacted to determine the nature and sensitivity of water withdrawal requirements and to develop appropriate mitigative measures. In most cases the water user would be notified prior to the instream activity so that water withdrawal could be postponed. In cases where the water usage is not sensitive, withdrawal could continue throughout construction.

Conclusions

Issues associated with the above sections are addressed in further detail in the sections on Vegetation, Hydrology, Fish and Fish Habitat, and Wildlife and Wildlife Habitat (4.5, 4.6, 4.7, and 4.8). Satisfactory information has been provided on renewable

resources. The Project is not likely to cause significant adverse environmental effects on renewable resources. Accordingly, the capacity of those resources to meet the needs of the present and those of the future is not likely to be significantly affected.

4.17 Cumulative Environmental Effects

4.17.1 Methodology

Alliance designed its cumulative effects assessment ("CEA") with a focus on the Project; however, the Company distinguished the CEA from the project-specific assessment by including consideration of a larger geographic study area for relevant environmental indicators, a longer time frame, and an assessment of the interaction between the Project and other projects or activities. The Company stated that the CEA was built on, and supplemented, the local and sub-regional analysis that formed the Project specific assessment. Other works and activities that were identified as having the potential to act cumulatively with effects from the Project included linear features such as other pipelines, seismic lines, and roads, along with oil and gas wells, gas plants, forestry activities, agriculture, and hunting.

In order to identify potential environmental and socio-economic issues, Alliance conducted a public consultation process that included workshops specifically geared to the topic of cumulative effects. Federal and provincial regulatory agencies, non-government environmental organizations, and other interested persons participated in the workshops. Comments were provided on the scope of the assessment, the assessment definitions, and the indicators which should be used.

Because of the long distance and variety of landscapes covered by the Project, Alliance divided the Project into six geographic areas which it submitted have relatively consistent environmental, social, and project conditions. The segments are as follows:

Segment 1: Aitken Creek, B.C. to Gordondale, Alberta;
Segment 2: Gordondale to the Wapiti River;
Segment 3: Wapiti River to Mayerthorpe;
Segment 4: Mayerthorpe to Fort Saskatchewan;
Segment 5: Fort Saskatchewan to Alberta/Saskatchewan Border; and
Segment 6: Saskatchewan.

The segments were further divided into representative map sheet areas for detailed study. The representative areas were chosen based on the following criteria:

- include both common and uncommon biophysical conditions;
- reflect relevant ecological boundaries;
- reflect the size and nature of the Project and its potential effects;
- reflect the nature and location of past and future projects and activities;
- reflect relevant administrative boundaries; and
- availability and utility of existing knowledge.

Alliance also selected a suite of representative species, parameters, communities, and habitats as indicators for the CEA. Some of the indicators used in the assessment were compiled from suggestions provided during the public sessions based on their sensitivity to potential effects, ecological importance, human-use values, special conservation status, the availability of relevant data,

and the ability to be monitored. In Volume IV of the application, Alliance provided a description of each indicator and rationale for their use. The indicators used by Alliance are summarized in Table 4-13.

Table 4-13
Cumulative Effects Assessment Indicators

Factor	Indicator	Application/Scope of Use
Air Quality	NO_2	compressor emissions; regional airshed basis in all segments
Native Vegetation	Mature Forest Aspen Parkland Grassland (native prairie)	aerial extent of terrestrial disturbances and secondary effects on wildlife habitat and forest resources in all segments
Ungulate	Moose	combined disturbances on an ungulate species of management concern and associated habitat in segments 1 and 3
Large Carnivore	Grizzly Bear	combined disturbances on a large carnivore species of management concern and associated habitat in segment 3
Small Carnivore	Marten	combined disturbances on a small, economically important carnivore species and associated habitat in segments 1 and 2
Avian Neotropical Migrant Waterbird Gamebird Shorebird	 Black-Throated Green Warbler Trumpeter Swan Sharp-tailed Grouse Long-billed Curlew	combined disturbance on avian species of management concern and associated habitat in segments 1, 2, 5, and 6 respectively
Aquatic	Fisheries Habitat Capability	net change in habitat capability resulting from combined disturbance; watershed based; all segments
Coldwater Aquatic	Arctic Grayling	combined disturbance on spring spawning species of management concern and associated habitat in segments 1 and 3
Coldwater Aquatic	Bull Trout	combined disturbance on fall spawning species of management concern and associated habitat in segment 3
Landscape Index	Access Density (km of right-of-way per km^2)	combined disturbance caused by increase in access and fragmentation; all segments

Landscape Index	Stream Crossing Density (number of stream crossings per km of stream)	combined disturbance caused by increase in access and sedimentation; all segments
Landscape Index	Total Cleared/Disturbed Area Total Edge Area Core Areas	combined effect on subregional and regional habitat availability, fragmentation, and connectivity; all segments
Resource Use	Traditional Land Use Trapping Forestry Semi-Primitive Recreation Agricultural Use	combined effects on current use patterns; all segments (resource use varies with segment)
Heritage or Archaeological Resources	Frequency and Rarity	combined effect on historical resources of social and cultural significance; provincial basis; all segments

Different study boundaries were applied to those factors which were more appropriately analyzed over a broader geographic scope, such as heritage resources and air quality. A separate watershed-based CEA was conducted on fish and fish habitat resources. In respect of heritage resources, cumulative effects and their significance were considered on a provincial basis, based on the existing archaeological/heritage resource databases. Buffers were applied to the landscape index used for assessment of impacts to core habitat areas. Air emissions were studied on a regional airshed basis. Project emission levels, which take into account emissions from other activities within the airshed, were compared to the federal maximum acceptable levels. Alliance stated that since those levels were established based on potential effects on organisms, the analysis was not taken further to consider potential pathways on other indicators. The acoustic environment was not formally included in the CEA. Alliance acknowledged that noise has the potential to act in combination with other effects to either fragment or stress the physical environment. However, Alliance submitted that, with respect to noise, the entire methodology for assessing noise effects is based on the premise of predicting how the proposed noise source would add to the existing ambient levels. Further details of the specific cumulative effects assessments conducted for heritage/archaeological resources, air emissions, noise, and fish and fish habitat were provided by Alliance in the topic-specific reports that formed part of the application (refer to Appendix V).

Three time periods were used in the Alliance CEA:

- pre-construction: 1996 to the first half of 1998;
- construction: the second half of 1998 to the end of 1999; and
- operation: 2000 to 2025.

The potential cumulative impacts on the indicators were assessed using the same criteria as in the project-specific assessment, with the exception of the definition of magnitude. The definition of magnitude was changed to incorporate the concept of disturbances from the Project acting in combination with other projects and the definition referred to regional plans as a measure of magnitude. For example, the definition for a medium magnitude cumulative effect reads as follows:

> "incremental or combined disturbance will elevate effect above existing background conditions or affect regional population, but cumulative effect will be consistent with regional plans and within established or derived social tolerance, guidelines, standards, criteria or thresholds (eg. federal air quality objective) for the indicator being considered."

High magnitude cumulative effects would be those effects which exceed the above-noted parameters.

The RMEC questioned the scope of Alliance's CEA, completeness of the data, appropriateness of the cumulative effects assessment criteria definitions, and Alliance's evaluation of the potential effects. The RMEC also presented evidence by way of its own CEA for selected components of the Project.

The RMEC argued that the Board had inappropriately narrowed the scope of the factors to be considered in relation to cumulative effects. Pursuant to the scoping decision, Alliance was required to consider "the combined effects of existing or background conditions, the Alliance Project, and all relevant other projects and activities for which formal plans or applications have been made ... for the overall construction and operations period (i.e. the 27 year period from 1998 to 2025)".

The Board further ruled on the meaning of "relevant" as it referred to "other projects and activities" to be considered in the CEA. This ruling was given as a result of questioning by the RMEC of a witness panel and for the purpose of delineating when evidence in relation to cumulative effects was relevant. In doing so, the Board followed the line of reasoning adopted in the Express Pipeline Decision. This ruling is reproduced in Appendix VI.

The RMEC argued that a requirement in that ruling that the environmental effects from the Project "must be demonstrated to operate cumulatively with the environmental effects from other projects or activities" goes beyond the requirements of the *CEAA*. Arguing that the Board's requirements were more onerous than the *CEAA*, the RMEC also took issue with the Board's requirement that future projects are to be included in the assessment of cumulative effects where those projects or activities are ones for which formal plans or applications have been made.

In respect of Alliance's approach to the analysis of cumulative effects, the RMEC submitted that Alliance should have assessed the impacts of past activities, the impacts of the Project, and the impacts of future activities, and then should have considered them in combination. Alliance claimed that this would be impractical and could even be misleading in the context of a project-specific CEA.

In terms of past effects, Alliance noted that it did not assess the effects of various projects and activities prior to the baseline conditions independent of the Project. Alliance stated that its approach to CEA assumed that baseline conditions manifest the impacts of past cumulative impacts and that any potential impacts created by the Project would be incremental to the existing conditions.

The RMEC also submitted that Alliance did not use readily available information sources for identifying projects that may act cumulatively. The RMEC suggested alternative sources of information that, in its view, could have been used. In response, Alliance provided rationale for why it had chosen certain information sources and not others, including several sources suggested by the RMEC. Particular examples of where differences of opinion existed on the use of data sets included forestry, agriculture, upstream oil and gas wells, and seismic activities.

The RMEC also criticized Alliance's CEA for the Project in respect of its definition of magnitude and its application in the determination of significance. The RMEC stated that the use of regional plans in most cases was not appropriate since many of the plans did not have specific goals or objectives with respect to the indicators being measured. In argument, the RMEC requested the Board to reject out-of-hand any reliance on municipal plans or other government plans in the analysis.

4.17.2 Potential Cumulative Environmental Effects

The potential cumulative effects that may result from the combination of impacts from the Project with those of other projects are similar to the potential project-specific impacts, but may have different probability, magnitude, duration, and frequency. The resources most likely to be impacted by Alliance, in combination with other projects, include native vegetation, wildlife and wildlife habitat, fish and fish habitat, and heritage and archaeological resources. Air emissions are also anticipated to have a cumulative impact on the environment.

The main cumulative impact to vegetation would be the reduction in forest habitat, and to some extent, other native vegetation communities. In most representative areas two per cent or less of the native vegetation would be cleared for construction. It is also anticipated that the long-term effects would be lessened after revegetation had taken place. However, facility sites would remain clear of vegetation, and in forested areas, part of the right-of-way would be kept clear of trees in order to facilitate operation, monitoring, and inspection.

With respect to wildlife and wildlife habitat, the most likely potential cumulative impacts of the Project would be overharvesting or increased disturbance due to increased access, habitat fragmentation, and direct loss of habitat. Although these issues are also discussed in section 4.8 of this report, Alliance also incorporated them into the CEA. The five landscape indicators described by Alliance in its CEA (see Table 4-13) were used to measure the potential cumulative impacts resulting from increased access, habitat fragmentation, and direct habitat loss. Further analysis of such impacts were covered indirectly in the CEA through discussions of cumulative impacts on moose, grizzly bear, marten, and warblers. With the application of the assessment criteria to the numerical landscape indices and the use of habitat disturbance thresholds for the wildlife species, Alliance concluded that the effects would be insignificant.

The RMEC questioned Alliance's analysis of cumulative impacts to grizzly bear habitat, pointing out that the model used by Alliance did not apply "buffers" to seismic lines. The RMEC argued that such buffering would show a significant adverse impact to grizzlies. Alliance submitted that, in its view, it was not appropriate to buffer seismic lines. In support of its argument, Alliance submitted that if seismic lines were buffered in the model, the results would indicate that female grizzlies would not live in the area when empirical evidence indicated that they do. Alliance also submitted that, cumulatively, access for hunters would not be increased significantly because the Project was routed adjacent to existing access for much of the route in forested areas.

The most likely potential cumulative impacts upon fish and fish habitat would be potential overfishing due to increased access, increase in sediment load, and direct habitat loss at crossing sites. Alliance anticipates a low degree of impact overall, primarily because of the following:

- a lack of fish and suitable fish habitat at many of the proposed water crossings, particularly in the North and South Saskatchewan and Assiniboine watersheds;

- a limited potential for downstream transport of sediment at many crossings; and
- application of appropriate mitigation and reclamation.

In respect of cumulative effects to fish and fish habitat, the RMEC expressed concerns regarding the potential for increased sedimentation resulting from numerous Project crossings in combination with other projects which involve clearing of riparian vegetation. The RMEC was of the view that Alliance did not properly consider this cumulative impact. Alliance indicated that the right-of-way would be reclaimed and drainage would be controlled such that there should be minimal residual long-term impacts from erosion.

Although the acoustic environment was treated separately from the formal CEA for the Project, the issue of the cumulative effects of separate aerial patrols conducted on adjacent pipelines was raised. Alliance noted that ground level measurements of aircraft performing aerial patrols have not been undertaken to date. Alliance stated that it would consider undertaking such studies and further submitted that the effects of aerial patrols were addressed through the use of a 500 m buffer on either side of disturbance features, which accounted for a variety of effects, including noise and activity.

4.17.3 Mitigative Measures

Alliance has submitted that it would apply mitigation to project-specific impacts which would also avoid or reduce potential cumulative effects. The project-specific measures are discussed in the relevant sections above. Some examples of measures that would directly reduce specific cumulative effects include the use of noise and air emission reduction technologies and routing adjacent to other linear corridors.

Alliance submitted that noise effects associated with aerial patrols had been mitigated through measures such as scheduling patrols to minimize patrols during the dusk and dawn periods in order to reduce the possibility of frightening grizzly bears along the right-of-way and in response to landowners' requests that patrols not be flown too close to specialized operations.

Conclusions

With respect to the RMEC's contention that the Board had inappropriately narrowed the scope of factors to be considered in relation to cumulative effects, it is noted that, by virtue of subsection 16(3) of the *CEAA*, the RA is to determine the scope of the factors to be considered in the assessment. This usually involves the establishment of some boundaries (as to time and space) in relation to the factors so that the resulting assessment is appropriately focussed. The Board established those boundaries and is of the view that it properly exercised its discretion in relation to its determination of the scope of the factors, and in particular in relation to the aforementioned requirements for assessment of cumulative effects. As to the RMEC's argument that the Board's ruling on cumulative effects went beyond the requirements of the *CEAA*, it is noted that this argument has already been dismissed by the Federal Court of Appeal in *Alberta Wilderness Association* v. *Express Pipelines Ltd.* [(1996) 201 N.R. 336 (F.C.A.)]

It is concluded that the scope of Alliance's CEA was consistent with the scope of assessment as determined throughout the public scoping process (Appendix III) and further clarified by the Board in its 26 February 1998 ruling (Appendix VI).

The methodology employed by Alliance in undertaking its CEA was reasonable and provided sufficient information to enable an assessment of the potential cumulative environmental effects associated with the Project. It is noted that regional plans were used as one of the measurements for the magnitude of cumulative effects. Although some regional plans could be useful in providing context for the assessment, their application in the assessment would be specific to the plan and therefore could be of limited value. However, Alliance provided sufficient information to enable a finding to be made in respect of the potential cumulative environmental effects associated with the Project irrespective of Alliance's partial reliance on regional plans in assessing the magnitude of cumulative effects.

Alliance is strongly encouraged to pursue discussions with companies owning pipelines parallelled by the Project regarding combined aerial patrols for right-of-way monitoring once reclamation measures have been completed. The results of these discussions would be of interest to the Board.

Based on the information provided, and with the implementation of the proposed mitigative measures and recommendations, it is concluded that the Project is not likely to cause significant adverse cumulative environmental effects.

4.18 Effects of Accidents or Malfunctions

4.18.1 Potential Environmental Effects

Accidents and malfunctions have the potential to affect human health, soils, vegetation, wildlife, aquatic resources, natural features, buildings, and property. Accidents and malfunctions associated with the construction and maintenance of the Project would include:

- fires resulting from clearing and slash disposal operations, vehicle exhausts or welding;
- hydrocarbon spills from vehicles and hydraulic hose ruptures;
- damage to existing unidentified buried infrastructure (i.e. pipelines and cables) during trenching; and
- failure of erosion control measures on slopes in the event that either breakers or berms are not capable of handling runoff.

In respect of pipeline operations, potential environmental effects would also be associated with minor or major releases of natural gas in the event of a pipeline facility leak or failure. In these circumstances, natural gas would be dispersed to the atmosphere or would ignite. In the case of the Project, the most potentially damaging accident or malfunction would involve a large leak or rupture of the operating pipeline. Alliance submitted that available data for Canada and the U.S. consistently demonstrate that the transportation of material by pipeline is significantly safer than by rail, highway or air. The Centre for Engineering Research Inc. estimated in its risk sensitivity study for the proposed pipeline that, given the design of the pipeline, the failure probability would be reduced to about 10 per cent of the North American commodity pipeline industry average. Potential effects

include the loss of vegetation in the immediate area, loss of soil caused by the gas release, and thermal damage to soil resulting from fire. The nature and potential significance of the effects of such an event could be highly site-specific depending on the time of year, physical characteristics of the area, the ecosystem in which the event occurred, and the activities undertaken by the emergency response crew.

The pipeline system would be monitored on a continuous basis using an advanced Supervisory Control and Data Acquisition ("SCADA") system. In the event of a leak or rupture, the Company's emergency response plan would be implemented and provincial, municipal, local, and federal emergency response teams and regulators would be notified and involved. The emergency response and repair crews would join first responder organizations and commence repair work. Two to five days is anticipated to be required to repair a break between mainline valves, with clean-up and reclamation requiring an additional two to five days.

To address the site specific variability, Alliance evaluated the potential effects of a large leak or rupture associated with three scenarios:

- the 1067 mm (42 inch) diameter mainline in the forested area of northwest Alberta;
- the 1067 mm (42 inch) diameter mainline at a major river crossing; and
- the 914 mm (36 inch) diameter mainline in the agricultural area of Alberta or Saskatchewan.

The following sections set out the potential effects for each of these three scenarios:

4.18.1.1 Accidental Release in a Forested Area

A large leak or rupture on the mainline would likely result in an explosion creating a crater up to 10 m wide. Sensors on the mainline valves would detect a pressure drop and shut-in automatically. After shut-in, gas would continue to disperse at a decreasing rate until atmospheric pressure is reached. If an ignition source was present the gas would ignite, possibly leading to fire in the surrounding area. The minimum calculated blowdown time for a 32 km segment of mainline pipeline through a single 324 mm (12 inch) valve would be 4.8 hours for 914 mm (36 inch) diameter pipe to 7.2 hours for 1067 mm (42 inch) diameter pipe.

The behaviour of the natural gas released would depend on the site and meteorology but, in most cases, a plume would rise vertically for at least 100 m, and would be restricted at ground level to the immediate vicinity of the rupture or leak.

Human Health

An accidental release may create a risk to human life in the immediate vicinity of the leak or rupture and the resulting surface plume area. Alliance submitted that in the event of an immediate ignition there would be a "life-safety risk" in the 60 m range.

Soils and Vegetation

An accidental release may have a direct effect on soils and vegetation in the immediate vicinity of the release (less than 0.1 ha). Vegetation is unlikely to be affected by short-term fumigation. Soils and

vegetation within and outside the right-of-way could also be affected by the emergency response and repair efforts. An individual or population of a rare or endangered plant species could be directly affected. Alliance submitted that this is considered to have a low probability of occurrence. Potential effects would be lowest in winter when snow cover would provide protection and plants would be dormant. In the event of ignition, the soil within the zone of an intense fire would basically be destroyed and the organic carbon would be burned up.

Wildlife

Impacts on wildlife would depend on the time and location of the accidental release with the overall mortality risk being highest during spring through fall when seasonally resident species are present. Mortality could occur in the immediate vicinity and the risk would increase in the plume area. One or more individuals of a rare or endangered species could be directly affected by an accidental release. The Company submitted that this is considered to have a low probability of occurrence. Collision mortality could occur as a result of response and clean-up efforts.

Wildlife could be disturbed and habitat altered by the release and the associated response efforts. The potential effects would be similar to those associated with pipeline construction and could be of greatest magnitude where activities occur in late winter of a severe snow year.

Aquatic Resources

Potential effects associated with aquatic resources are addressed in the next section. Small streams and watercourses along the right-of-way could be affected by alterations to riparian habitat and increased erosion.

4.18.1.2 Accidental Release at a Major River Crossing

An accidental release in a coldwater river would have similar effects to those that would occur in a forested area with the specifics depending on the site and weather conditions. Since the gas is buoyant, it would rise through the water column and would tend to displace dissolved oxygen in the plume. It is assumed that the initial force would be sufficient to break through the ice cover allowing the gas to vent to the atmosphere. Dissolved concentrations of methane would be small due to its low solubility in water. It is likely that any natural gas trapped in a gaseous form under ice cover would be continually dispersed by the river current.

Human Health, Soils, Vegetation, and Wildlife

Potential effects are expected to be similar to those identified for an accidental release in a forested area.

Aquatic Resources

Mortality is expected to be limited to the immediate vicinity of the accidental release. Although unlikely, mortality could also occur as a result of response and clean-up efforts. Overall mortality risk would be highest during winter if fish are congregated in an overwintering area that coincides with the location of the leak or rupture. Habitat mapping conducted for the Project indicated that this is

unlikely since most locations selected for the pipeline crossings are shallow with uniform cross-sections.

Instream and riparian habitat could be altered by the release and response efforts, and downstream habitat could be affected by sediment input. Disturbances would be similar to those associated with construction and could be of the greatest magnitude where stream flow is too great for isolated construction techniques or where activities are required outside of the least risk window.

4.18.1.3 Accidental Release in an Agricultural Area

An accidental release in an agricultural area and the associated effects are expected to be similar to those addressed in the accidental release in a forested area. Response may be facilitated by existing access.

4.18.2 Mitigative Measures

The following measures have been identified and adopted by Alliance in its environmental plans to address accidents and malfunctions:

- fire prevention and suppression:
  - Fire Contingency Plan developed in accordance with the *Fire Prevention Act, Prairie and Forest Fires Act* (1982), and the *Oil and Gas Conservation Act* and Regulations in Saskatchewan; the *Forest and Prairie Protection Act* and Regulations in Alberta; and the *Forest Practices Code of British Columbia Act - Forest Fire Prevention and Suppression Regulations* in B.C.;
  - a Fire Preparedness Plan would be filed with the Prince George Fire Centre for construction between April 1st and October 1st in B.C.;
  - trained Fire Boss to be designated for each construction spread;
  - additional fire watchers with radio contact in the event that construction activities are too spread out for the Fire Boss to manage;
  - construction crews will be briefed on fire hazards, locations of fire-fighting equipment and fire suppression procedures;
  - burning permits would be obtained from the appropriate municipal or forestry authority;
  - smoking outside of vehicles would be prohibited when fire hazard is high or extreme;
  - all vehicles would be parked in cleared or mowed open areas within approved work limits;
  - equipment would be maintained in good working order, construction equipment with spark arrestors or mufflers;
  - all equipment would carry fully charged fire extinguishers with large equipment such as dozers and sidebooms carrying two extinguishers and a shovel;
  - slash burning crews would have two fully charged extinguishers in addition to other fire-fighting equipment as required by forest district or municipal regulations;
  - water truck would be maintained on the right-of-way during clearing and slash burning during spring, summer, fall, and all periods of high fire hazard;
  - slash burning would be kept to a size that can be safely managed by the personnel available; and
  - fire-fighting equipment and crew would be deployed to plough or clear fire breaks or extinguish the fire directly if possible. All equipment and personnel would be made available to control the fire.

- hydrocarbon spill:
  - Spill Contingency Plan would be implemented;
  - containment measures would be implemented immediately;
  - sorbent material applied to contain and recover spill;
  - construction equipment would be continuously maintained in good working order as outlined in engineering specifications;
  - all vehicles would be fuelled and serviced at least 100 m away from a watercourse, wetland, or native prairie;
  - berms or trenches would be constructed to contain spill prior to entering water body;
  - if material enters a water body, booms, skimmers and sorbents would immediately be deployed, if feasible, to contain and recover spilled material;
  - contaminated topsoils and subsoils would be remediated or removed and replaced with soils of similar capability; and
  - contaminated areas would be cleaned up in consultation with spill response specialists and the appropriate government agencies.

- rupture of foreign lines and cables:
  - existing facilities would be located and flagged using "one call" services or by contacting the owners or operators of the facilities. All known locations of underground facilities would be carefully exposed in accordance with prescribed methods.

- failure of erosion control measures on slopes:
  - erosion control measures would be routinely checked during aerial reconnaissance and ground visits would be conducted for areas of concern or failure. Erosion control installations would be repaired and corrected and the area reclaimed as required. Topsoil would be salvaged, slopes regraded and erosion control structures replaced and improved.

While the risk of a pipeline rupture is low, the Company submitted that it has adopted specific design and operating measures, such as increased depth of cover and pipe wall thickness, to further minimize the risk of such an event. Operation and maintenance manuals and emergency response plans would be developed in consultation with local, municipal, provincial, and federal emergency response teams.

The emergency response plans would include the three scenarios identified. A relational data base containing information on landowners, occupants and lessees, transportation infrastructure, environmental sensitivity, emergency response contacts, and land use would also be provided. This information would be available to operations staff in the event of an accident and would be used to assist in planning and implementing the appropriate response to an incident.

Measures to reduce risks to human health would be implemented as the paramount priority. This would include immediate notification of any local residents, trappers, and industrial and recreational users in the vicinity, and implementation of access control measures to keep non-essential and unqualified personnel out of the incident area.

A restoration and reclamation program would be implemented as part of the emergency response program to reduce long-term effects on soils, vegetation and associated wildlife habitat. Locations of rare plants, wildlife species, or sensitive habitat would be recorded and these locations would be

protected, where possible, during clean-up efforts. In the event of ignition, damaged soil would be removed and replaced with equivalent imported subsoil and topsoil, and reclaimed.

Habitat enhancement would be implemented as required to protect or enhance aquatic habitat. Crossing locations with enhanced environmental sensitivity would be recorded, and these locations would be protected, where possible, during clean-up operations. Watercourse crossings would incorporate measures to further reduce the risk of pipe damage and accidental release into watercourses. Heavier-walled pipe would be used at all watercourses. The use of concrete coated pipe to provide negative buoyancy would provide additional protection. The use of directionally drilled crossings would reduce the risk of river scour and erosion as the pipeline would be placed well below the river without disturbing the bed or banks of the river.

In addition, "table top" and real simulations would be conducted on a regular schedule for all operating areas. Local police and emergency response agencies would be involved in simulation exercises.

Conclusions and Recommendations

Satisfactory information has been provided regarding the potential effects of malfunctions and accidents and with the measures identified that would be undertaken to mitigate the effects of these events. This information would be incorporated into the emergency procedures forming part of the operations and maintenance manuals required pursuant to sections 48 and 49 of the Board's *Onshore Pipeline Regulations*. Given that these manuals would be submitted for the Board's approval, if requested by the Board pursuant to subsection 48(2) of the *Onshore Pipeline Regulations*, the inclusion of the following condition in any certificate that may be issued is recommended:

Recommendation 33

Unless the Board otherwise directs, the Company shall submit to the Board for approval the emergency procedures required pursuant to sections 48 and 49 of the Onshore Pipeline Regulations at least 30 days prior to the commencement of operation.

It is important to ensure that emergency response manuals contain information on rare plants, wildlife species, sensitive habitat, and important features such as archaeological sites that could potentially be impacted by either an accident, malfunction, or by any response thereto. The contact names and phone numbers of the provincial and federal agencies, including identification of their respective responsibilities for protection of these resources would be required for inclusion in the manuals.

With the above-noted provisions, together with the recommended condition, it is not likely that there would be significant adverse environmental effects caused by accidents and malfunctions associated with the Project.

4.19 Effects of the Environment on the Project

The effects of the environment on the Project primarily relate to physiographic constraints imposed on the construction, operation, and long-term integrity of the pipeline. These effects are discussed in the relevant preceding sections. Most of these constraints on the Project are mitigated through pipeline routing to avoid problem areas, such as muskeg and unstable slopes and, where necessary, through specific engineering design, such as cathodic protection and pipeline coating.

Conclusions

With the appropriate application of Alliance's proposed mitigative measures and the recommendations in this report, the effects of the environment on the Project are adequately addressed and there are not likely to be significant adverse effects of the environment on the Project.

Chapter 5

Environmental Inspection, Monitoring, and Follow-up Programs

5.1 Environmental Inspection

As part of its Environmental Management System and Compliance Assurance Program, Alliance stated that it would ensure that trained environmental inspectors would be on-site during all construction activities. The environmental inspectors' responsibilities would involve, but not be limited to, ensuring that all of the mitigative measures outlined in the Environmental Protection and Reclamation Plan and alignment sheets would be appropriately implemented and ensuring compliance with all of the conditions and regulations pertaining to the Project. The environmental inspectors would also deal with any unexpected environmental issues and ensure appropriate mitigative measures are implemented.

Alliance submitted that the environmental inspectors would consult with the appropriate government agencies and specialists, and would make recommendations to other inspectors, supervisors, contractors, and the Construction Supervisor and other relevant technical experts. The environmental inspectors would have the authority to stop work at locations along their designated spread but construction shut-down decisions covering an entire spread would only be made by the Construction Supervisor after consultation with the various spread inspectors.

Alliance submitted that there would normally be three environmental inspectors assigned to each spread, but that the number of environmental inspectors would depend on the length of the spread, the amount of clearing and grading that would be required, and the sensitivity of the area. One of the inspectors would be designated the Senior Environmental Inspector and would be responsible for coordinating environmental activities along the entire spread, reporting directly to the Construction Supervisor. All of the senior inspectors would also report to an Environmental Construction Supervisor.

All environmental inspectors would be required to complete an environmental training course that would explain Alliance's environmental policy and obligations, and the inspectors' responsibilities. As well, all inspection or supervision personnel would be required to complete an environmental information course. All other construction personnel and visitors would be required to read an environmental handbook to ensure that all field personnel would understand their responsibilities regarding environmental protection.

Alliance has also committed to having various environmental resource specialists on call to assist the environmental inspectors when necessary. Alliance anticipates that soil scientists, botanists, wildlife and fisheries biologists, and archaeologists would likely be required. The duties of these specialists would include:

- identification and mitigation in areas of high potential for rare plants;
- identification and mitigation in areas of high potential for listed wildlife species;

- monitoring and mitigation in areas with problem soils;
- monitoring during fish habitat enhancement;
- water quality monitoring; and
- identification, mitigation, and monitoring in areas of high archaeological, palaeontological, or historical resource potential.

These specialists would report directly to the senior environmental inspector on each construction spread.

In addition to Alliance's environmental inspection program, the Board has trained environmental inspection staff who would audit compliance with the numerous environment-related recommendations and proposed certificate conditions found in this CSR, should the Project be certificated.

5.2 Post-Construction Monitoring and Follow-Up

5.2.1 General

Alliance recognized that, for projects of this magnitude, environmental as-built reports are normally required by the Board. The Company committed to providing a report containing:

(i) a project description including what portion of the work was conducted (i.e. which spread), the construction commencement and completion dates, and the names of the activity inspectors and other key construction supervisory personnel;

(ii) the general procedures, equipment to be used, and mitigation measures implemented for each activity for which environmental inspection was required;

(iii) the procedures that were implemented in the case of any unforseen environmental issue that arose as well as a discussion of the decision-making process involved in arriving at those procedures;

(iv) a detailed record of any discussions and decisions made regarding conflicting permit conditions or requests from government agencies;

(v) a description of problems encountered (e.g. uncooperative operators, equipment breakdown) which may have been detrimental to the efforts to implement mitigative measures and a discussion of any measures taken to alleviate or counteract those problems;

(vi) a detailed record of any instances where recommendations (e.g. wet weather shut-down) could not be implemented and the circumstances and location of the event as well as the decision-making rationale;

(vii) a record of government and stakeholder liaison;

(viii) a comprehensive photo and video record;

(ix) selected alignment sheets with hand-written notes pertinent to the as-built report such as areas where extra temporary workspace was taken, actual topsoil depths recorded during

stripping, location of heritage resources or rare and endangered wildlife or plants discovered during construction; and

(x) a list of environmental issues and their respective status (i.e. resolved and unresolved).

Specific post-construction monitoring programs for noise and air emissions are discussed in the relevant sections of this CSR.

5.2.2 Heat Effects on Soils and Crops

Mr. Carter, intervening on behalf of landowner clients, raised concerns regarding the potential for heat from a buried pipeline to affect soils and crops. Possible effects include premature snow melt, instances where crop yields are affected, or where crops ripen earlier over a pipeline.

The average temperature for gas exiting the mainline compressor stations would be approximately 24°C (75°F) in the winter and approximately 35°C (95°F) in the summer with the possibility that the exit temperature may be even warmer. Alliance submitted that it was not aware of any scientific or peer-reviewed articles or information about the effect of temperature, the temperature profile above or around the pipeline and how it might affect either crop yields or snow melting. Alliance further noted that it had no scientific means to factor in the possible heat effects other than through generalized experience.

Alliance undertook to monitor heat effects in an attempt to bring some better scientific understanding to this matter. Alliance noted that, since the work would be relatively new, it would have to modify the program over a few years. Alliance noted that in developing the program, it would want to provide an opportunity for soil scientists to properly plan the work in order that results would be meaningful and quantifiable. Alliance noted, however, that it would be feasible to monitor the soil temperature regime for one or two years, observe the surface manifestations, and attempt to quantify those results.

Conclusions and Recommendations

Environmental Inspection

Alliance has committed to obtain required permits from various regulatory agencies. It is important that the Board's environmental inspectors be able to readily access permits when on site, as this would provide inspectors with a better indication of the constraints and duties imposed on Alliance at each location. Alliance's contractors and inspectors should also be made aware of permit requirements. All permits should be readily available to construction staff. In this regard, it is recommended that any certificate issued to Alliance be subject to the following condition:

Recommendation 34

The Company shall maintain a file in each construction office containing:

(a) any information relating to applicable environmental undertakings as set out in the application or as otherwise adduced in evidence before the Board in the GH-3-97 proceeding; and

(b) copies of all applicable permits or authorizations containing environmental conditions.

Alliance has provided some information regarding environmental inspection; however, further details would be required prior to the commencement of construction to ensure satisfaction with Alliance's proposals for on-site inspection. A proper environmental inspection plan is critical to the successful implementation of environmental recommendations and conditions. A detailed plan that clearly identifies individuals involved and their respective responsibilities and expertise would also assist the Board's inspection staff in establishing and maintaining appropriate contacts. Accordingly, it is recommended that any certificate issued to Alliance be conditioned as follows:

Recommendation 35

The Company shall:

(a) submit to the Board for approval, and to DFO-Habitat, at least 30 days prior to the commencement of construction of the approved facilities, a detailed environmental inspection plan for construction identifying the environmental inspectors, their respective qualifications, and their geographic and topical areas of responsibility; and

(b) notify the Board of any changes to the environmental inspection plan described in paragraph (a), when any such changes are made.

Post-Construction Monitoring and Follow-Up

Alliance's preliminary plans for monitoring and follow-up are satisfactory. However, it is acknowledged that Alliance would likely gain further insight into the specific needs for post-construction monitoring and reclamation as construction progresses. Reclamation and post-construction monitoring plans would also form the basis for site-specific post-construction reports. In this regard, it is recommended that the following condition be placed in any certificate that may be issued to Alliance:

Recommendation 36

The Company shall submit to the Board for approval, and to DFO-Habitat, at least 15 days prior to completion of construction on each spread, a detailed reclamation and post-construction monitoring plan for each construction spread. This plan shall include a description of any monitoring program and special measures for post-construction control of erosion and sedimentation at watercourses, particularly those sensitive watercourses for which crossings would be constructed in winter.

In order to assist the Board in maintaining a record of the conditions along Alliance's right-of-way, to assist Board inspectors in planning post-construction inspections, and to have a better understanding of the success of the mitigative measures proposed by Alliance and recommended in this CSR, the following conditions are proposed for any certificate issued to Alliance. Alliance has committed to file detailed post-construction information in any environmental as-built report required by the Board. It is anticipated that the information Alliance submitted, as outlined above, would be included in any post-construction report filed with the Board. DFO-Habitat and Environment Canada have also expressed an interest in obtaining information in respect of Alliance construction practices. Recommendation 37 also provides direction to Alliance on the type of information required when wet soil contingency measures are employed. Further information in support of this recommendation can be found in section 4.4.

Recommendation 37

The Company shall submit to the Board, DFO-Habitat, and Environment Canada a post-construction environmental report within six months of the date that each approved facility is placed in service. The post-construction environmental report for each approved facility shall set out the environmental issues that have arisen up to the date on which the report is filed and shall:

(a) provide a description of all minor amendments to practices, procedures, and recommendations which have been implemented during the construction process;

(b) provide a summary of all instances when wet soil conditions required implementation of contingency measures or shutdown of construction, specifically identifying:

(i) the date of the decision;

(ii) the indicator(s) used for the decision and the measure/rationale applied to each indicator;

(iii) *the location/geographic extent of the construction spread affected, and soil type;*

(iv) *the nature of work being affected by the decision;*

(v) *the specific contingency measures that were implemented;*

(vi) *the date contingency measures were no longer required or construction recommenced and the rationale for the decision; and*

(vii) *any specific follow-up, reclamation, or monitoring recommended;*

(c) *indicate those issues which have been resolved and those unresolved;*

(d) *describe the measures which the Company proposes to take in respect of unresolved issues;*

(e) *include copies of any as-built reports that are prepared in accordance with undertakings made to DFO, and any comments from DFO in respect of those reports; and*

(f) *provide a list and suitable map indicating all designated access routes and the location and type of all temporary facilities.*

Recommendation 38

The Company shall submit to the Board, on or before December 31st following each of the first two complete growing seasons which occur after the filing of the post-construction environmental report referred to in Recommendation 37:

(a) *a list of the environmental issues indicated as unresolved in the report and any that have arisen since the report was filed; and*

(b) *a description of the measures which the Company proposes to take in respect of any unresolved environmental issues.*

Recommendation 39

Unless the Board otherwise directs, the Company shall submit to the Board, in conjunction with the final report filed pursuant to Recommendation 38, a videotape or remote sensing imagery of the entire pipeline right-of-way, in a form that is satisfactory to the Board.

It is noted that there is a lack of scientific evidence available to clearly determine the thermal effects of pipelines on soils and vegetation. In this regard, Alliance's initiative to conduct a heat effects monitoring program is recognized. In order to provide useful data that can assist in understanding the nature of this environmental effect, the following recommendation is proposed.

Recommendation 40

The Company shall submit to the Board:

(a) *a description of its heat effects monitoring program for vegetation located along the right-of-way downstream of the mainline compressor stations, including the parameters to be monitored, the frequency of monitoring, and the benchmarks to be used for comparison in addition to any comments from landowners and interested persons on the program; and*

(b) *in accordance with the reporting schedule to be set out in its heat effects monitoring program, the results of the Company's monitoring program including any comments on the results from landowners and other interested persons.*

The proposed inspection, monitoring, and follow-up programs for the Project meet the need for an appropriate follow-up program. These programs are considered sufficient to verify the accuracy of the environmental assessment and determine the effectiveness of any measures taken to mitigate the adverse environmental effects of the Project.

Chapter 6

Abandonment

6.1 Potential Environmental Effects

The abandonment of pipeline facilities can potentially result in effects including surface subsidence, alteration of surface and groundwater movement, and the contamination of soils and groundwater.

At some point in time, the Project would no longer be needed for the purpose for which it was built. Alliance submitted that, at that time, it would need to review the options, issues, and regulatory requirements that would be considered for the decommissioning and abandonment of the pipeline facilities.

Alliance noted that the steel pipeline is similar in composition to other pipelines and that the inert fusion-bonded epoxy coating would continue to protect the pipeline, even after abandonment. Alliance indicated that in some instances the pipeline is recovered for the value of the steel, and in other instances pipelines are left in place to avoid disruption.

Two parties raised concerns with the future abandonment of the Alliance Pipeline. Mrs. Sandra Elliott, a Regina-based landowner whose land would potentially be crossed by the pipeline, stated that she does not agree with the pipeline abandonment program suggested to her by Alliance, namely leaving the pipeline in place. She further enquired as to who would be responsible for removing the pipeline and whether there has been any long-term study done on the pipe material composition to ensure that these would stand up to harsh climatic conditions. The Native Canadian Petroleum Association raised the issue of the public having to cover future costs associated with abandoned facilities.

6.2 Mitigative Measures

The Company submitted that the industry has begun to look at the issues related to pipeline abandonment[1] and identified three general methodologies under current practices and procedures:

(i) Pipe removal - of the entire system and the restoration of land to pre-disturbance status as closely as practicable;

(ii) Abandonment in place - purged of gas and left in place with surface appurtenances removed and land surface restored; and

(iii) Transfer Ownership - for continued service.

[1] Reference was made by the Company to the Pipeline Abandonment Steering Committee, which was formed in 1994 to oversee the issue of pipeline abandonment. The steering committee was comprised of representatives from the Canadian Association of Petroleum Producers, the Canadian Energy Pipeline Association, the Alberta Energy and Utilities Board, and the National Energy Board. The steering committee released discussion papers on (i) the technical and environmental issues related to pipeline abandonment in November 1996 and (ii) associated legal issues in May 1997.

Alliance submitted that its decommissioning and abandonment plan would comply with the regulatory standards of the day, and would be prepared in consultation with persons having an interest in the land disposition. The Company further stated that, at minimum, the pipeline would be purged of gas and cleaned to satisfy concerns regarding soil and groundwater contamination, and that the Company would accommodate future land use plans to the extent possible.

Conclusions

In order to either transfer or abandon the pipeline, the Company would be required to apply pursuant to section 74 of the *NEB Act*. It is further noted that an application under section 74 of the *NEB Act* for abandonment would require that an environmental screening be undertaken pursuant to the *CEAA Law List Regulations* to consider the significance of any potential environmental effects.

The effects associated with abandonment would not be significantly different than those associated with the initial construction of the pipeline, and therefore abandonment is not likely to cause significant environmental effects. Further consideration of the environmental effects and the measures that will be undertaken to mitigate those effects will be undertaken at the time of the actual abandonment.

Chapter 7

Conclusions and Recommendations

Having considered all of the evidence and information within the scope of the assessment and relevant to the factors found in section 16 of the *CEAA* that were to be considered, it is concluded that, with the implementation of Alliance's proposed mitigative measures and the recommendations set forth in this CSR, the Project is not likely to cause significant adverse environmental effects.

The complete list of recommendations is reproduced below. The last of the recommendations (Recommendation 41) is unique to this chapter and generally mandates adherence to the information and undertakings provided by Alliance throughout the assessment process.

Recommendation 1

The Company shall apply the following criteria for the siting of all temporary facilities including construction camps, pipe and equipment storage, work areas, warehouse areas, borrow pits, staging areas, new access and other areas that would be used or disturbed prior to or during construction:

(a) avoid native prairie areas and areas that would require clearing of trees by:

(i) using existing cleared sites in forested areas and agricultural fields in agricultural areas, with preference being given to areas currently experiencing industrial use; and

(ii) using sites in areas of native prairie that have been previously cleared of native vegetation and/or altered for industrial use;

(b) avoid Environmentally Significant Areas unless the site already experiences industrial use and its use during construction will prevent the need to create new clearings elsewhere;

(c) avoid areas with known or high potential for wildlife, and significant habitat for wildlife, with a designated status (COSEWIC and provincial), as well as other sensitive/significant wildlife areas;

(d) avoid areas with known or high potential for plants with a designated status;

(e) avoid watercourses and wetlands;

(f) avoid steep slopes, organic soils and poorly drained areas;

(g) avoid areas with known or high potential for heritage resources; and

(h) select sites that will not be in conflict with existing land uses.

Recommendation 2

The Company shall submit to the Board for approval, at least 30 days prior to the disturbance of any proposed temporary facility site that is not in accordance with the criteria noted in Recommendation 1:

(a) a description of the site;

(b) the environmental effects and measures that would be used to mitigate these effects and, in the event that measures other than those adduced during the hearing are proposed, an analysis supporting the use of these measures; and

(c) the results of consultations with landowners and the relevant municipal, provincial, and federal government departments and agencies.

Recommendation 3

Unless the Board otherwise directs, the Company shall:

(a) ensure that the detailed environmental inspection plan submitted to the Board for approval (pursuant to Recommendation 35), includes the identity, qualifications and experience of the soils specialist(s) that will be responsible for ensuring proper identification of the indicators in (i) through (vi) of paragraph (c);

(b) ensure that the soils specialist(s) identified in (a) will respond in a timely manner, to the site on any spread where wet soil indicators are likely to occur, and shall have at least equal authority to that of the construction supervisor for matters regarding the implementation of contingencies and shutdown, as well as the recommencement of construction activities following the suspension of work;

(c) implement appropriate wet soils contingency measures as described in its application or as otherwise adduced in evidence, if one of the following indicators occurs:

(i) rutting of topsoil to the extent that admixing may occur;

(ii) excessive wheelslip;

(iii) build-up of mud on tires and around cleats;

(iv) formation of extended puddles on the workspace;

(v) excessive tracking of mud along the road as vehicles leave the right-of-way; or

(vi) any other indicator that may be used to determine the potential for construction to cause an adverse effect on soils in wet condition;

(d) suspend construction in areas of native prairie if one of the above indicators occurs;

(e) suspend construction on cultivated land if one of the above indicators occurs and full-width topsoil stripping has not been undertaken; and

(f) report forthwith to the Board which wet soils contingency measures were implemented, and why they were implemented.

Recommendation 4

The Company shall, at least 30 days prior to the commencement of construction of each construction spread (as identified in the application), submit to the Board, for each previously identified site with a plant species with a designated status and each previously identified significant vegetation community:

(a) the mitigative option selected for that site (from the list of options provided in the GH-3-97 evidence); and

(b) a description of the appropriateness of that option based on site-specific conditions and the suitability of the option for the species or community.

Recommendation 5

If any previously unidentified significant plant communities or plants with a designated status are discovered during construction, the Company shall, in consultation with the Board and other appropriate regulatory agencies, avoid, relocate, or restore these features or areas in accordance with the procedures described in its application or as otherwise adduced in evidence before the Board in the GH-3-97 proceeding.

Recommendation 6

For all watercourse crossings undertaken in winter which would have the potential to impact any sensitive watercourse, the Company shall ensure proper long-term control of erosion and sedimentation through the appropriate use of erosion protection and sediment control measures as described in Table 4-8 of the Comprehensive Study Report.

Recommendation 7

For any watercourse crossings to be undertaken in winter which would have the potential to impact any sensitive watercourse, the Company shall submit to the Board, at least 15 days prior to commencement of construction of such watercourse crossings:

(a) *a water quality monitoring program to be undertaken immediately prior, during, and after construction of the crossings;*

(b) *a contingency plan detailing the criteria for any measures that would be implemented as a result of monitoring undertaken pursuant to paragraph (a); and*

(c) *evidence as to whether DFO-Habitat is satisfied with any programs derived pursuant to paragraph (a) and the measures described in (b).*

Recommendation 8

The Company shall submit to the Board, at least 15 days prior to commencement of construction at the Wapiti River, confirmation of the crossing technique to be used, a detailed construction schedule for the crossing, and any undertakings which the Company has made to DFO in respect of the crossing.

Recommendation 9

The Company shall submit to the Board and DFO-Habitat, prior to the commencement of construction on each spread, evidence that all required authorizations, permits, or approvals for the conduct of watercourse crossings along the subject construction spread have been obtained.

Recommendation 10

Where it is necessary to exceed 10 per cent of the flow or volume of a water body when withdrawing water for hydrostatic testing purposes, the Company shall submit to the Board for approval, at least 10 days prior to commencement of water withdrawal, a hydrostatic test water withdrawal plan that, at a minimum, includes the rationale for the required exceedence, the estimated amount of the exceedence, an environmental effects assessment and mitigation plan, and results of consultation with the DFO and appropriate provincial authorities.

Recommendation 11

In any fish-bearing watercourses where blasting is to be undertaken, Alliance shall conduct blasting activities in accordance with DFO's 1996 draft document entitled "Guidelines for the Use of Explosives in Canadian Fisheries Waters".

Recommendation 12

For all water withdrawals from potential fish-bearing waterbodies, Alliance shall screen all water intakes in accordance with the 1995 DFO guideline entitled "Freshwater Intake End-of-Pipe Fish Screen Guideline".

Recommendation 13

The Company shall:

(a) except as varied in accordance with paragraph (c) hereof:

(i) comply with all the timing and setback restrictions as outlined in Appendices A1-13, A1-15, A1-16, and A1-17 of the Wildlife Assessment, the Alliance Pipeline Project, Volume 2 - Appendices, dated June 1997;

(ii) comply with all the timing and setback restrictions, including those outlined for specific species and construction spreads, as identified by Environment Canada in its letters to the Board dated 29 October 1997 and 29 January 1998; and

(iii) where the Company proposes construction activities within the timing and setback restrictions for locations KP 1388.5 to 1389, KP 1401.5 to 1402.5, and KP 1639 to 1641.5, the Company shall, at least 15 days prior to the commencement of construction for those locations, file correspondence from Environment Canada indicating its views on whether conditions are suitable in those locations for a waiver of the timing and setback restrictions;

(b) cause no variation to the construction schedule that would result in conflict with the timing and setback restrictions concerning any species protected under the Migratory Birds Convention Act;

(c) for those wildlife species not covered under the Migratory Birds Act, cause no variation to the construction schedule that would result in conflict with the timing and setback restrictions without prior approval of the Board; and

(d) for any variation sought under paragraph (c), submit to the Board, at least 15 days prior to the commencement of construction in locations affected by the timing and setback restrictions, correspondence from Environment Canada and appropriate provincial authorities identifying any previously unaddressed timing and setback restrictions, and indicating their views on whether conditions are suitable in those locations for an amendment of the restrictions.

Recommendation 14

The Company shall adhere to the seasonal timing of construction activities as described in its application or as otherwise adduced in evidence before the Board in the GH-3-97 proceeding. Seasonal times should differentiate between frozen and non-frozen soil conditions.

Recommendation 15

Unless the Board otherwise directs, the Company shall ensure that all work and activities associated with temporary facilities are conducted in accordance with provincial and federal fisheries and wildlife setback and timing restrictions.

Recommendation 16

The Company shall submit to the Board for approval, at least 30 days prior to the conduct of pre-construction wildlife surveys:

(a) the proposed survey methodologies;

(b) for the surveys to be conducted in respect of rare and endangered species, a comprehensive list of survey locations, which also identifies the species for which each survey is being undertaken; and

(c) comments from Environment Canada regarding the survey methodologies.

Recommendation 17

The Company shall submit to the Board for approval, at least 30 days prior to the commencement of construction activities for each spread included in the pre-construction wildlife survey:

(a) the results of the survey;

(b) any additional measures that the Company intends to use to minimize any additional effects identified as a result of the survey; and

(c) comments from Environment Canada on the results of the survey and any additional measures proposed by the Company.

Recommendation 18

The Company shall:

(a) conduct a pre-clearing grizzly den site survey in suitable denning habitat locations prior to clearing activities taking place in those locations;

(b) submit to the Board, at least 60 days prior to clearing in grizzly habitat areas, the methodology (including timing and locations) for the pre-clearing grizzly den site survey; and

(c) submit to the Board at least 10 days prior to clearing, the results of the pre-clearing grizzly den site survey including the results of consultations with the provincial biologist(s) and the identification of any additional mitigation measures the Company would undertake.

Recommendation 19

If any previously unidentified significant habitat features, specialized habitat for wildlife with a designated status, or nesting habitat for song birds or raptors are discovered during construction, the Company shall, in consultation with the Board, Environment Canada, and other appropriate regulatory agencies, avoid, relocate, or restore these features or areas in accordance with the procedures described in its application or as otherwise adduced in evidence before the Board in the GH-3-97 proceeding.

Recommendation 20

The Company shall implement a worker awareness program in regard to the potential for wildlife mortalities along roads, and its workers shall maintain reasonable reduced speeds along the right-of-way, along access roads, and, where feasible, along secondary roads. Off right-of-way traffic shall be prohibited, except for designated access routes.

Recommendation 21

Unless the Board otherwise directs, the Company shall submit to the Board for approval its program for monitoring and reporting COSEWIC listed raptor mortality resulting from the new power lines associated with the Project facilities, the measures that the Company will take to reduce raptor mortality, and the criteria that the Company will use in applying these measures.

Recommendation 22

The Company shall provide any comments received from Environment Canada and MELP on the results of the emissions modelling using the USEPA (1997) ISC3-OLM Model for the Morinville, Estlin, and Taylor Compressor Stations including the need for further modelling or monitoring in respect of these stations.

Recommendation 23

(a) *The Company shall develop, with input from regulatory agencies, including Environment Canada, and interested persons, an air quality monitoring program.*

(b) *The Company shall submit to the Board a description of the air quality monitoring program referred to in paragraph (a) together with any comments received from regulatory agencies (including Environment Canada and MELP) and interested persons.*

Recommendation 24

Unless the Board otherwise directs, the Morinville Compressor Station and the Taylor Lateral Compressor Station, in addition to the Windfall Compressor Station, shall be subject to the Company's air quality monitoring program. In the event that electric motor drivers are not used at the Bigstone lateral Compressor Station, the Company shall, at least 15 days prior to the commencement of operation, file with the Board any comments from regulatory agencies, including Environment Canada, and interested persons regarding whether this station should be subject to the Company's air quality program including the Company's response to these comments.

Recommendation 25

The Company shall, in accordance with the reporting schedule to be set out in its air quality monitoring program, submit to the Board the results of its emissions monitoring including a comparison to the modelled values for the stations and any comments received from Environment Canada, MELP, and interested persons regarding the results.

Recommendation 26

The Company shall submit to the Board and Environment Canada, as soon as available, a copy of the Company's action plan under the federal Voluntary Challenge and Registry Program to deal with greenhouse gas emissions arising directly from the operation of the pipeline.

Recommendation 27

The Company shall submit to the Board, at least 30 days prior to the commencement of construction of each lateral compressor station, an ambient noise assessment for the proposed lateral compressor station site.

Recommendation 28

Unless the Board otherwise directs, the Company shall:

(a) file with the Board, within 12 months after the commencement of each of the mainline and lateral compressor stations, a monitoring report for each compressor station detailing the results of an appropriate noise monitoring program, including, but not limited to, the noise emission levels at the source, the fenceline, and the three closest residences, or an assessment site within or near 1.5 km from the station if no residences are within this radius, at the maximum operating level;

(b) notify the Board in writing of any noise complaint(s) received in respect of the operation of its compressor stations and apprise the Board of the results of any further noise monitoring undertaken in response and any measures that have been taken to address the complaint(s); and

(c) *in the event that the noise complaint identified in response to (b) is substantiated as an increase in noise levels of 5 dBA or more, or is attributed to a specific frequency range, the Company shall undertake remedial measures within four months of receipt of the noise complaint, and in the event that implementation of the measures will take longer, or in the Company's view is not warranted, the Company shall file with the Board its justification and the results of further consultations with the affected person(s).*

Recommendation 29

With respect to archaeological, palaeontological, and heritage resources, Alliance shall, at least 30 days prior to the commencement of construction:

(a) *file with the Board confirmation that consultations with the local historical society and school board regarding the mitigation at site EfN1 10, school house memorial have been completed and provide a description of the mitigation proposed;*

(b) *advise the Board in writing how concerns at the following sites have been resolved:*

(i) *site HfRm 8 on the Highway Lateral;*

(ii) *sites HdRh t3, HdRh t5, HcRg t20, HcRg t21, HbRe t34, and HbRe t35 on the Aitken Creek Lateral;*

(iii) *sites HaRc t32, HaRc 10, HaRc t34, HaRc 11 and GIRb 2 on the Fort St. John Lateral; and*

(iv) *site HbRa 1 on the Boundary Lake Lateral;*

(c) *provide the Board with a copy of any revisions or amendments to the Historical Resource Impact Assessment/Archeological Impact Assessment ("HRIA/AIA") reports for the provinces of British Columbia, Alberta and Saskatchewan;*

(d) *advise the Board in writing as to whether the HRIA/AIA reports, including any revisions or amendments thereto, and any recommendations contained therein are acceptable to the Cultural Facilities and Historical Resources Division of Alberta Community Development, the Saskatchewan Heritage Branch, and the Archaeological Branch, British Columbia Ministry of Small Business, Tourism and Culture;*

(e) *provide the Board with any comments received from the above-noted provincial agencies in respect of the reports, including any further mitigation; and*

(f) *confirm whether Alliance will comply with the mitigative measures and recommendations set out in the reports referred to in (c) and any further mitigation identified in response to (e).*

Recommendation 30

Alliance shall submit to the Board copies of the reports on the mitigation programs completed at the historical, archaeological, and palaeontological sites encountered during construction together with any comments received on these reports from the Cultural Facilities and Historical Resources Division of Alberta Community Development, the Saskatchewan Heritage Branch, and the Archaeological Branch, British Columbia Ministry of Small Business, Tourism and Culture and the respective First Nations.

Recommendation 31

The Company shall submit to the Board, at least 30 days prior to the commencement of construction of each compressor and meter station, a description of the measures that would be incorporated in the design to address the visual impact of the station including:

(a) *the rationale for proposing those measures; and*

(b) *the results of consultations undertaken with respect to those measures and an indication as to whether the persons consulted are satisfied with the use of those measures.*

Recommendation 32

Unless the Board otherwise directs, the Company shall file with the Board, at least 30 days prior to the commencement of construction:

(a) *confirmation that identification of issues of concern in respect of traditional use sites has been completed with First Nations communities including, but not limited to: Horse Lake, Doig River, Blueberry River, Halfway, Alexander, and Alexis including:*

(i) *a listing of issues by First Nation;*

(ii) *the measures proposed to mitigate the issues identified in response to (i); and*

(iii) *any comments from the respective First Nations on the measures identified in response to (ii);*

(b) *confirmation that the following consultations regarding traditional use sites have been completed and a description of the mitigation proposed:*

(i) *with the Chief and Council of the Sturgeon Lake First Nation regarding the mitigation at sites GdQn T1, Otin Meta wiwin, GdQn T3, moose lick, GcQj T1, pack trail, Sardine Lake, and Little Smoky Village;*

(ii) *with the Sturgeon Lake and the Kelly Lake First Nations regarding land use practices which may be affected by the construction of the pipeline; and*

(iii) *with the Saskatchewan Federation of First Nations in respect of monitoring burials potentially encountered during ditching operations.*

Recommendation 33

Unless the Board otherwise directs, the Company shall submit to the Board for approval the emergency procedures required pursuant to sections 48 and 49 of the Onshore Pipeline Regulations at least 30 days prior to the commencement of operation.

Recommendation 34

The Company shall maintain a file in each construction office containing:

(a) *any information relating to applicable environmental undertakings as set out in the application or as otherwise adduced in evidence before the Board in the GH-3-97 proceeding; and*

(b) *copies of all applicable permits or authorizations containing environmental conditions.*

Recommendation 35

The Company shall:

(a) *submit to the Board for approval, and to DFO-Habitat, at least 30 days prior to the commencement of construction of the approved facilities, a detailed environmental inspection plan for construction identifying the environmental inspectors, their respective qualifications, and their geographic and topical areas of responsibility; and*

(b) *notify the Board of any changes to the environmental inspection plan described in paragraph (a), when any such changes are made.*

Recommendation 36

The Company shall submit to the Board for approval, and to DFO-Habitat, at least 15 days prior to completion of construction on each spread, a detailed reclamation and post-construction monitoring plan for each construction spread. This plan shall

include a description of any monitoring program and special measures for post-construction control of erosion and sedimentation at watercourses, particularly those sensitive watercourses for which crossings would be constructed in winter.

Recommendation 37

The Company shall submit to the Board, DFO-Habitat, and Environment Canada a post-construction environmental report within six months of the date that each approved facility is placed in service. The post-construction environmental report for each approved facility shall set out the environmental issues that have arisen up to the date on which the report is filed and shall:

(a) provide a description of all minor amendments to practices, procedures, and recommendations which have been implemented during the construction process;

(b) provide a summary of all instances when wet soil conditions required implementation of contingency measures or shutdown of construction, specifically identifying:

(i) the date of the decision;

(ii) the indicator(s) used for the decision and the measure/rationale applied to each indicator;

(iii) the location/geographic extent of the construction spread affected, and soil type;

(iv) the nature of work being affected by the decision;

(v) the specific contingency measures that were implemented;

(vi) the date contingency measures were no longer required or construction recommenced and the rationale for the decision; and

(vii) any specific follow-up, reclamation, or monitoring recommended;

(c) indicate those issues which have been resolved and those unresolved;

(d) describe the measures which the Company proposes to take in respect of unresolved issues;

(e) include copies of any as-built reports that are prepared in accordance with undertakings made to DFO, and any comments from DFO in respect of those reports; and

(f) *provide a list and suitable map indicating all designated access routes and the location and type of all temporary facilities.*

Recommendation 38

The Company shall submit to the Board, on or before December 31st following each of the first two complete growing seasons which occur after the filing of the post-construction environmental report referred to in Recommendation 37:

(a) *a list of the environmental issues indicated as unresolved in the report and any that have arisen since the report was filed; and*

(b) *a description of the measures which the Company proposes to take in respect of any unresolved environmental issues.*

Recommendation 39

Unless the Board otherwise directs, the Company shall submit to the Board, in conjunction with the final report filed pursuant to Recommendation 38, a videotape or remote sensing imagery of the entire pipeline right-of-way, in a form that is satisfactory to the Board.

Recommendation 40

The Company shall submit to the Board:

(a) *a description of its heat effects monitoring program for vegetation located along the right-of-way downstream of the mainline compressor stations, including the parameters to be monitored, the frequency of monitoring, and the benchmarks to be used for comparison in addition to any comments from landowners and interested persons on the program; and*

(b) *in accordance with the reporting schedule to be set out in its heat effects monitoring program, the results of the Company's monitoring program including any comments on the results from landowners and other interested persons.*

Recommendation 41

Unless the Board otherwise directs, the Company shall:

(a) *cause the approved facilities to be designed, manufactured, located, constructed, and installed in accordance with those specifications, drawings, mitigative measures, and other information or data set forth in its application, in its undertakings made to the DFO and Environment Canada, and as otherwise adduced in its evidence before the Board, except as varied in accordance with paragraph (b) hereof; and*

(b) *cause no variation to be made to the specifications, drawings, mitigative measures, or other information or data referred to in paragraph (a) without the prior approval of the Board.*

K. W. Vollman
Presiding Member

A. Côté-Verhaaf
Member

C. M. Ozirny
Member

Calgary, Alberta
September 1998

Appendix I

Project Details

The Project includes a number of laterals, along with associated compression and metering facilities. The majority of the receipts will enter the mainline between the Gordondale Station and the Windfall Compressor Station. The first 345 km of the mainline will consist of 1067 mm (42 inch) diameter pipe, designed to operate at a maximum operating pressure of 8275 kPa (1,200 psi). At the Windfall Compressor Station, the pressure will be increased to 12 000 kPa (1,740 psi) and the size of the mainline pipe downstream of this point will be 914 mm (36 inches) in diameter. A total of seven mainline compressor stations will be located in Canada at approximately 193 km (120 mile) intervals.

The mainline compressor stations are proposed to be installed at the following locations:

Station No.	Kilometre Post	Station Name/ Province	No. of Units per Station	ISO (MW) per Unit	Estimated Power Line Length
3	421.5	Windfall, AB	3 (2 in series & 1 spare)	30	60 m
5	628.4	Morinville, AB	1	23	570 m
7	818.4	Irma, AB	1	23	8.0 km
9	1010.0	Kerrobert, SK	1	23	1.6 km
11	1205.7	Loreburn, SK	1	23	4.5 km
13	1398.2	Estlin, SK	1	23	14 km
15	1589.9	Alameda, SK	1	23	8.0 km

A number of laterals converge at the Gordondale Station. As such, pig receiving and launching facilities, as well as a slug catcher, will be installed at this location. Storage/tankage facilities will also be required at all mainline compressor stations which have filter/scrubbers.

Mainline block valves will be installed at a spacing of approximately 32 km (20 miles). SCADA system facilities will be located at each block valve to enable remote monitoring and operation of the block valve and other equipment and instrumentation.

The Alliance lateral system includes pipe sizes from approximately 114 mm to 610 mm (4 to 24 inches) in diameter as illustrated in the following table (reference Figure 2-3 and accompanying legend for geographic context):

Lateral System Pipeline Sizing

Lateral Name	Pipe Segment		Diameter (mm)	MOP (kPa)	Length (km)
	From	To			
Highway	BC 01	BC 02	508	12 000	9.65
Aitken Creek	BC 02	Taylor Junction	508	12 000	131.43
Taylor	BC 03 / BC 04	Taylor Junction	219	8 275	4.89
Boundary Lake	AB 07	AB 05	219	8 275	21.30
Boundary Lake	AB 05	Taylor Junction	324	8 275	29.60
Pouce Coupe	AB 11	Taylor Lateral	168	9 930	0.81
Fort St. John	Taylor Junction	Gordondale Site	610	9 930	75.34
Peace River	AB 10	AB 09	219	9 930	12.00
Peace River	AB 09	AB 14	273	9 930	34.21
Peace River	AB 14	Mainline	273	9 930	0.79
Gordondale W.	AB 13	AB 12	406	8 275	5.09
Gordondale W.	AB 12	Gordondale Site	406	8 275	0.80
Whitburn	AB 15	AB 16	168	8 275	9.17
Whitburn	AB 16	Mainline	324	8 275	0.39
Valhalla North	AB 17	Mainline	114	8 275	0.12
Valhalla S. Con.	AB 20	Mainline	168	8 275	0.10
Spirit River	AB 23	Wembley Comp	406	8 275	19.37
Teepee Creek	AB 21	Wembley Comp	168	10 690	47.19
Hythe	AB 26	AB 24 / AB 26 JNCT	324	8 275	0.56
Hythe	AB 24	AB 24 / AB 26 JNCT	273	8 275	26.50
Hythe	AB 24 / AB 26 JNCT	Wembley Comp	324	8 275	16.24
Wembley Con.	AB 27	Wembley Comp	273	8 275	0.10
Wembley Con.	Wembley Comp.	Mainline	508	8 275	0.10
Elmworth	AB 27A	Mainline	324	9 930	29.97
Wapiti	AB 29	Mainline	168	9 930	6.66
Gold Creek	AB 30	Mainline	219	8 275	0.29
Karr	AB 31	Mainline	219	8 275	1.66
Simonette	AB 32	Mainline	114	8 275	2.24
Ante Creek	AB 34	AB 35	168	8 275	11.18

Lateral Name	Pipe Segment		Diameter (mm)	MOP (kPa)	Length (km)
	From	To			
Ante Creek	AB 35	Mainline	219	8 275	13.17
Bigstone	AB 37	Mainline	219	9 930	19.55
Fox Creek	AB 40	Mainline	219	9 930	18.23
Kaybob	AB 41	Mainline	406	8 275	4.76
Edson West	AB 43	Edson Lateral	168	9 930	16.29
Kaybob South	AB 45	Edson Lateral	406	9 930	7.86
Edson	AB 44A	AB 44	219	9 930	40.89
Edson	AB 44	Edson West JNCT	406	9 930	8.18
Edson	Edson West JNCT	Kaybob South JNCT	406	9 930	51.48
Edson	Kaybob South JNCT	AB 46	610	8 275	28.90
Edson	AB 46	Mainline	610	8 275	12.50
Two Creeks	AB 38	Mainline	114	8 275	18.62
Carson Creek	AB 47	Mainline	114	13 100	11.77
Whitecourt	AB 48	Mainline	168	12 000	0.34
Paddle River	AB 49	Mainline	168	12 000	2.09
Cherhill	AB 50	Mainline	168	12 000	2.71
Fort Saskatchewan	AB 53 / AB 54	Mainline	273	12 000	1.79

The system will include 26 lateral compressor stations, which are designed to allow for varying levels of installed compression in order to facilitate relocation of lateral compression in response to changing shipper receipt location preferences. Lateral valves will be installed at all receipt point locations and mainline tie-in points, and all lateral receipt points will include custody transfer metering. The particulars are set out on this and the following page.

Details of Permanent Lateral Facilities

Station	Location Name for Compressor Stn. or Meter Stn	Compressor Station Location Name	Meter Station	Compress or Station	Pigging Facilities	Total kW on Site
BC01	Highway		x		x	
BC02	Aitken Creek	Aitken Creek	x	x		4 860
BC03	McMahon		x		x	
BC04	Younger		x			
T. BOOSTER		Taylor Booster		x	x	2 400
AB05	PetroCan Boundary Lake		x		x	
AB07	Rigel Boundary Lake S		x		x	
	Gordondale				x	
AB09	Canrock Fourth Creek		x		x	
AB10	Rigel Josephine		x		x	
AB11	Star Pouce Coupe	Pouce Coupe	x	x		300
AB12	CNRL Pouce Coupe	Pouce Coupe 2	x	x		150
AB13	WC Gordondale		x		x	
AB14	Canrock Gordondale	Canrock	x	x	x	3 140
	AB14 Junction to Mainline				x	
AB15	Suncor Progress		x		*	
AB16	Norcen Progress	Progress	x	(1)	*	1 200
AB17	Can Ab. Valhalla	Valhalla	x	x		150
AB20	Crestar Valhalla	Valhalla 2	x	(1)		300
AB21	Talisman TeePee Creek	TeePee Creek	x	x	*	600
AB23	AEC Sexsmith		x		x	
AB24	AEC Hythe/Brainard	Hythe	x	x	x	600
	Junction of AB24 to AB26 Lateral				x	
AB26	Rigel Knopcik		x		x	
AB27	Crestar Wembley	Wembley	x	x	x	3 140
AB27A	Can. Hunter Elmworth	Elmworth	x	x	x	900
	AB27A Junction to Mainline				x	
AB29	Ulster Wapiti	Wapiti	x	x	*	900
	AB29 Junction to Mainline				*	
AB30	PetroCan Gold Creek	Gold Creek	x	x		750
AB31	Can. Hunter Karr		x		x	
	AB31 Junction to Mainline				x	

Station	Location Name for Compressoror Meter Stn. Stn	Compressor Station Location Name		Meter Station	Compress or Station	Pigging Facilities
AB32	Encal Simonette	Simonette	x	x	*	150
	AB32 Junction to Mainline				*	
AB34	Rio Alto Ante Creek		x		*	
AB35	Rio Alto Waskahigan	Waskahigan	x	x	*	1 200
	AB35 Junction to Mainline				*	
AB36	Petromet Bigstone		x		x	
AB37	Amoco Bigstone	Bigstone		x	x	900
	AB37 Junction to Mainline		x			
AB38	Summit Two Creeks	Two Creeks	x	x		150
Windfall					x	
AB40	PetroCan Kaybob	Kaybob	x	x		1 420
	AB40 Junction to Mainline				x	
AB41	Amoco Kaybob	Kaybob 2	x	x	x	450
	AB41 Junction to Mainline				x	
AB43	Ranger Galloway		x		x	
	Junction of AB43 to Edson Lateral				x	
AB44	Talisman Edson		x		x	
AB44A	Poco Wolf South	Wolf South	x	x	x	600
AB45	Chevron Kaybob South		x		x	
	AB45 Junction to Mainline				x	
AB46	Amoco West Whitecourt	West Whitecourt	x	x	x	5 600
AB47	Mobil Carson Creek	Carson Creek	x	x		600
AB48	PetroCan Whitecourt	Whitecourt	x	x		1 345
AB49	Can-Oxy Paddle River	Paddle River	x	x	*	1 420
	AB49 Junction to Mainline				*	
AB50	Chauvco Cherhill	Cherhill	x	x	*	1 200
	AB50 Junction to Mainline				*	
AB53	Chevron Fort Sask.		x		*	
AB54	Dow Fort Sask.		x		*	
	AB53/54 Junction to Mainline				*	

* Tie-in capabilities so that transportable pigging facilities could be attached for line sizes NPS 4 and NPS 6.
(1) - denotes that a Compressor Station would be necessary at ultimate volumes (but not at design volumes).

Appendix II

General Construction Timing

General Construction Timing			
		Soil Condition	
Spread	Relative Location	Frozen	Unfrozen
1S	KP 75.1 - KP 0.0 (Fort St. John Lateral) KP 126.7 - KP 189.6 KP 75.0 - KP 95.0		X
2W	KP 95.0 - KP 126.7 KP 189.6 - KP 258.7	X	X
3W	KP 258.7 - KP 367.9	X	
4W	KP 367.9 - KP 497.5	X	
5S	KP 497.5 - KP 711.9		X
6S	KP 711.9 - KP 932.5		X
7S	KP 932.5 - KP 1173.4		X
8S	KP 1173.4 - KP 1421.8		X
9S	KP 1421.8 - KP 1655.8		X

Appendix III

Scope of Environmental Assessment

Attached is a verbatim copy of the decision that was released by the Board on 19 June 1997 in respect of the scope of the environmental assessment required to be conducted pursuant to the *CEAA* in respect of the Project. The scoping decision provided a framework for Alliance to prepare and complete its environmental assessment and was based on preliminary information filed by the Company.

Appendix IV

Chronology of Key Steps and Milestones in Environmental Assessment

The following list summarizes the major steps in the Board's process for conducting the environmental assessment of the Project:

31 December 1996	Alliance filed a preliminary submission with the Board requesting that the Board initiate scoping activities under the *CEAA*.
6 January 1997	The Board issued a news release announcing that the preliminary submission had been received and that a Public Registry had been established.
29 January 1997	The Board contacted other federal government departments, pursuant to the *CEAA*, to determine their interest in the Project.
29 January 1997	The Board asked Alliance for further information on its preliminary submission.
19 February 1997	Alliance filed its response to the Board's request for additional information on scoping.
11 March 1997	The Board contacted federal government departments, which had either expressed interest or for which there would be a possible *CEAA* trigger, to obtain comments on the draft scope.
14 March 1997	The Board issued a News Release announcing the initiation of scoping activities and that the Board would be seeking public input in the near future.
14-27 March 1997	Federal government departments submitted comments on the draft scope.
18 April 1997	The Board released a draft scope of the environmental assessment for the Project for public comment (16 May 1997 due date).
19 June 1997	The Board issued the final scope of the environmental assessment after further consultation with federal authorities.
3 July 1997	Alliance filed its Application for a certificate of public convenience and necessity with the Board.
8 July 1997	The Board issued a news release announcing receipt of Alliance's application.
9 July 1997	The Board sent a letter to Federal Departments and Agencies regarding the procedural track to be taken, under the *CEAA*, for the environmental assessment of the Project.

25 July 1997	The Board contacted Alliance regarding the location of copies of its application.
3 September 1997	The Board issued Hearing Order GH-3-97, including Directions on Procedure, which set out the process for public involvement in the environmental assessment and the Board's public hearing process.
3 September 1997	The Board issued a news release announcing the schedule of the public hearing for the Project.
4 September 1997	The Board issued a letter to landowners and environmental groups advising of the decision to hold a public hearing to obtain the evidence and views of the public.
4 September 1997	The Board issued a letter to federal departments and agencies requesting that departments provide comments, including specialist advice or expert information, by 27 October 1997.
3 September 1997 to hearing	Pre-hearing comments, questions, and evidence were provided by intervenors, interested parties, RAs, and other federal departments.
18, 20 & 23 September 1997	Public seminars were held by the Board in Fort St. John, Edmonton, and Regina to further explain how interested persons could participate.
17-26 November 1997	The Board held a pre-hearing conference.
6 January 1998 to 21 May 1998	The Board's public hearing was held in Calgary and regional hearing sessions were held in Regina, Fort St. John, and Edmonton (77 hearing days total).
30 June 1998	A draft of the CSR was released for comment from RAs, other federal departments which had expressed interest, intervenors, and Alliance.
12 August 1998	All comments from parties received on draft CSR.
17 August 1998	Reply comments received from Alliance.
25 September 1998	Sign-off of CSR by all RAs.
30 September 1998	Submission of CSR to Minister and Agency for *CEAA* public comment period.

Appendix V

Key Environmental Assessment Documentation and Concordance

Key Documentation Listing

1. Alliance's application dated 3 July 1998 filed pursuant to the *NEB Act* (most particularly, Volumes IV "Environmental and Socio-Economic Impact Assessment" and V "Environmental Plans");

2. R. Webb Environmental Services Ltd. - Wildlife Assessment, Alliance Pipeline Project, Volume 1 - Report;

3. R. Webb Environmental Services Ltd. - Wildlife, Alliance Pipeline Project, Volume 2 - Appendices;

4. Fedirchuk McCullough & Associates Ltd. (FMA) - Historical Resources Impact Assessment Report - Alliance Pipeline Limited Partnership, Alliance Pipeline Project, Alberta - Volume II, Permit 96-063;

5. Fedirchuk McCullough & Associates Ltd. (FMA) - Historical Resources Impact Assessment Report - Alliance Pipeline Limited Partnership, Alliance Pipeline Project, Alberta - Volume II, Appendices, Permit 96-063;

6. Fedirchuk McCullough & Associates Ltd. (FMA) - Heritage Resources Impact Assessment Report - Alliance Pipeline Limited Partnership, Alliance Pipeline Project, Saskatchewan - Volume III, Permits 96-091 and 97-028;

7. Fedirchuk McCullough & Associates Ltd. (FMA) - Heritage Resources Impact Assessment Report - Alliance Pipeline Limited Partnership, Alliance Pipeline Project, Saskatchewan - Volume III: Appendices, Permits 96-091 and 97-028;

8. Fedirchuk McCullough & Associates Ltd. (FMA) - Historical Resources Impact Assessment Report - Alliance Pipeline, Alberta Mainline Map - Volume IIA, Permit 96-063;

9. Fedirchuk McCullough & Associates Ltd. (FMA) - Historical Resources Impact Assessment Report - Alliance Pipeline Alberta Lateral Map - Volume IIB, Permit 96-63;

10. Fedirchuk McCullough & Associates Ltd. (FMA) - Heritage Resources Impact Assessment Report - Alliance Pipeline, Saskatchewan Mainline Map, Volume III, Permits 96-091 and 97-028;

11. Heritage North Consulting Limited - Archaeological Assessment - Ancestral-Traditional/Lands of the Blueberry River and Doig River First Nations, Peace River District, N.E. British Columbia - Stage One Results and Final Report.

12. TERA Environmental Consultants (Alta.) Ltd. - Vegetation Assessment Report;

13. Mentiga Pedology Consultants Ltd. - Soil Assessment Report;

14. Geo-Engineering (M.S.T.) Ltd. - Geotechnical Assessment Report;

15. HFP Acoustical Consultants Ltd. - Noise Impact Statement, Mainline Compressor Stations, Alliance Pipeline Project, Canadian Segment;

16. Jacques Whitford Environment Limited - Air Quality Assessment Report Supplementary Studies;

17. Ramsay & Associates Consulting Services Ltd. - Socio-Economic and Land/Resource Use Assessment Report;

18. Golder Associates - Alliance Pipeline Project, Aquatic Resource and Habitat Assessment for Proposed Water Crossings;

19. Golder Associates - Alliance Pipeline Project, Mainline Watercourse Crossings - Peace River Watershed, Volume 1, KP 75.76 to KP 114.90;

20. Golder Associates - Alliance Pipeline Project, Mainline Watercourse Crossings - Wapiti River Sub-Watershed, Peace River Watershed, Volume 1, KP 123.25 to KP 226.62;

21. Golder Associates - Alliance Pipeline Project, Mainline Watercourse Crossings - Smoky River Sub-Watershed, Peace River Watershed, Volume 1, KP 230.08 to KP 315.59;

22. Golder Associates - Alliance Pipeline Project, Mainline Watercourse Crossings - Little Smoky River Sub-Watershed, Peace River Watershed, Volume 1, KP 324.47 to KP 395.09;

23. Golder Associates - Alliance Pipeline Project, Mainline Watercourse Crossings - Athabasca River Watershed, Volume 1, KP 400.95 to KP 495.93;

24. Golder Associates - Alliance Pipeline Project, Mainline Watercourse Crossings - Pembina River Sub-Watershed, Athabasca River Watershed, Volume 1, KP 498.48 to KP 579.82;

25. Golder Associates - Alliance Pipeline Project, Mainline Watercourse Crossings - North Saskatchewan River Watershed, Volume 1, KP 591.04 to KP 699.76;

26. Golder Associates - Alliance Pipeline Project, Mainline Watercourse Crossings - North Saskatchewan River Watershed, Volume 2 KP 706.38 to KP 791.81;

27. Golder Associates - Alliance Pipeline Project, Mainline Watercourse Crossings - Battle River Sub-Watershed, North Saskatchewan River Watershed, Volume 1 of 1, KP 841.31 to KP 896.44;

28. Golder Associates - Alliance Pipeline Project, Mainline Watercourse Crossings - North Saskatchewan River Watershed, Volume 3, KP 911.86 to KP 968.39;

29. Golder Associates - Alliance Pipeline Project, Mainline Watercourse Crossings - North Saskatchewan River Watershed, Volume 4, KP 971.72 to 1037.68;

30. Golder Associates - Alliance Pipeline Project, Mainline Watercourse Crossings - North Saskatchewan River Watershed, Volume 5, KP 1040.56 to KP 1096.97;

31. Golder Associates - Alliance Pipeline Project, Mainline Watercourse Crossings - South Saskatchewan River Watershed, Volume 1, KP 1126.11 to KP 1195.36;

32. Golder Associates - Alliance Pipeline Project, Mainline Watercourse Crossings - Assiniboine River Watershed, Volume 1, KP 1242.10 to KP 1356.07;

33. Golder Associates - Alliance Pipeline Project, Mainline Watercourse Crossings - Assiniboine River Watershed, Volume 2, KP 1357.17 to KP 1648.77;

34. Correspondence received from and evidence submitted by Parties and interested persons (i.e. letters of comment), as detailed in the Public Registry; and

35. Hearing Transcripts.

Concordance

In compiling the CSR, all evidence adduced as part of the GH-3-97 Hearing was considered. Given the volume of information submitted, and the duration of the Hearing, the following table of concordance has been compiled as a general guide for those persons seeking further information on matters addressed in this CSR. Persons using this table are cautioned that this table is not intended to provide a complete reference to all occurrences of evidence on any particular subject matter. Similarly, this table is not intended to provide a complete reference to matters referred to in this CSR.

Pursuant to the CEAA, the Board has created a public registry for the Project. A complete listing of documents and correspondence filed as part of the GH-3-97 Hearing is set out in the Exhibit List for the GH-3-97 Alliance Pipeline Project. Copies of the Exhibit List can be obtained by contacting the Board toll-free at 1-800-899-1265. Copies of documents appearing on the Exhibit List and Hearing transcripts are also available for viewing at the Board library.

Table of Concordance

		Application Volumes	Transcript Volumes	I.R. Responses	Other Documents
2.1	The Application and Project Overview	App. Booklet, I, II, IV			- Alliance - News Release dated 3 Mar. 1998 - Alliance - Updated Shipper and Ownership List dated 21 Jan. 1998
2.2	Purpose and Need	App. Booklet, I, IV			
2.3	Environment Assessment Process				- National Energy Board Hearing order GH-3-97 - Board Scoping Document for Alliance Project
2.4	Consultation with Other Federal Departments and Agencies			NEB 4, 5, 6, 8	- Letters from Federal Departments to Board re: Alliance Pipeline project
2.5	Scope of the Environmental Assessment		12, 13, 37		- Board Scoping Document for Alliance Project - Board Ruling on Scoping dated 26 Feb. 98

		Application Volumes	Transcript Volumes	I.R. Responses	Other Documents
2.6	Alternatives to the Project	IV	87		
2.7	Assessment Criteria				
3.0	Alliance's Public Participation Process	III, IV	11, 13, 29, 30, 31, 35	NEB 2, 5, 8, 11	- Alliance EIA/SIA Supplementary Information Binder
4.1	Description of Environment	IV			- Mentiga Pedology - Soil Assessment - Geo-Engineering - Geotechnical Assessment - Golder Associates - Aquatic and Habitat Assessment for Proposed Watercourse Crossings - R. Webb Environmental Services - Wildlife Assessment - Volumes 1 and 2 - Tera - Vegetation Assessment
4.2.1.1	General Route	IV	33		
4.2.1.2	Mainline Route	II, IV	33, 74	NEB 1	
4.2.1.3	Lateral Routes	II, IV	29	NEB 6	- Alliance EIA/SIA Supplementary Information Binder
4.2.1.4	Facility Site Selection	II, IV	27	NEB 5, 6	
4.2.1.5	Project Design	II, IV	17, 18, 33, 74	NEB 2, 5 TCPL 2, 33 FHPL 163 NGTL 11	
4.2.2	Temporary Facilities	IV		NEB 4, 6	
4.3	Physiography and Bedrock	IV, V, VI	19	NEB 1, 5	- Geo-Engineering - Geotechnical Assessment
4.4	Soils	IV, V, VI	29, 38	NEB 4, 5, 6, 8, 11	- Mentiga Pedology - Soil Assessment - Soil Assessment Supplementary Studies - Alliance EIA/SIA Supplementary Information Binder - Alliance written argument on environmental and socio-economic effects
4.5	Vegetation	III, IV, V	8, 9, 12, 13, 16, 78, 79	NEB 1	- Tera - Vegetation Assessment - Volume 1 - Tera - Vegetation Assessment - Volume 2 - Tera - Vegetation Assessment - Supplementary Information - PFRA Letters to the Board dated 8 Dec. 1997 and 23 Oct. 1997 - SERM Letter to the Board dated 19 Nov. 1997 - Alliance written argument on environmental and socio- economic effects - Ramsay & Associates Consulting Services Ltd. - Socio- Economic and Land/Resource use Assessment Report
4.6	Hydrology	IV, VI			- Letters from DFO-CCG to the Board

		Application Volumes	Transcript Volumes	I.R. Responses	Other Documents
4.7	Fish and Fish Habitat	IV, V, VI	12, 13, 15, 19, 38	NEB 1, 4, 5, 6, TCPL IRs	- Golder Associates - Aquatic and Habitat Assessment for Proposed Watercourse Crossings - Golder Associates - watercourse crossing reports by watershed - Alliance - designed watercourse crossings, dated Feb. and Mar. 1998 - Alliance - Response to Undertaking to Enderwick @ Transcript pg.4260 - DFO-Habitat letters to Board, dated 14, 27, and 31 Oct. 97, 10 Feb. 26 Mar., and 30 Apr. 98 - Environment Canada letter to Board, dated 29 Oct. 97 - SERM letter to Board, dated 19 Nov. 97 - Alliance - Watercourse Crossings Cost Summary - Alliance written argument on environmental and socio-economic effects
4.8	Wildlife and Wildlife Habitat	IV, V	7, 8, 10, 11, 13, 14, 30, 32, 33, 50, 73, 78, 79	NEB 1, 4, 6, 11	- R. Webb Environmental Services - Wildlife Assessment - Volume 1 - R. Webb Environmental Services - Wildlife Assessment - Volume 2 - R. Webb Environmental Services - Supplementary Information - Environmental Canada letter to the Board dated 29 Oct. 97 - Environment Canada letter to the Board dated 29 Jan. 98 - WCWC Letter to the Board dated 18 Nov. 97 - Letters from various landowners concerning wildlife - Alberta Fish & Game Association Letters to the Board dated 17 Sept. 97, 27 Oct. 97, and 15 Feb. 98 - Alberta Wilderness Association Letter to the Board date 14 Nov. 97 - RMEC Letters to the Board - RMEC - exhibits filed during the Hearing - Alliance written argument on environmental and socio-economic effects
4.9	Environmentally Significant Areas	IV, V	8, 33	NEB 11	- Tera - Vegetation Assessment - Volume 1
4.10	Air Quality	IV	7, 11, 14, 18, 33	NEB 5, 6	- Alliance EIA/SIA Supplementary Info. Binder - Jacques - Air Quality Assessment Reports - Application of ISC3-OLM Model dated 6 May 98 - Environment Canada's Letters to the Board dated 29 Jan. 98, 8 Apr. 98, and 20 May. 98 - Alliance's Responses to Undertakings at T4274 and T4267
4.11	Acoustic Environment	III, IV	20, 27, 33	NEB 2, 5, 6	- HFP Acoustical Consultants Ltd. - Noise Impact Statement - Alliance EIA/SIA Supplementary Info. Binder
4.12	Heritage, Archaeological and Palaeotological Resources	IV		NEB 4, 6	- Fedirchuk McCullough & Associated Ltd. - Historical Resource Impact Assessments - Heritage North Consulting Limited - Archaeological Assessments - Alliance EIA/SIA Supplementary Info. Binder
4.13	Waste Management	IV, V		NEB 4	- Alliance's 4 Dec. 98 response to 19 Nov. 97 Letter from SERM

		Application Volumes	Transcript Volumes	I.R. Responses	Other Documents
4.14	Socio-Economic Matters	III, IV	27, 33	NEB 4, 5, 8	- Ramsay & Associates Consulting Services Ltd. - Socio-Economic and Land/Resource Use Assessment Report
4.15	First Nations	III, IV	4, 9, 27, 29, 30, 32, 33, 34, 35, 38, 40, 41, 50, 52, 79, 82	Alliance Volume B NEB 8	- Alliance EIA/SIA Supplementary Info. Binder - Ramsay & Associates consulting Services Ltd. - Socio-Economic and Land/Resource Use Assessment Report - Fedirchuk McCullough & Associated Ltd. - Historical Resource Impact Assessments - Heritage North Consulting Ltd. - Archaeological Assessments - 16 Apr. 98 Board Ruling
4.16	Renewable Resources	IV		NEB 5	- Ramsay & Associates Consulting Services Ltd. - Socio-Economic and Land/Resource use Assessment Report
4.17	Cumulative Environmental Effects	III, IV, VI	13, 14, 20, 29, 36, 37, 33	NEB 5, 6 RMEC IRs RMEC response to Alliance IR #1	- Board Ruling on Scoping dated 26 Feb. 98 - Board Scoping Document for Alliance Project - RMEC letters to the Board - RMEC - exhibits filed during Board hearing - Golder Associates - Aquatic and Habitat Assessment for Proposed Watercourse Crossings - Alliance written argument on environmental and socio-economic effects
4.18	Effects of Accidents or Malfunctions	II, IV, V	16, 33	NEB 2, 4, 5, 6	- Centre for Engineering Research Risk Mitigation and Extended Risk Sensitivity studies
4.19	Effects of the Environment on the Project	II, IV, V	19		
5.0	Environmental Inspection, Monitoring and Follow-up Programs	IV, V, VI	14, 29	NEB 4, 5, 6, 8, 11	
6.0	Abandonment	IV	22, 74		- Sandra Elliott's 11 May 98 written argument

Appendix VI

Ruling Re: Scope of Assessment

The verbatim text follows of the Board's ruling dated 26 February 1998 on the RMEC Motion re Reconsideration of the Hearing Panel's Ruling in respect of Filing of ProGas Limited Supply Data:

At the conclusion of the Hearing yesterday, Rocky Mountain Ecosystem Coalition ("RMEC") made a motion for reconsideration of an earlier Ruling dealing with RMEC's request that the ProGas Panel provide evidence concerning the proportion of connected versus unconnected wells and the pipelining and other facilities that would be required to bring forward unconnected wells. When seeking the reconsideration, RMEC noted that the information it was seeking was, in its view, relevant to a consideration of cumulative environmental effects.

The Board has carefully considered this matter and rules as follows: Pursuant to the *Canadian Environmental Assessment Act*, the Board issued a Scope of Assessment for the Alliance Pipeline Project. This document set out the scope of the project, the factors to be considered in the assessment and the scope of those factors. The lines of inquiry in issue can be considered in light of two different aspects of this Scoping Document.

Firstly, the "scope of the project", as described in the Scope of Assessment document, includes "any other identifiable upstream physical works or activities that are required to be built to make possible the commencement of operation of the physical works and/or physical activities identified in no. 1 above" [i.e. the Alliance Pipeline Project].

The Board is of the view that, in light of this aspect of its Scoping Decision, Parties may pursue lines of inquiry seeking to ascertain whether or not other identifiable physical works or activities must be undertaken by gas suppliers in order that the Alliance Project may commence operation. For example, Parties could ask whether ProGas is required to undertake construction of any identifiable upstream physical works in order to make possible the commencement of operation of the Alliance Pipeline Project. Parties are entitled to ask such questions in order to discuss the scope of the project.

Secondly, the Board notes that the Scope of the Assessment document in the section on "Scope of the Factors" states that the cumulative effects assessment is to consider "the combined effect of existing or background conditions, the Alliance Project, and all relevant other projects and activities for which formal plans or applications have been made".

Although the Scoping Decision does not define "relevant", the Board notes its Ruling in relation to the Express Pipeline Project, which can be found in the Report of the Joint Review Panel, May 1996.

At page 187 of that Report, the Panel stated: "An analysis of the aforementioned paragraph of the *CEAA* [subparagraph 16(1)(a) which requires an assessment of cumulative effects] indicates that certain requirements must be met for the Panel to consider cumulative environmental effects.

First, there must be an environmental effect of the project being assessed.

Second, that environmental effect must be demonstrated to operate cumulatively with the environmental effects from other projects or activities.

Third, it must be known that the other projects or activities have been, or will be, carried out and are not hypothetical.

These three criteria from the *CEAA* must be met before the Panel will find evidence on cumulative environmental effects to be relevant."

This Board is of the view that these requirements are of assistance in assessing the relevance of evidence on cumulative effects and notes that in this case the third criteria has been further defined in relation to future projects to mean other projects or activities for which formal plans or applications have been made.

In light of this second aspect of its Scoping Decision, Parties may pursue lines of inquiry seeking to ascertain whether or not there are other projects and activities for which formal plans or applications have been made, the effects of which will operate cumulatively with one or more of the environmental effects of the Alliance Pipeline Project. For such evidence to be relevant to the matters in issue, all of those criteria must be met.

Appendix VII

Summary Information for Sensitive Watercourse Crossings

KP	Watercourse	Fish Community	Potential Habitat Use	Tentative Timing Restrictions (species pertaining to)	Proposed Crossing Period	Proposed Crossing Method	Alternate / Contingency	Proposed Equipment Crossing Technique
144.2	Bear River	Coolwater	forage fish, potential NRPK habitat	none identified (timing restrictions waived by Peace River Office)	summer	open-cut		existing bridge or span
187.9	Wapiti River	Coldwater	all types of fish species, including sport fish (spawning and overwintering)	Aug 15-July 15 (ARGR, BKTR, BLTR, GOLD, MNWH, NRPK, WALL)	July 15-Aug 15	open-cut	open-cut in fall	existing bridge or span
217.8	Bald Mountain Creek	Coldwater	all types of fish species, including sport fish (spawning & some overwintering)	Aug 15-July 15 (ARGR, BLTR, MNWH, NRPK)	winter	isolate	open-cut (July 15-Aug 15)	span or clean gravel ramp
226.6	Big Mountain Creek	Coldwater	all types of fish species, including sport fish (spawning & some overwintering)	Aug 15-July 15 (ARGR, BLTR, MNWH, NRPK)	winter	isolate	open-cut (July 15-Aug 15)	span or clean gravel ramp
235.1	Smoky River	Coldwater	all types of species, including sport fish (spawning and overwintering)	Aug 15-July 15 (ARGR, BKTR, BLTR, GOLD, MNWH, NRPK, WALL)		directional drill	open-cut (July 15-Aug 15)	existing bridge or span
250.9	Zero Creek	Coldwater	forage fish, good sport fish potential (spawning & overwintering)	Aug 15-July 15 (BLTR, MNWH)	winter	isolate	open-cut (July 15-Aug 15)	span
259.2	Patterson Creek	Coldwater	forage fish, good sport fish potential (spawning & overwintering)	Aug 15-July 15 (ARGR, BLTR, MNWH)	winter	isolate	open-cut (July 15-Aug 15)	span
270.0	Smuland Creek	Coldwater	forage fish, moderate sport fish potential (mainly overwintering but some spawning)	Aug 15-July 15 (ARGR, NRPK, suspected presence of fall spawners-Peace River Office)	winter	isolate	open-cut (July 15-Aug 15)	span
277.7	Karr Creek	Coldwater	forage fish, high potential for sport fish overwintering habitat (no spawning substrate)	Aug 15-July 15 (ARGR, suspected presence of fall spawners-Peace River Office)	winter	isolate	open-cut (July 15-Aug 15)	span
282.9	Latornell River	Coldwater	high sport fish potential (spawning and overwintering), forage fish	Aug 15-July 15 (ARGR, BLTR, NRPK, MNWH, WALL)	winter	isolate	open-cut (July 15-Aug 15)	existing bridge
294.5	Tributary to Simonette River No.1	none identified	none at crossing, but potential for NRPK & burbot reproduction downstream of crossing	none identified	winter	isolate		span
294.7	Simonette River	Coldwater	forage fish, sport fish (spawning and overwintering)	Aug 15-July 15 (ARGR, BLTR, MNWH, NRPK, WALL)	winter	isolate	open-cut (July 15-Aug 15)	existing bridge
296.6	Tributary to Simonette River No.2	none identified	none	none identified	winter	isolate		span
297.5	Tributary to Simonette River No.3	Coolwater	forage fish	none identified	winter	isolate		span

KP	Watercourse	Fish Community	Potential Habitat Use	Tentative Timing Restrictions (species pertaining to)	Proposed Crossing Period	Proposed Crossing Method	Alternate / Contingency	Proposed Equipment Crossing Technique
303.8	Tributary to Simonette River No.5	Coldwater	potential for ARGR spawning in spring (high water), low forage fish potential	Aug 15-July 15 (ARGR, suspected presence of fall spawners)	winter	isolate	open-cut (July 15-Aug 15)	span
312.3	Tributary to Shell Creek No.2	Coolwater	moderate ARGR potential for spawning in spring, high forage fish potential	none identified	winter	isolate	open-cut (July 15-Aug 15)	span
313.7	Shell Creek	Coldwater	high sport fish potential (spawning and overwintering), forage fish	Aug 15-July 15 (ARGR, BLTR, MNWH)	winter	isolate	open-cut (July 15-Aug 15)	span
315.6	Deep Valley Creek	Coldwater	high sport fish potential (spawning and overwintering), forage fish	Aug 15-July 15 (ARGR, BLTR, MNWH)	winter	isolate	open-cut (July 15-Aug 15)	existing bridge or span, existing ford
326.3	Tributary to Waskahigan River No.3	none identified	forage fish & high sport fish potential (ARGR spawning)	none identified	winter	isolate	open-cut (July 15-Aug 15)	span
336.9	Waskahigan River	Coldwater	high sport fish potential (spawning & overwintering), forage fish	Aug 15-July 15 (MNWH, ARGR, BLTR, NRPK, WALL)	winter	isolate	open-cut (July 15-Aug 15)	span
363.5	Little Smoky River	Coldwater	high sport fish potential (overwintering & spawning), forage fish	Sept 1-June 30 (ARGR, BLTR, BURB, MNWH, NRPK, WALL, YLPR)	winter	isolate	open-cut (June 30-Sept 1)	span
395.1	Iosegun River	Coldwater	sport fish and forage fish	April 15-June 30 (ARGR, NRPK, WALL)	winter	isolate	open-cut (June 30-April 15)	span
412.4	Two Creek	Coldwater	sport fish and forage fish	Sept 1-July 15 (ARGR, BLTR, MNWH, RNTR)	winter	isolate	open-cut (July 15-Sept 1)	span
437.4	Chickadee Creek	Coldwater	forage fish and moderate sport fish potential (spawning & overwintering)	Sept 1-July 15 (ARGR, BLTR, MNWH, RNTR)	winter	isolate	open-cut (July 15-Sept 1)	span
454.9	Tributary to Chickadee Creek	Coldwater	forage fish and moderate sport fish potential (spawning)	Sept 1-July 15 (ARGR, BLTR, MNWH, RNTR)	winter	isolate	open-cut (July 15-Sept 1)	span
470.6	Sakwatamau River	Coldwater	high potential for all types of species (spawning and overwintering)	Sept 1-July 15 (ARGR, BLTR, MNWH, RNTR, NRPK, BURB)	winter	isolate	open-cut (July 15-Sept 1)	span
480.4	Athabasca River	Coldwater	sport fish (spawning and overwintering), forage fish	Sept 1-July 15 (MNWH, NRPK, BNTR, LKWH, GOLD, RNTR, BURB, ARGR, BLTR, WALL)		directional drill	open-cut (July 15-Sept 1)	existing bridge
529.9	Paddle River	Coldwater	sport fish, forage fish	April 15-July 15 (ARGR, NRPK, GOLD, WALL)	summer	open-cut (July 15-April 15)	isolate (April 15-July 15)	span
536.4	Pembina River	Coldwater	sport fish (spawning), forage fish	Sept 10-July 5 (NRPK, ARGR, BLTR, MNWH, RNTR, WALL)	July 5-Sept 10	open-cut	isolate (Sept 10-July 5)	existing bridge
541.4	Deep Creek	Coolwater	forage fish and sport fish potential downstream (spawning & overwintering)	April 15-July 15 (NRPK)	summer	isolate (before July 15)	Isolate	span

KP	Watercourse	Fish Community	Potential Habitat Use	Tentative Timing Restrictions (species pertaining to)	Proposed Crossing Period	Proposed Crossing Method	Alternate / Contingency	Proposed Equipment Crossing Technique
554.4	Tributary to Coyote Creek	none identified	forage fish and moderate sport fish potential (spawning and overwintering)	none identified	summer	isolate (before July 15)	Isolate	span
639.8	Sturgeon River	Coolwater	sport species and forage fish	April 15-July 1 (GOLD, NRPK, YLPR, SAUG, WALL) NOTE: fall timing restrictions waived by Edmonton District	July 1-April 15	open-cut	isolate (April 15-July 1)	existing bridge or span
657.6	North Saskatchewan River	Coldwater	sport fish, forage fish	April 15-Aug 1 (GOLD, NRPK, SAUG, RNTR, YLPR, CTTR, WALL) NOTE: fall timing restrictions waived by Edmonton District	Aug 1-April 15	open-cut		existing bridge
841.3	Battle River	Coolwater	forage fish, good sport fish habitat	Apr 1-July 1 (NRPK, YLPR, WALL)	summer/fall after July 1	open-cut	isolate (April 1-July 1)	existing bridge or span
1183.2	South Saskatchewan River	Coolwater/ Coldwater	sport fish, forage fish	Sept 10-Aug 15 (MNWH, NRPK, BKTR, GOLD, LKWH, RNTR, SAUG, WALL, YLPR)		directional drill	open-cut (Aug 15-Sept 10); an extension in the window may be required	existing bridge
1335.5	Qu'Appelle River	Coolwater	sport fish & bigmouth buffalo	April 1-June 1 (NRPK, BGBF, WALL)	summer after June 1	open-cut	isolate (April 1-June 1)	span
Highway Lateral								
134.7	Tributary to Blueberry River No.0	Coldwater	sport fish potential at crossing location	May 1-June 30 (ARGR)	summer 99	isolate		span
Aitken Creek Lateral								
124.2	Blueberry River (Crossing No.2)	Coolwater/ Coldwater	forage fish, moderate potential for sport fish	May 1-June 30 (ARGR, NRPK)	summer 99	isolate	possible use of existing road or bridge for equipment crossing	span
40.5	Stoddart Creek (Crossing No.1)	Coolwater	forage and coolwater sport fish	May 1-June 30 (WALL, NRPK)	summer 99	directional drill	isolate	span
19.5	Stoddart Creek (Crossing No.2)	Coolwater	sport and forage fish	Jan 1-June 30 (NRPK, WALL, BURB)	summer 99	directional drill	isolate	span
Boundary Lake Lateral								
10.5	Beatton River	Coolwater	sport and forage fish	Jan 1-June 30 (NRPK, WALL, BURB)		directional drill	directional drill / isolate	existing bridge
36.2	Alces River	Coolwater	forage fish and moderate sport fish potential	Jan 1-June 30 (BURB)	June 30-Jan 1	isolate	open-cut	span
Fort St. John Lateral								
18.2	Pouce Coupéé River	Coolwater/ Coldwater	sport and forage fish	April 15-July 15 Sept 1-Mar 25 (ARGR, BLTR, NRPK, WALL)	summer 98	directional drill	isolate	span or existing bridge

KP	Watercourse	Fish Community	Potential Habitat Use	Tentative Timing Restrictions (species pertaining to)	Proposed Crossing Period	Proposed Crossing Method	Alternate / Contingency	Proposed Equipment Crossing Technique
46.5	Kiskatinaw River	Coolwater/ Coldwater	forage and sport fish	Sept 1-July 1 (ARGR, BLTR, NRPK, RNTR, WALL, LKTR)		directional drill	alternate directional drill	span or existing bridge
62.4	Eight Mile Creek	Coolwater/ Coldwater	forage and sport fish	Sept 1-July 1 (BLTR, ARGR)	summer 98	isolate		span
64.7-65.3	Peace River	Coolwater/ Coldwater	sport and forage fish	April 15-April 5 (ARGR, BLTR, GOLD, LKTR, LKWH, NRPK, WALL, YLPR)		directional drill	alternate directional drill / bridge	existing bridge
Teepee Creek Lateral								
10.9	Niobe Creek	Coolwater	forage and sport fish	none (waived by Fish & Wildlife)	summer 99	open-cut		span
Spirit River Lateral								
4.6	Bear River (Crossing No.2)	Coolwater	forage fish, NRPK and YLPR potential	none (waived by Fish & Wildlife)	summer 99	open-cut		span
	Hythe Lateral							
36.1	Sinclair Creek	Coolwater	forage fish, possible NRPK or YLPR habitat	none (waived by Fish & Wildlife)	summer 99	open-cut		span
Elmworth Lateral								
8.2	Beaverlodge River	Coolwater	sport and forage fish	April 15-July 15 (NRPK)	summer 99	directional drill	isolate	span
24.3	Red Willow River	Coolwater/ Coldwater	sport and forage fish	Aug 15-July 15 (ARGR, BLTR, NRPK, MNWH, WALL)	summer 99	directional drill	isolate	span
Ante Creek Lateral								
11.0	Tributary to Waskahigan River No.3	none identified	sport fish spawning and overwintering, forage fish	none identified	winter 98/99	isolate		span
11.9	Tributary to Waskahigan River No.4	none identified	forage fish	none identified	winter 98/99	isolate		span
19.5	Tributary to Waskahigan River No. 5	none identified	sport fish overwintering areas, forage fish	none identified	winter 98/99	isolate		span
Bigstone Lateral								
6.9	Tony Creek	Coolwater/ Coldwater	forage fish, sport fish overwintering	Sept 15-June 30 (ARGR, MNWH, NRPK, WALL)	winter 98/99	directional drill	isolate	span
9.4	Tributary to Tony Creek No. 2	none identified	sport fish overwintering potential	none identified	winter 98/99	isolate		span
13.2	Tributary to Tony Creek No.2 (2nd crossing)	none identified	sport fish spawning and rearing	none identified	winter 98/99	isolate		span
20.9	Little Smoky River	Coolwater/ Coldwater	sport fish spawning and overwintering	Sept 1-June 30 (ARGR, BLTR, BURB, MNWH, NRPK, WALL, YLPR)	winter 98/99	directional drill	isolate	span or existing bridge
Two Creeks Lateral								
12.4	Tributary to Two Creek No.1	none identified	forage fish, potential overwintering area for sport fish	none identified	winter 98/99	isolate		span

KP	Watercourse	Fish Community	Potential Habitat Use	Tentative Timing Restrictions (species pertaining to)	Proposed Crossing Period	Proposed Crossing Method	Alternate / Contingency	Proposed Equipment Crossing Technique
Fox Creek Lateral								
1.0	Tributary to Iosegun Lake No. 1	Coolwater	forage fish and potential sport fish use (WALL, NRPK)	none identified	winter 98/99	isolate		span
5.7	Tributary to Iosegun Lake No. 3	Coolwater/ Coldwater	sport fish potential (WALL, NRPK)	Jan 1-April 30 (BURB)	winter 98/99	isolate		span
17.5	Outlet Creek	Coolwater	sport and forage fish	April 15-June 30 (NRPK, YLPR, WALL)	June 30-April 15	isolate	open-cut	span
Edson Lateral								
5.4-5.7	Athabasca River	Coolwater/ Coldwater	forage and sport fish	Sept 1-July 15 (ARGR, BLTR, MNWH, NRPK, BNTR, GOLD, SAUG, LKWH, BURB, WALL, RNTR)		directional drill	open-cut (July 15-Sept 1)	existing bridge or ice bridge
7.7	Windfall Creek (Crossing No.1)	Coolwater/ Coldwater	forage and sport fish spawning and overwintering	April 15-July 15 Sept 15-April 15 (ARGR, RNTR, BKTR, MNWH)	winter 98/99	isolate		span
18.0	Windfall Creek (Crossing No.2)	Coolwater/ Coldwater	sport and forage fish spawning and overwintering	April 15-July 15 Sept 15-April 15 (ARGR, RNTR, BKTR, MNWH)	winter 98/99	isolate		span
28.7	Tributary to Windfall Creek No.6	Coldwater	sport fish and forage fish spawning and overwintering	Jan 1-July 15 (RNTR, BURB)	winter 98/99	isolate		span
48.8	Tributary to Pine Creek No.1	none identified	sport fish spawning and rearing	none identified	winter 98/99	isolate		span
52.9	Tributary to Pine Creek No.2	none identified	possible forage fish	none identified	winter 98/99	isolate		span
54.5	Tributary to Pine Creek No.3	Coldwater	sport and forage fish	May 1-July 15 (RNTR)	winter 98/99	isolate		span
57.3	Tributary to Pine Creek No.4	Coldwater	possible sport fish spawning and rearing, overwintering	May 1-July 15 (RNTR)	winter 98/99	isolate		span
80.5	Edson River	Coolwater/ Coldwater	sport fish (spawning habitat is limited, overwintering relatively abundant though)and forage fish	Sept 1-July 15 (ARGR, BLTR, RNTR, BURB, MNWH, NRPK)	winter 98/99	directional drill	isolate	span
103.4-103.5	McLeod River	Coolwater/ Coldwater	sport fish and forage fish (spawning, feeding and overwintering)	Sept 1-July 15 (RNTR, MNWH, BKTR, BLTR, ARGR)	winter 98/99	directional drill	open-cut (July 15-Sept 1)	existing bridge
106.3	Swartz Creek	Coolwater/ Coldwater	sport and forage fish	Sept 15-April 15 (MNWH)	winter 98/99	directional drill	isolate	span
138.5	Wolf Creek	Coolwater/ Coldwater	sport and forage fish	Sept 15-July 15 (NRPK, ARGR, RNTR, WALL, MNWH, BNTR)	winter 98/99	directional drill	isolate	span
Edson West Lateral								
1.5	Little Sundance Creek	Coolwater/ Coldwater	sport fish overwintering	Sept 1-July 15 (RNTR, MNWH, BKTR, BURB, BLTR, ARGR)	winter 98/99	isolate		span
12.5	Sundance Creek	Coolwater/ Coldwater	possibly some sport fish (coolwater), forage fish	Sept 1-July 15 (RNTR, MNWH, BKTR, BLTR, ARGR)	winter 98/99	isolate		span

KP	Watercourse	Fish Community	Potential Habitat Use	Tentative Timing Restrictions (species pertaining to)	Proposed Crossing Period	Proposed Crossing Method	Alternate / Contingency	Proposed Equipment Crossing Technique
Kaybob South Lateral								
4.0 & 4.2	Pine Creek	Coolwater/ Coldwater	sport fish spawning and overwintering	Sept 1-July 15 (RNTR, MNWH, BURB, BLTR, ARGR)	winter 98/99	directional drill	isolate	span

ARGR - Arctic Grayling (*Thymallus arcticus*)
BGBF - Bigmouth Buffalo (*Ictiobus cyprinellus*)
BKTR - Brook Trout (*Salvelinus fontinalis*)
BLTR - Bull Trout (*Salvelinus confluentus*)
BNTR - Brown Trout (*Salmo trutta*)
BURB - Burbot or Loche (*Lota lota*)
CTTR - Cutthroat Trout (*Oncorhynchus clarki or Salmo calrki*)
GOLD - Goldeye (*Hiodon alosoides*)
LKTR - Lake Trout (*Salvelinus namaycush*)
LKWH - Lake Whitefish (*Coregonus clupeaformis*)
MNWH - Mountain Whitefish (*Prosopium williamsoni*)
NRPK - Northern Pike (*Esox lucius*)
RNTR - Rainbow Trout (*Oncorhynchus mykiss or Salmo gairdneri*)
SAUG - Sauger (*Stizostedion canadense*)
WALL - Walleye (*Stizostedion vitreum vitreum*)
YLPR - Yellow Perch (*Perca flavescens*)

Appendix VIII

Abbreviations

AB	Alberta
ATV	all-terrain vehicle
Agency	Canadian Environmental Assessment Agency
Alliance or the Company	Alliance Pipeline Ltd.
Altamont	Altamont Gas Transmission Company
B.C.	British Columbia
Board or NEB	National Energy Board
CEA	cumulative effects assessment
CEAA	*Canadian Environmental Assessment Act*
CH_4	methane
CLI	Canada Land Inventory
CNT	Consultative Notation
CO	carbon monoxide
CO_2	carbon dioxide
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CSR	Comprehensive Study Report
CTL	Coniferous Timber Licenses
cm	centimetre
Cochin	Cochin Pipe Lines Ltd.
dBA	decibels (A-weighted sound level)
DFO-CCG	The Department of Fisheries and Oceans, Canadian Coast Guard
DFO-Habitat	Department of Fisheries and Oceans, Habitat

EPN	Early Public Notification
ESA	Environmentally Significant Areas
EUB	Alberta Energy and Utilities Board
FMA	Forest Management Area
FSIN	Federation of Saskatchewan Indian Nations
Foothills or FHPL	Foothills Pipe Lines Ltd.
ft	feet
GHGs	greenhouse gases
GWP	global warming potentials
ha	hectare
INAC	Indian and Northern Affairs Canada
IPL	IPL Energy Inc.
I.R.	Information Request
km	kilometre
KP	kilometre post
kPa	kilopascal
kt	kilotonnes
Lakehead	Lakehead Pipe Line Company, Inc.
m	metre
mm	millimetre
MELP	British Columbia Ministry of Environment, Lands and Parks
MOP	maximum operating pressure
MOUs	Memoranda of Understanding
NEB Act	*National Energy Board Act*
NGTL	NOVA Gas Transmission Ltd.

NO_x	oxides of nitrogen
NO_2	nitrogen dioxide
NRCan	Natural Resources Canada
Northern Border	Northern Border Pipeline Company
NPS	nominal pipe size in inches
O.D.	outside diameter
PFRA	Prairie Farm Rehabilitation Administration
psi	pounds per square inch
RA	Responsible Authority
RMEC	Rocky Mountain Ecosystem Coalition
ROW	right-of-way
SCADA	Supervisory Control and Data Acquisition
SERM	Saskatchewan Environment and Resource Management
SK	Saskatchewan
TransCanada or TCPL	TransCanada PipeLines Limited
Treaty 8	Treaty 8 Tribal Association
U.S.	United States of America
VCR	Voluntary Challenge and Registry
Viking	Viking Gas Transmission Company
WCSB	Western Canada Sedimentary Basin
WCWC	Western Canada Wilderness Committee

Appendix IX

Glossary

[Those terms marked by an asterisk are as defined by the *CEAA*]

construction

any pipeline construction activity which may have an impact on the environment, including preparatory work, such as clearing or grading.

environment*

the components of the Earth, and includes

(a) land, water, and air, including all layers of the atmosphere,

(b) all organic and inorganic matter and living organisms, and

(c) the interacting natural systems that include components referred to in paragraphs (a) and (b).

environmental effect*

in respect of a project,

(a) any change that the project may cause in the environment, including any effect of any such change on health and socio-economic conditions, on physical and cultural heritage, on the current use of lands and resources for traditional purposes by aboriginal persons, or on any structure, site or thing that is of historical, archaeological, palaeontological or architectural significance, and

(b) any change to the project that may be caused by the environment,

whether any such change occurs within or outside Canada.

follow-up program*

a program for

(a) verifying the accuracy of the environmental assessment of a project, and

(b) determining the effectiveness of any measures taken to mitigate the adverse environmental effects of the project.

fragmentation

	the reduction of large habitats into smaller areas through development.
greenhouse gas	a trace gas in the atmosphere which is transparent to solar short wave radiation but selectively absorbs and subsequently emits thermal long wave radiation. The effect of these gases in the atmosphere is to allow the transmission of incoming solar radiation to the earth's surface which warms and emits thermal energy to the atmosphere. Greenhouse gases absorb this energy and re-emit some of it back to the earth's surface, thereby producing a warming which is known as the greenhouse effect.
lek	pairing and mating habitat area, primarily utilized by Sage and Sharp-tailed grouse.
mitigation*	in respect of a project, the elimination, reduction, or control of the adverse environmental effects of the project, and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means.
mustelid	species of low-slung, long-bodied, carnivores belonging to the family Mustelidae (eg. marten, weasels).
Project	the Canadian portion of Alliance's proposed pipeline from northeastern British Columbia and northwestern Alberta to Chicago, Illinois.
Responsible Authority*	a federal authority that is required by the *CEAA* to ensure that an environmental assessment is conducted.
right-of-way	the legal right of passage over both public and privately owned land, also the way or area over which the right exists.
riparian	the habitat bordering a lake or a river.
scarifying	the process of loosening or stirring the soil, without turning it over, to make a site more amenable to plant growth.
shoo-fly	access road used during construction of a pipeline; may be specially constructed or may be existing road.
sodic soil	a soil that contains sufficient exchangeable sodium (salts) to interfere with the growth of most plants.
spread	discrete portion of the pipeline route for construction, usually defined by KP, which facilitates contractual arrangements,

	scheduling of work force and equipment, and accommodates physical and environmental considerations.
staging area (construction)	a site used for the temporary storage and handling of equipment and materials in order to facilitate project construction.
staging area (waterfowl)	a general locality where large numbers of waterfowl congregate during migration.
sustainable development*	development that meets the needs of the present, without compromising the ability of future generations to meet their own needs.
tackifier	organic liquid application used to solidify the top layer of soil storage piles to prevent wind erosion.
temporary workspace	lands in addition to the right-of-way that are necessary to facilitate construction.
three-lift	a soil handling procedure whereby the soil is selectively removed, stored and replaced in three layers; topsoil, upper subsoil, and lower subsoil.
ungulate	herbivorous, hoofed mammal, generally living in herds.
upstream	typically refers to facilities utilized to provide hydrocarbons to transmission facilities (e.g. exploration, production wells, flowlines).

Addendum I

Department of Fisheries and Oceans

Addendum II

Prairie Farm Rehabilitation Administration