MANAGING IMPACTS OF MAJOR PROJECTS: AN ANALYSIS OF THE ENBRIDGE GATEWAY PIPELINE PROPOSAL

by

Timothy Van Hinte
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Name: Timothy Van Hinte

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Environmental Management

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Examining Committee:

Senior Supervisor: **Thomas I. Gunton**
Professor
School of Resource and
Environmental Management

Committee Member: **J.C. Day**
Professor Emeritus
School of Resource and
Environmental Management

Date Approved: March 22, 2005

ABSTRACT

Enbridge, a major pipeline company, has proposed a new pipeline termed the Gateway Project to transport increased crude oil production in the Alberta oil sands to market. The Gateway Project would include construction of a 1,100-1,300-kilometer crude oil pipeline from northern Alberta to British Columbia's (B.C.) north coast and a marine terminal to transport crude oil on tankers from the pipeline to U.S. and Asian markets.

This report provides an overview of potential environmental impacts, socioeconomic effects, and institutional issues associated with the Gateway Project on Coastal First Nations in B.C. Pipelines, ports, and tankers have potential to create detrimental environmental effects and socioeconomic impacts on communities. In addition, an evaluation of current regulatory and approval processes for pipeline, port, and tanker projects reveals several deficiencies. To address these issues, Enbridge and Coastal First Nations should engage in a comprehensive impact and benefits agreement (IBA) negotiation and implementation process.

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AAPA	American Association of Port Authorities
AVC	Assurance of Voluntary Compliance
B.C. EAA	*British Columbia Environmental Assessment Act*
B.C. EAO	British Columbia Environmental Assessment Office
B.C. TC	British Columbia Treaty Commission
B.C.	British Columbia
BBBL	Billion barrels
BBL	Barrels
BPD	Barrels per day
BWTF	Ballast Water Treatment Facility
CAPP	Canadian Association of Petroleum Producers
CCG	Canadian Coast Guard
CCME	Canadian Council of Ministers of the Environment
CDFs	Confined disposal facilities
CEA Act	*Canadian Environmental Assessment Act*
CEAA	Canadian Environmental Assessment Agency
CIRL	Canadian Institute of Resources Law
CORE	Commission on Resources and Environment
CSA	Canadian Standards Association
DFO	Fisheries and Oceans Canada
DWT	Dead weight tons
EA	Environmental Assessment
GESAMP	Group of Experts on the Scientific Aspects of Marine Pollution
GIC	Governor in Council
HDD	Horizontal directional drilling
IAIA	International Association for Impact Assessment

IBA	Impact and benefits agreement
IMO	International Maritime Organization
IPIECA	International Petroleum Industry Environmental Conservation Association
ITOPF	International Tanker Owners Pollution Federation
JBNQA	James Bay and Northern Quebec Agreement
JWEL	Jacques Whitford Environment Limited
Km	Kilometer
KPL	Kitimat Pipeline Limited
LRMP	Land and Resource Management Plan
LWBC	Land and Water British Columbia Inc.
MSRM	Ministry of Sustainable Resource Management
MTBE	Methyl tertiary butyl ether
MVPI	Mackenzie Valley Pipeline Inquiry
NEB Act	*National Energy Board Act*
NEB	National Energy Board
NEB	National Energy Board
NRCAN	Natural Resources Canada
NRTEE	National Round Table on Environment and Economy
OGC	Oil and Gas Commission
OOGRG	Offshore Oil and Gas Research Group
OSMS	Oil Sands Market Study
PAHs	Polyaromatic hydrocarbons
PCBs	Polychlorinated biphenyls
PRT	Project Review Team
REM	School of Resource and Environmental Management
ROW	Right-of-way
RSC	Royal Society of Canada
SCC	Supreme Court of Canada
SDM	Shared decision making
SERVS	Ship Escort/Response Vessel System

SPSA	*Significant Projects Streamlining Act*
TCMS	Transport Canada Marine Safety
TEDA	Terrace Economic Development Authority
TPH	Tons per hour
TRC	TERMPOL Review Committee
TRP	Technical Review Process of Marine Terminal Systems and Transhipment Sites
TRTFN	Taku River Tlinglit First Nation
U.S.	United States
U.S. DOI	United States Department of the Interior
U.S. EPA	United States Environmental Protection Agency
U.S. NAS	United States National Academy of Sciences
U.S. NOAA	United States National Oceanic and Atmospheric Administration
WCEL	West Coast Environmental Law

CHAPTER 1: INTRODUCTION

1.1 Background

1.1.1 Enbridge Gateway Project

Over the next several decades, crude oil production in the Alberta oil sands is expected to increase due to increased energy demand in the United States (U.S.) and Asia-Pacific Regions (Jacques Whitford Environment Limited (JWEL) 2003b). Enbridge, a major pipeline company, has proposed a new pipeline termed the Enbridge Gateway Project to transport increased oil production to market. If approved the Gateway Project would include construction of a 1,100-1,300-kilometer crude oil pipeline from either Fort McMurray or Edmonton in Alberta to either Kitimat or Prince Rupert on the north coast of British Columbia (B.C.) (Enbridge Pipelines Inc. n.d.). In addition, Enbridge is proposing to develop a marine terminal in Kitimat or Prince Rupert in order to transport crude oil on tankers from the pipeline to markets in the United States and overseas (Enbridge Pipelines Inc. n.d.).

Enbridge engaged in discussions with Coastal First Nations in B.C. to identify their interests and concerns with respect to the proposed project (Coastal First Nations n.d.). Coastal First Nations indicated that further information on potential environmental and socioeconomic effects of the project was required (Coastal First Nations n.d.). Enbridge invited Coastal First Nations to submit a proposal outlining work activities and resource requirements to conduct a review of the Gateway Project. Enbridge approved the proposal submitted by Coastal First Nations in August 2004, which initiated the review contained in this report.

1.1.2 Coastal First Nations

Over the past decade, Coastal First Nations have become progressively more involved in land and resource management issues on the north coast of B.C. (Coastal First Nations n.d.). Specifically, First Nations "have become increasingly concerned about the impacts of industrial forestry and fisheries practices on the ecological integrity of the marine and terrestrial systems on the Coast" (Coastal First Nations n.d.: 1). In response to these concerns, Coastal First Nations and the Province of British Columbia signed the *General Protocol Agreement on Land Use Planning and Interim Measures* in 2001 to increase participation of First Nations in land use decisions and to provide First Nations with the opportunity to obtain cultural and economic benefits from land use decisions related to their traditional territories (Coastal First Nations and British Columbia 2001). Through this protocol (known as the Turning Point Initiative), Coastal First Nations "are working to develop and implement resource management practices that are ecologically and economically sustainable" (Coastal First Nations n.d.: 1).

The Turning Point Initiative involves cooperation between eight First Nations groups: Gitga'at First Nation; Haida Nation; Haisla Nation; Heiltsuk Nation; Kitasoo/Xaixais First Nation; Metlakatla First Nation; Old Massett Village Council; and Skidegate Band Council (Coastal First Nations and British Columbia 2001). Traditional territories of Coastal First Nations extend from north of Vancouver Island to the Alaskan border on B.C.'s northwest coast and also include Haida Gwaii (fig. 1.1).

There are three general objectives of the Coastal First Nations – Turning Point Initiative. These are:

- To develop land and marine use plans that will provide ecosystem-based management over traditional territories and special protection for specific areas;
- To develop First Nations' economic opportunities in the areas of forestry, fisheries, and tourism; and
- To support the development of a management framework that will provide short-term and long-term capacity building for managing the land, waters, and resources within First Nations' traditional territories (Coastal First Nations n.d.: 1).

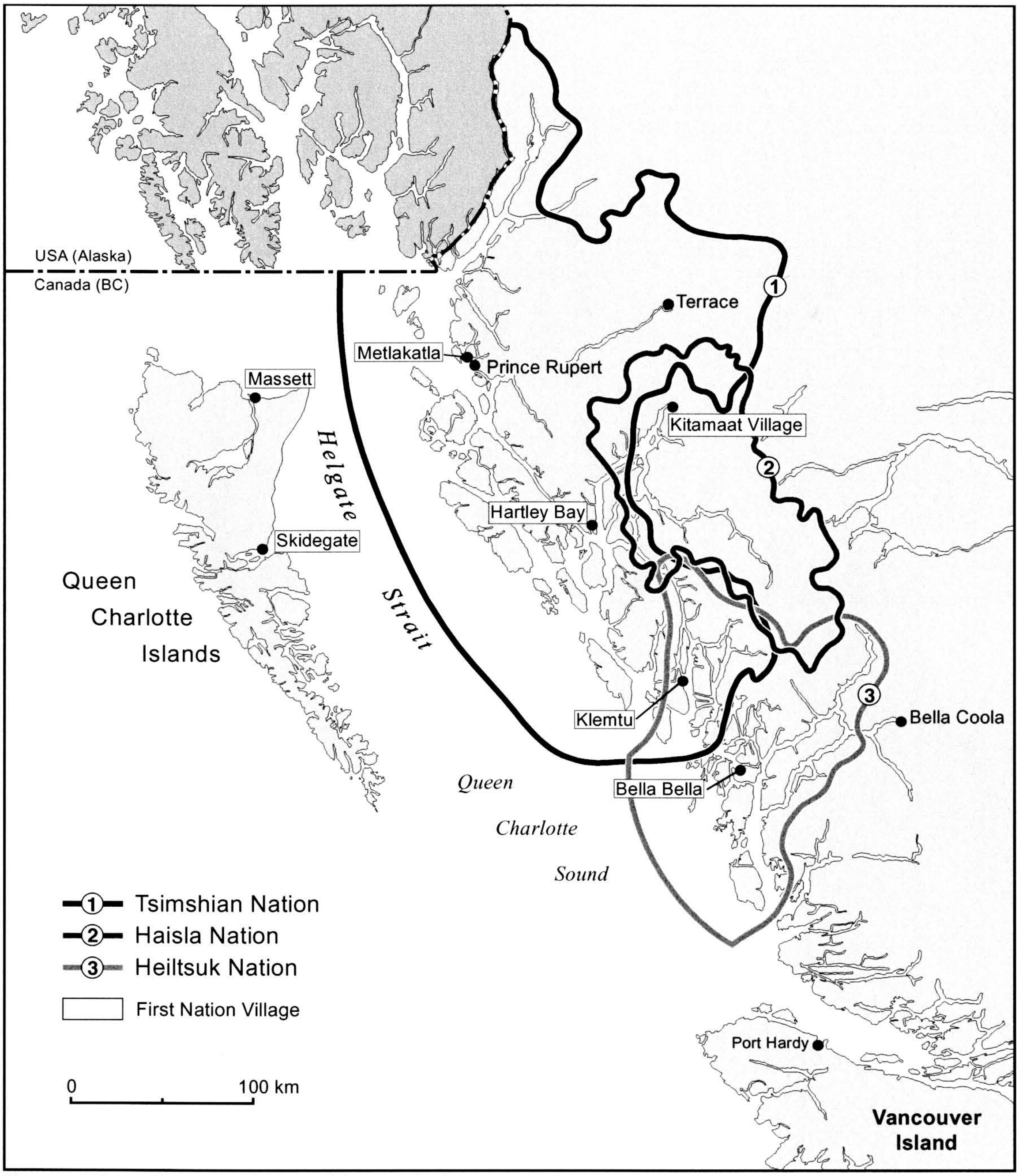
1.1.3 Enbridge Inc.

Enbridge is involved in transporting and distributing energy to North American and international markets (Enbridge Inc. 2005). The company owns and operates Enbridge Pipelines and a number of other pipeline companies in Canada and the United States (Enbridge Inc. 2005). Currently, Enbridge pipeline systems include approximately

13,500 kilometers of pipeline and deliver over 2 million barrels of crude oil and other liquids per day (fig. 1.2) (Enbridge Inc. 2005). The company is also involved in a variety of other initiatives including, international energy projects, natural gas transmission and distribution, and processing of other petroleum products (Enbridge Inc. 2005).

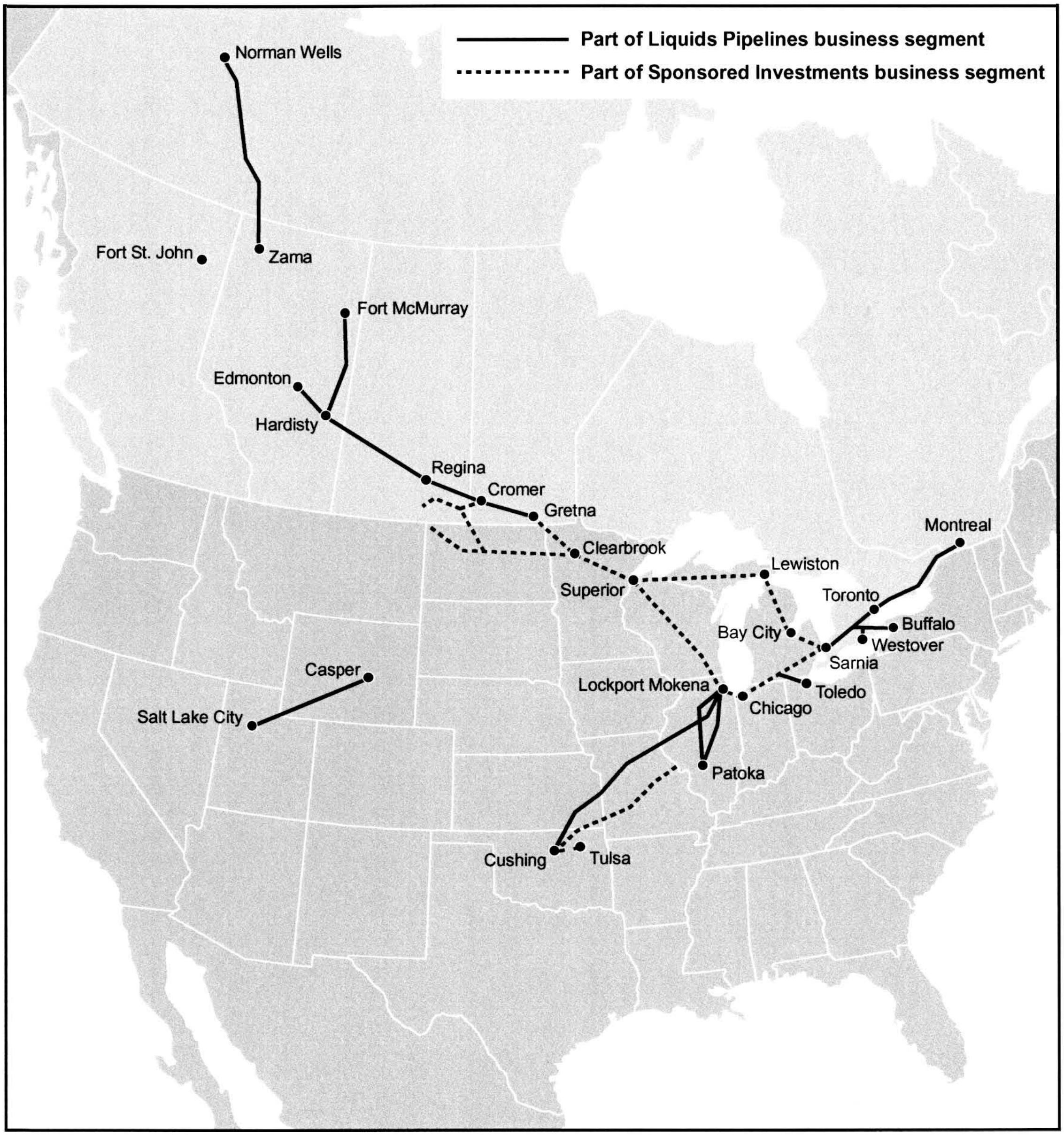
In addition, Enbridge owns and operates Enbridge Gas Distribution, the largest gas distribution company in Canada (Enbridge Inc. 2005). Enbridge Gas Distribution provides natural gas to over 1.7 million industrial, commercial, and residential customers in Ontario, Quebec, and New York State (Enbridge Inc. 2005). Enbridge employs over 4,000 people in Canada, the United States, and South America (Enbridge Inc. 2005).

Figure 1.1: Coastal First Nations Traditional Territories



Source: Data from David Suzuki Foundation 2001

Figure 1.2: Enbridge Liquids Pipelines in North America



Source: Data from Enbridge Inc. 2004

1.2 Purpose and Objectives

The purpose of this report is to provide an overview of potential environmental impacts, socioeconomic effects, and institutional issues associated with the Gateway Project on Coastal First Nations. This report is not intended to be a comprehensive impact assessment or detailed project analysis. Instead, this report is a preliminary environmental, socioeconomic, and institutional scoping assessment intended to provide a summary of key issues and to synthesize current literature with respect to large-scale pipeline, port, and tanker projects in Canada and internationally. Specifically, objectives of this study are:

- To identify major environmental and socioeconomic impacts of the proposed Enbridge Gateway Project on Coastal First Nations;
- To review institutional and jurisdictional issues in relation to regulatory structures and approval processes associated with the proposed project;
- To identify major issues and concerns arising from potential impacts;
- To review mitigation measures designed to reduce or minimize impacts; and
- To identify policies and opportunities for maximizing net benefits for Coastal First Nations.

This report is intended to provide a summary of major issues in order to assist Coastal First Nations in the review of the Gateway Project and to facilitate meaningful consultations with Enbridge.

1.3 Methodology

The methodology used in this report consists of a review of primary and secondary data associated with environmental impacts, socioeconomic effects, and institutional issues of large-scale pipeline, port, and tanker projects. In addition, project specific data provided by Enbridge was reviewed to identify key project components and to assess potential impacts of the Gateway Project on Coastal First Nations. The review is divided into three major areas of research: environmental, socioeconomic and institutional/regulatory issues. Furthermore, international best practices for oil and gas development projects were assembled from implementation theory, policy analysis, and impact assessment literature to complete an evaluation of regulatory structures and approval processes relevant to the Gateway Project. A draft report was then prepared and provided to Enbridge for its review and comment. Finally, the report was revised based on comments received from Enbridge.

1.4 Structure of the Report

The report is divided into six chapters, including this introductory chapter. The second chapter provides an overview of the Gateway Project, including a general description of the project's location, key components, timing, investment, and employment opportunities. In addition, a comparison between the Gateway Project and other similar pipeline projects in Canada and in the United States is presented to provide a context for the project. The third chapter identifies potential environmental impacts of pipeline, port, and tanker projects and outlines measures used to mitigate potential impacts.

The fourth chapter reviews potential socioeconomic impacts of pipeline projects and mitigation measures used to minimize such impacts, including a review of literature related to impact and benefits agreements (IBAs). In addition, the final section of the fourth chapter assesses potential economic benefits and opportunities for First Nations resulting from the project. The fifth chapter focuses on institutional and regulatory issues associated with pipeline, port, and tanker projects. The purpose of chapter five is to identify parties involved, to describe relevant regulatory structures and approval processes related to such projects, and to evaluate regulatory and approval processes based on best practices criteria. The report ends with conclusions and recommendations.

CHAPTER 2: DESCRIPTION OF THE GATEWAY PROJECT

2.1 Overview

This chapter of the report provides an overview of the Gateway Project. Information in this section is based on reports, presentations, and other research material provided by Enbridge. The Gateway Project would consist of three main components: development of a crude oil pipeline from northern Alberta to the north coast of B.C.; construction and operation of a marine terminal at either Kitimat or Prince Rupert in B.C.; and operation of tankers to transport crude oil between the selected port and markets in the western United States and in Asia-Pacific regions.

2.2 Project Description

2.2.1 General Description

Over the next several years, crude oil production in Alberta is projected to increase to serve growing markets in Asia and the U.S. In response to the expected rapid growth in production, Enbridge undertook a study in 2002 to assess the feasibility of additional facilities to transport crude oil from northern Alberta to markets in the U.S. and overseas (JWEL 2003b). As part of the Oil Sands Market Study (OSMS), Enbridge completed an evaluation of potential pipeline route and marine terminal options in Alberta and B.C. (JWEL 2003b). The purpose of the Enbridge study was to evaluate different port and route options based on technical, engineering, economic, environmental, stakeholder, and other components (JWEL 2003b). Following completion of the OSMS, Enbridge began planning for a new crude oil pipeline from Alberta to the B.C. coast and an associated deep water marine terminal, collectively referred to as the Gateway Project.

Enbridge is considering four different facility options for the Gateway Project (table 2.1). The four options include:

- Construction of a pipeline from Fort McMurray to Kitimat and development of a port in Kitimat;
- Construction of a pipeline from Edmonton to Kitimat and development of a port in Kitimat;
- Construction of a pipeline from Fort McMurray to Prince Rupert and development of a port in Prince Rupert; and
- Construction of a pipeline from Edmonton to Prince Rupert and development of a port in Prince Rupert (Enbridge Pipelines Inc. n.d.).

Table 2.1: Description of Gateway Project Options

Project Option	**Fort McMurray - Kitimat**	**Edmonton - Kitimat**	**Fort McMurray – Prince Rupert**	**Edmonton – Prince Rupert**
Pipeline Length	1,218 km	1,123 km	1,325 km	1,230 km
Initiating Point Elevation	331 m	675 m	331 m	675 m
High Point Elevation	1,430 m	1,430 m	1,430 m	1,430 m
Termination Point Elevation	140 m	140 m	20 m	20 m
Mainline Pump Stations	11	10	12	11
Annual Throughput	400,000 BPD	400,000 BPD	400,000 BPD	400,000 BPD
Storage Tanks at Initiating Point	4 x 500,000 BBL	4 x 500,000 BBL	4 x 500,000 BBL	4 x 500,000 BBL
Storage Tanks at Termination Point	7 x 500,000 BBL	7 x 500,000 BBL	7 x 500,000 BBL	7 x 500,000 BBL
Marine Terminal	Single Berth	Single Berth	Single Berth	Single Berth
Tankers	2-3 shipments per week of tankers 250,000 DWT or greater	2-3 shipments per week of tankers 250,000 DWT or greater	2-3 shipments per week of tankers 250,000 DWT or greater	2-3 shipments per week of tankers 250,000 DWT or greater

Source: Enbridge Pipelines Inc. n.d., 2004b

The length of the proposed pipeline would be approximately 1,100-1,300 kilometers, including 10-12 mainline pump stations, depending on the route selected (Enbridge Pipelines Inc. n.d.). The pipeline has been designed to have an annual throughput of 400,000 barrels per day (BPD), 4 storage tanks at the initiating point each with a capacity of 500,000 barrels (BBL), and 7 storage tanks at the marine terminal each with a capacity of 500,000 BBL (Enbridge Pipelines Inc. n.d.). Furthermore, the proposed marine terminal would consist of a single berth and crude oil shipments will occur 2-3 times per week on tankers of 250,000 dead weight tons (DWT) or greater (Enbridge Pipelines Inc. n.d., 2004b).

2.2.2 Location

The Gateway pipeline would originate in northern Alberta and travel west across northern B.C. until it reaches either Kitimat or Prince Rupert (fig. 2.1). The pipeline route originating north of Fort McMurray would travel southwest across Alberta to just south of Tumbler Ridge in B.C. From Tumbler Ridge, the pipeline would travel west across B.C., through Fort St. James and Burns Lake, to Mount Nimbus, where it would continue to either Kitimat or Prince Rupert, depending on the selected marine terminal site. However, if Edmonton is selected as the initiating point, the pipeline would travel northwest across Alberta to Tumbler Ridge, west across B.C. along the same route as the Fort McMurray option, and would terminate in either Kitimat or Prince Rupert.

Figure 2.1: Location of Proposed Pipeline Routes and Marine Terminal Sites

Source: Data from Enbridge Pipelines Inc. 2004b

2.2.3 Key Components

2.2.3.1 Pipeline

Preliminary documentation provided by Enbridge indicates that the company has considered a variety of pipeline designs. The company has considered different pipeline diameters, flow rates, and required pump stations for the Gateway Project (table 2.2). The proposed pipeline could be designed with a throughput rate of either 200,000 BPD, 300,000 BPD, or 400,000 BPD depending on pipeline diameter. The design throughput rate could be increased by adding additional pump stations.

Table 2.2: Potential Crude Oil Pipeline Configurations

Pipeline Diameter	Annual Average Flowrate (BPD)	Number of Mainline Pump Stations			
		Fort McMurray to Kitimat	Edmonton to Kitimat	Fort McMurray to Prince Rupert	Edmonton to Prince Rupert
36"	400,000	6	6	6	6
30"	400,000	11	10	12	11
30"	300,000	11	10	11	10
30"	200,000	5	4	5	5
24"	200,000	11	10	12	11

Source: Enbridge Pipelines Inc. n.d.

In most locations, the pipeline would be buried, but a number of above-ground facilities would also be developed including pumping stations, valves, aerial crossings, a pressure-reduction station, and storage tanks at both initiating and termination points (Enbridge Pipelines Inc. n.d.). The pipeline would also include a number of sectionalizing valves (also known as block valves) to isolate crude oil in sections along the route in case of a pipeline leak or rupture. Enbridge has indicated "valves will be installed at all major river crossings at both upstream and downstream locations and at the major slopes in accordance with both CSA Z662-03 and Enbridge standards" (Enbridge Pipelines Inc. n.d.: 2).

Mainline pump stations would also include a variety of major equipment and facilities. Each pump station would include:

- An electrical services building, maintenance facilities, cold storage for hazardous materials, and washroom facilities;
- Horizontal centrifugal pumps, variable frequency drives, and pump discharge pressure control valves, ultrasonic meters for line balance, and sump systems; and
- Sending and receiving traps or pig by-pass headers (Enbridge Pipelines Inc. n.d.: 2).

Development of the pipeline would be carried out through construction of 11 separate segments (known as spreads) to be built either during winter or summer months.

2.2.3.2 Alberta Tank Terminal and British Columbia Marine Terminal

Construction of storage tanks is proposed at the Alberta tank terminal, located at either Fort McMurray or Edmonton. Each storage tank would have a 500,000 BBL capacity and would be designed using internal, floating roof, and steel storage design specifications (Enbridge Pipelines Inc. n.d.). The number of storage tanks at the Alberta terminal will largely depend on the type of pipeline system configuration selected by Enbridge. For example, a pipeline system with a flowrate of 400,000 BPD would require 4 tanks, a pipeline system with a flowrate of 300,000 BPD would require 3 tanks, and a pipeline system with a flowrate of 200,000 BPD would require 2 tanks. Additional storage capacity may be required for throughput rates greater than 400,000 BPD.

In addition to storage tanks, major equipment at the Alberta tank terminal would include:

- Custody transfer metering, pressure control valves, vertical centrifugal pumps, and pump discharge control valves;
- A sump system complete with re-injection pump; and
- Fire detection and suppression equipment (Enbridge Pipelines Inc. n.d.).

Before the pipeline reaches the B.C. marine terminal, installation of a pressure reduction station would be required to reduce line pressure as a result of an elevation drop from the mountains. Design of the pressure reduction station would include equipment such as pipeline isolation valves, pressure control valves, a sump system, and sending and receiving traps.

In selecting a marine terminal site, Enbridge has considered a variety of factors, including:

- Year-round ice-free access;
- Sufficient water depth and a suitable turning basin to permit safe transit by large tankers;
- An area generally sheltered from the dangers of inclement weather;
- An area accessible from existing road systems;
- Ease of marine access; and
- Availability of sufficient land adjacent to the marine facilities (JWEL 2003a).

Regardless of which pipeline system or terminal site (Kitimat or Prince Rupert) is chosen, the B.C. marine terminal would be constructed with a single berth and 7 steel storage tanks each with a capacity of 500,000 BBL (Enbridge Pipelines Inc. n.d.). In addition to storage tanks, the B.C. terminal would include other equipment and facilities, such as pressure control valves, line balance metering, custody transfer metering, delivery pumps, and communications and utilities infrastructure. The marine terminal would also include two kilometers of 48" diameter pipeline to transfer crude oil from the pipeline system to the marine loading berth.

Enbridge is considering locating the B.C. marine terminal at either Prince Rupert or Kitimat. If Prince Rupert were selected as the preferred site, the pipeline would approach the port along the Skeena River valley (JWEL 2003a). Prince Rupert has the deepest harbor in North America and also has year-round ice-free access. JWEL (2003a) described other advantages of the Prince Rupert port as follows:

- The port is closer to the open ocean and to Asian markets than other pacific coast ports;

- The port is one of the safest ports on the west coast, in terms of navigational hazard risk factors;
- The channel has sufficient depth to support large tankers up to approximately 320,000 DWT; and
- The port has approximately 400 hectares of available land on the Ridley Island property and approximately 6 hectares of available land at the Westview terminal in the inner harbor.

Currently, the Prince Rupert port operates 6 terminals that transport a variety of products, including lumber, wood pulp, grain, specialty crops, steel, sulfur, and coal. The port also includes a cruise ship terminal (JWEL 2003a).

If Kitimat were selected as the preferred marine terminal site, the pipeline would approach the town site via the Kitimat and Skeena River valleys (JWEL 2003a). The Kitimat port has many of the same advantages as the Prince Rupert option, such as year-round ice-free access and the ability to accommodate ships up to approximately 320,000 DWT. Other advantages of the Kitimat port include the availability of over 680 hectares of industrial land and navigational visibility that is rarely restricted by fog or snow. Currently, the port consists of four private terminals that transport products such as ammonia, methanol, methyl tertiary butyl ether (MTBE), kraft pulp and paper, aluminum, lumber, woodchips, and other materials (JWEL 2003a).

The preferred location of the Kitimat marine terminal is the west bank of Kitimat Arm, north of Bish Creek, and approximately 1.3-kilometers south of Alcan's smelter facility (Enbridge Pipelines Inc. n.d.). However, due to an underwater slope failure on the west side of Kitimat Arm in the 1970s as a result of a pile-driving operation, seabed sediments that overlay bedrock in this area are extremely unstable. Therefore, Enbridge has considered a floating terminal at this location. If a floating terminal were constructed, marine structures at the Kitimat terminal would include:

- A floating loading platform, located at midships of the vessels, equipped with three 400 millimeter-loading arms with the combined capacity of 15,000 tons per hour (TPH). The loading arms will have dry disconnect couplings to eliminate spillage and will be hydraulically controlled;
- Stiff-leg connections from the floating platform to shore anchored abutments. The stiff-legs would rotate in a vertical plane to allow for tidal fluctuations and

would transfer the berthing, wind, wave, and current loads from the platform directly to the rock;

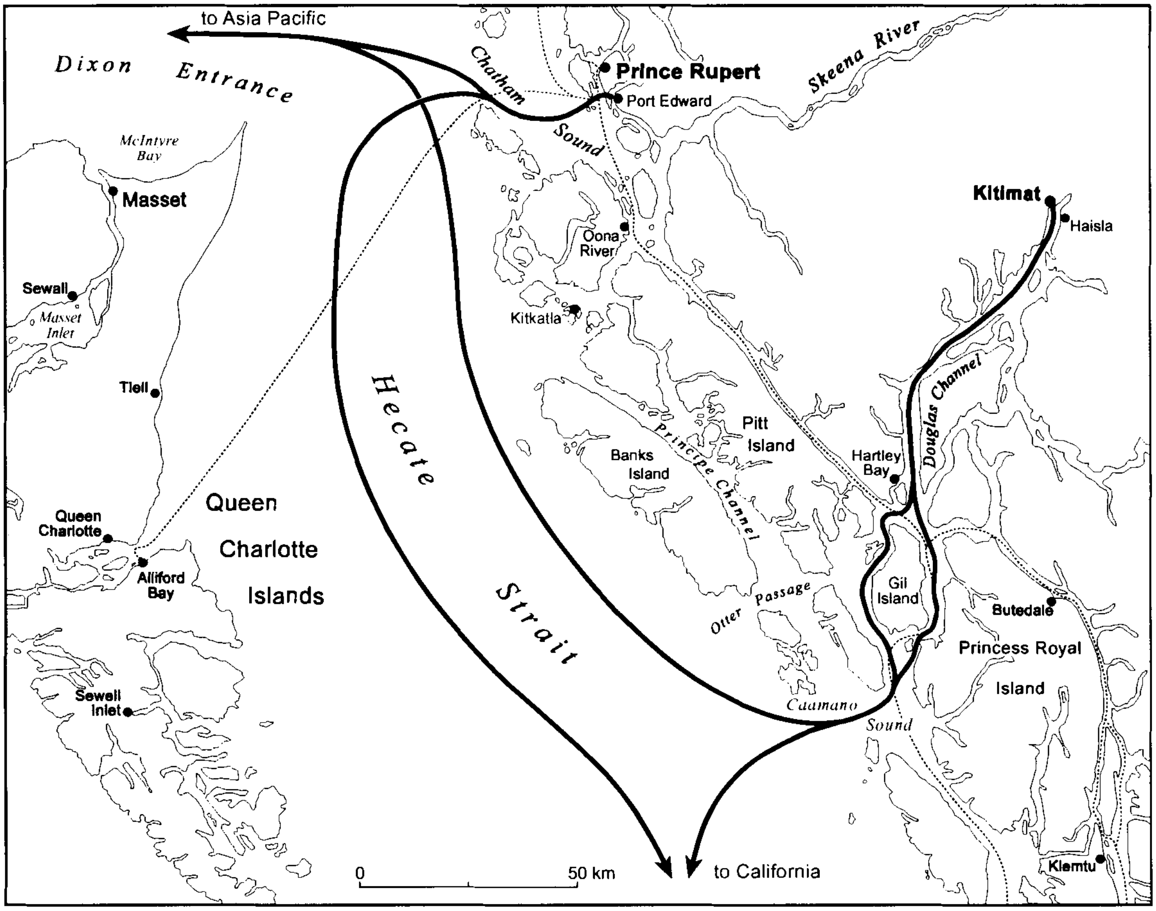
- Floating moorings with quick release hooks for the breast, head, and stern lines; and

- A ramp from the loading platform to the shore that would support the loading pipeline(s) and will allow pedestrian and light vehicular access (Enbridge Pipelines Inc. n.d.: 5).

2.2.3.3 Tanker Operations

Regardless of which pipeline system or marine terminal site were selected, tanker operations associated with the Gateway Project would consist of 2-3 crude oil shipments per week on tankers of at least 250,000 DWT (Enbridge Pipelines Inc. n.d.). Higher pipeline throughput rates may require an additional berth at the marine terminal. Other companies would carry out provision and operation of the tanker and tug support fleet. Tanker routes in the Pacific Ocean would differ depending on selection of the Prince Rupert or Kitimat port. In terms of navigation, ships leaving Prince Rupert would pass through Chatham Sound and Brown Passage before entering either Dixon Entrance or Hecate Strait (fig. 2.2). Tankers would leave Kitimat harbor through Kitimat Arm and Douglas Channel, prior to traveling around Gil Island to Caamano Sound. From Caamano Sound, ships would enter Hecate Strait and travel either north to Asia-Pacific regions or south to California. Kitimat Arm has sufficient depth and width to accommodate tankers of approximately 320,000 DWT (JWEL 2003a). Currently, the Kitimat port is only operating vessels of approximately 50,000 DWT (JWEL 2003a).

Figure 2.2: Potential Tanker Route Options for the Gateway Project



Source: Data from Enbridge Pipelines Inc. 2004b

2.2.4 Project Phases and Timing

Development and operation of the Gateway Project would be carried out through four interrelated project phases: planning and regulatory approvals; development and construction; operation; and decommissioning (Enbridge Pipelines Inc. 2005b). The planning and regulatory approvals stage began in early 2005 with initiation of project definition, preliminary engineering, and regulatory consultation activities (table 2.3). Enbridge expects to file the project description with the Canadian Environmental Assessment Agency (CEAA) in September 2005, while the company anticipates that National Energy Board (NEB) applications will be filed in April 2006. Other key milestones in this stage would include commencement of detailed project engineering (June 2006); commencement of land acquisition processes (November 2006); and completion of regulatory and approvals processes (December 2007).

Construction would begin in late 2007, once regulatory approvals have been granted. Enbridge would begin ordering pipe and other project materials in the fall of 2007 and would start preliminary pipeline construction activities in early 2008, such as clearing and developing the pipeline right-of-way (ROW). The pipeline system would be divided into 11 construction segments (also known as spreads) and each spread would be completed during either summer or winter months. Pipeline and facility construction would continue for approximately two years, until May 2010, when the project is expected to become operational.

While project operations would begin in 2010, Enbridge has not indicated how long the project is expected to remain operational. The life of the pipeline system would likely be dependant on a number of factors related to international demand for, and supply of, crude oil. Finally, once a determination has been made with respect to project termination, the pipeline system and its associated facilities would be decommissioned and abandoned. To date, Enbridge has not provided information on the timing and specific activities during decommissioning and abandonment.

Table 2.3: Timing and Schedule for the Gateway Project

Project Task	2005 Q1	Q2	Q3	Q4	2006 Q1	Q2	Q3	Q4	2007 Q1	Q2	Q3	Q4	2008 Q1	Q2	Q3	Q4	2009 Q1	Q2	Q3	Q4	2010 Q1	Q2
Project definition, decision to go forward	Mar. 21																					
Plan for field work, environmental studies, permits		■																				
Preliminary engineering		■	■	■	■	■																
Field work for CEAA, NEB filing, engineering, consultation		■	■	■	■	■																
File project description			Sept. 30																			
Prepare NEB application				■	■																	
File NEB application						Apr. 17																
Detail engineering, award cycle for construction							■	■	■	■	■	■	■	■								
Follow up field work							■	■														
Land acquisition, agreements								■	■	■	■	■	■	■	■							
File amendments to NEB application								Dec. 12														
Hearing									■													
NEB decision												Oct. 16										
Governor in Council (GIC) approval												■										
Order pipe and long delivery items												■	■	■	■							
Land activities after GIC approval													■									
Clearing, access roads													■	■								
Pipeline, facilities construction, commissioning, linefill														■	■	■	■	■	■	■	■	■
Commence operation																						May 19

Source: Data from Enbridge Pipelines Inc. 2005b

2.2.5 Investment

Total investment as a result of construction of the Gateway Project would be approximately $2.5 to $3 billion depending on the terminal location selected (table 2.3). Pipeline development costs are estimated to be approximately $1.2 billion ($488 million in Alberta and $669 million in B.C.). Indirect costs, such as engineering, contingency, and financing costs, are expected to reach $728 million. The balance of project investment would be in the areas of pump station development; tank construction; environmental and regulatory approvals; and marine terminal development. A more detailed description of economic development opportunities for Coastal First Nations as a result of project investment is presented in chapter 4 of this report.

Table 2.4: Total Project Investment

Project Component	Alberta	British Columbia	Total
Pipeline	$488,000,000	$669,000,000	**$1,157,000,000**
Pumping Stations	$106,000,000	$124,000,000	**$230,000,000**
Tanks	-	$188,000,000	**$188,000,000**
Marine Terminal	-	$58,000,000	**$58,000,000**
Right-of-Way, Environmental, and Regulatory Approvals	$52,000,000	$69,000,000	**$121,000,000**
Indirect Costs*	$303,000,000	$425,000,000	**$728,000,000**
Total	**$910,000,000**	**$1,590,000,000**	**$2,482,000,000**

*Indirect costs include engineering, sales tax, contingency, and financing costs

Source: Enbridge Pipelines Inc. 2003a

2.2.6 Employment

Enbridge estimates that average annual construction employment for the Gateway Project would be approximately 1,043 person years over the 3-year construction period (table 2.4). A detailed description of the project workforce is presented in appendix 1.

An average project workforce of approximately 959 is expected for 2008, largely as a result of pipeline construction in Alberta (229 jobs) and in B.C. (242 jobs). Project employment in 2008 would peak at 1,909 in August. The average number of construction jobs would peak in 2009 with an average workforce of approximately 1,559, with a significant number of jobs in the areas of pump station development (173 jobs), pipeline construction in Alberta (208 jobs) and B.C. (544 jobs), and tank construction (138 jobs). At its peak in July, construction employment in 2009 would be approximately 2,924. Average project employment is expected to reach approximately 613 by 2010, largely as a result of employment needs in the areas of pipeline construction in Alberta (221 jobs) and in B.C. (113 jobs). In 2010, Enbridge estimates that project construction employment would peak in February at 2,458.

While a significant number of employment opportunities would likely be generated as a result of project construction activities, the Gateway Project would create few permanent operational jobs (Enbridge Pipelines Inc. 2003a). Enbridge estimates that only 75 permanent operational jobs would be generated: 45 for pipeline and marine terminal operations in B.C. and 30 for pipeline operations in Alberta. A more detailed description of employment opportunities associated with the Gateway Project is provided in chapter 4.

2.2.7 Comparison with Similar Projects

A comparison between the Gateway Project and pipeline projects in Canada and the U.S. shows numerous similarities (table 2.5). The proposed Gateway Project is similar to the Trans-Alaska Pipeline System in that both projects would consist of a crude oil pipeline of approximately the same length, a marine terminal, and tanker operations. However, construction costs would differ substantially between the two projects. During the construction period of the Trans-Alaska Pipeline in the 1970s, total construction costs were estimated at $8 billion (Alyeska Pipeline Service Company 2003). In contrast, the proposed Gateway Project would include approximately $2.5 billion in project investments (Enbridge Pipelines Inc. 2003a, 2003b).

In terms of total pipeline length, the Gateway Project would be significantly shorter than the proposed Alaska Highway Pipeline (2,810 km) and the pipeline associated with the Mackenzie Gas Project in the Northwest Territories (1,696 km). In addition, the proposed Gateway Project is anticipated to incur fewer costs than both the Alaska Highway Pipeline ($13.6 billion) and the Mackenzie Gas Project ($7 billion).

Table 2.5: Average Employment for the Gateway Project

Category	2008	2009	2010	3-Year Average
General				
Enbridge Personnel	47	50	46	48
Design Consultants	83	83	70	78
Construction				
Stations	67	173	33	91
Tanks	66	138	17	73
Marine Terminal	42	57	8	36
Pipeline				
Logging (AB)	29	10	-	13
Logging (BC)	62	33	10	35
Site Development (AB)	1	9	5	5
Site Development (BC)	1	1	-	1
Stockpiling (AB)	8	3	-	4
Stockpiling (BC)	5	9	-	5
Construction (AB)	229	208	221	219
Construction (BC)	242	544	113	299
Camps (AB)	5	35	28	23
Camps (BC)	3	75	14	31
Inspections (AB)	15	17	13	15
Inspections (BC)	17	39	7	21
Surveying (AB)	10	10	6	9
Surveying (BC)	10	22	3	12
Nondestructive testing (AB)	5	5	6	5
Nondestructive testing (BC)	5	18	3	9
Reclamation	7	20	10	12
Operation*				
Pipeline (AB)	-	-	30	N/A
Pipeline and Marine Terminal (BC)	-	-	45	N/A
Average Annual Employment**	**959**	**1559**	**613**	**1043**
Peak Month (Total Employment)	**August 1909**	**July 2924**	**February 2458**	N/A

*Permanent operational jobs, which would begin in 2010 and continue for the life of the project, are not included in the average employment calculation for 2010.
**Totals may vary due to rounding.

Source: Enbridge Pipelines Inc. 2003a, 2005c

Table 2.6: Comparison of Gateway Project to Other Pipeline Projects

Project	Construction Period	Facilities	Location	Pipeline Length	Construction Costs*
Gateway Project (proposed)	2007-2009	Oil pipeline, single berth marine terminal, and tanker operations	Northern Alberta to the north coast of B.C.	1100 – 1300 km	$2.5 to $3 billion
Trans-Alaska Pipeline	1974-1977	Oil pipeline, four-berth marine terminal, and tanker operations	Prudhoe Bay, Alaska to Valdez, Alaska	1280 km	$8 billion (US)
Trans Mountain Pipeline	1950s	Oil pipeline, marine terminal, and tanker operations	Edmonton, Alberta to Vancouver, B.C.	1150 km	N/A
Mackenzie Gas Project (proposed)	2006-2009	Onshore natural gas fields, gas pipeline, and related facilities	Mackenzie Delta in Northwest Territories to northern Alberta	1696 km	$7 billion
Norman Wells Pipeline	1982-1985	Oil pipeline and related facilities	Norman Wells, Northwest Territories to Zama, Alberta	870 km	$1 billion
Alaska Highway Pipeline (proposed)	Prior to 2007	Natural gas pipeline and related facilities	Prudhoe Bay, Alaska to Gordondale, Alberta	2,810 km	$13.6 billion
Alliance Pipeline	1998-2000	Natural gas pipeline and related facilities	Northeastern B.C. and northwestern Alberta to Elmore, Saskatchewan	1,565 km	$2 billion

* Only figures for the Gateway Project and the Mackenzie Gas Project are in current dollars. All others have not been adjusted for inflation.

Source: Aboriginal Pipeline Group et al. 2004; Alyeska Pipeline Service Company 2003; Bone 2000; Canada NEB 1998; Enbridge Pipelines Inc. n.d., 2003a, 2003b; Terasen Pipelines 2005; U.S. DOI 2002; Yukon Department of Energy, Mines and Resources 2002

2.3 Conclusion

The proposed Gateway Project would transport crude oil in the Alberta tar sands from either Fort McMurray or Edmonton in Alberta to either Kitimat or Prince Rupert on B.C.'s north coast. Key components of the proposed project would include: construction of a 1,100-1,300-kilometer crude oil pipeline; pump stations; storage tanks in Alberta and B.C.; a single-berth marine terminal in either Kitimat or Prince Rupert; and tanker operations from the marine terminal to markets in the U.S. and Asia.

The Gateway Project would be carried out in four stages: planning and regulatory approvals; development and construction; operation; and decommissioning. Planning and approvals stages began in 2005 and regulatory approvals are expected to be in place by late 2007. Development and construction of the project would take place between 2008 and 2010, and the project is expected to be operational by May 2010. In terms of investment, Enbridge estimates that total costs of the Gateway Project would approach $2.5 billion, with investments of approximately $1.6 billion in B.C. and $900 million in Alberta. Average annual direct construction employment for the project is anticipated to average 1,043 person years. However, only a limited number of permanent pipeline and marine terminal operational jobs would be generated (45 jobs in B.C. and 30 jobs in Alberta).

CHAPTER 3: ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

3.1 Overview

Pipeline, port, and tanker projects can have significant environmental impacts. Impacts can be short-term or long-term in duration and can be experienced at a variety of magnitudes. While many potential impacts can be mitigated through sound planning and management, residual effects may occur and could require specific mitigating measures. This chapter identifies potential environmental impacts of pipeline, port and tanker projects as well as measures that can be used to mitigate these potential effects.

3.2 Pipelines

3.2.1 Description of Activities

The life cycle of a pipeline typically involves four major phases: planning and design, construction, operation, and abandonment (Canada NEB 2003b). In the planning and design phase, project proponents carry out a number of activities including completing required reports and studies pertaining to route selection and approvals processes; negotiating for land and land rights; engaging in public consultation processes; and participating in public and regulatory hearings (Canada NEB 2003b).

The second phase of pipeline development involves construction of the pipeline (Canada NEB 2003b). Activities carried out in this phase have potential to generate significant environmental impacts and therefore will be the major focus of this report section. Once NEB approval has been granted and project proponents have negotiated land rights, pipeline construction follows a number of steps:

- The pipeline location is surveyed and further studies are often undertaken as conditions of pre-construction;
- Trees and vegetation are cleared from the ROW and associated work areas;

- Layers of topsoil and subsoil are stripped off;
- The ground is graded to provide a smooth and safe work surface;
- Pipe sections are laid out in order, welded together, and checked using X-ray and/or ultrasonic techniques;
- A pipeline trench is dug, pipe is coated with protective materials, and pipe is lowered into the trench;
- The trench is backfilled with subsoil to bury pipe and topsoil is replaced;
- The pipeline is pressure tested to ensure safe operation and work sites are cleaned up; and
- The pipeline is put into operation with permission of the NEB and land is reclaimed (Canada NEB 2003b).

In the operational phase, a pipeline begins transporting hydrocarbons (Canada NEB 2003b). Pipeline monitoring programs during operation typically involve inspections for pipeline damages and leaks, as well as patrols to check for unauthorized activity (Canada NEB 2003b). The pipeline operations also have potential to generate adverse environmental effects, largely through spills and pipeline malfunctions.

In the final phase, a pipeline company applies to the NEB for permission to abandon a pipeline either through direct removal or abandonment in place (Canada NEB 2003b). Abandonment plans are developed in all cases, but abandonment procedures may vary between pipelines depending on location and proposed future uses of the ROW (Canada NEB 2003b). Plans address a variety of issues associated with pipeline abandonment including land use management, soil and groundwater contamination, water crossings, soil erosion, utility and pipeline crossings, and related pipeline equipment such as risers, valves, and piping (Canada NEB 2003b).

3.2.2 Physiography and Soils

Potential impacts of pipeline projects on physiography and soils typically occur during construction due to surface disturbance required to clear areas for a pipeline ROW and associated facilities (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; Canada NEB 1996, 1998, 2003a; Encana Ekwan Pipeline Inc. 2003; Foothills Pipe

Lines (South Yukon) Ltd. 1979; Salmo Consulting Inc. 1999; Taggart and McCracken 2002; U.S. DOI 1972; WCEL 2003). Clearance of linear corridors may involve significant grading, backfilling, grubbing, trenching, blasting, and vehicle traffic to build access roads and to prepare the landscape for pipeline installation. Construction activities can alter the structure and function of soils, landforms, and other physiographic features on the landscape. Potential impacts on physiography and soils include:

- Loss of soil capability as a result of topsoil and subsoil mixing;
- Soil compaction, pulverization, rutting, and reduced percolation and drainage rates;
- Erosion and increased sediment load;
- Decreased terrain stability and increased potential for slides; and
- Direct topsoil and subsoil loss (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; Canada NEB 1996, 1998, 2003a; Encana Ekwan Pipeline Inc. 2003; Salmo Consulting Inc. 1999).

Mitigation strategies can be used to reduce effects on physiography and soils. Potential mitigation measures include:

- Implementing proper soil handling and salvage techniques to mitigate soil loss and mixing;
- Carrying out construction activities during winter months to minimize compaction and pulverization;
- Reducing surface disturbances through project design such as reduced route length and facility footprints; and
- Stabilizing, restoring, and re-vegetating of banks and slopes to increase stability and minimize erosion (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; Canada NEB 1996, 1998, 2003a; Encana Ekwan Pipeline Inc. 2003; Salmo Consulting Inc. 1999).

3.2.3 Surface and Ground Water

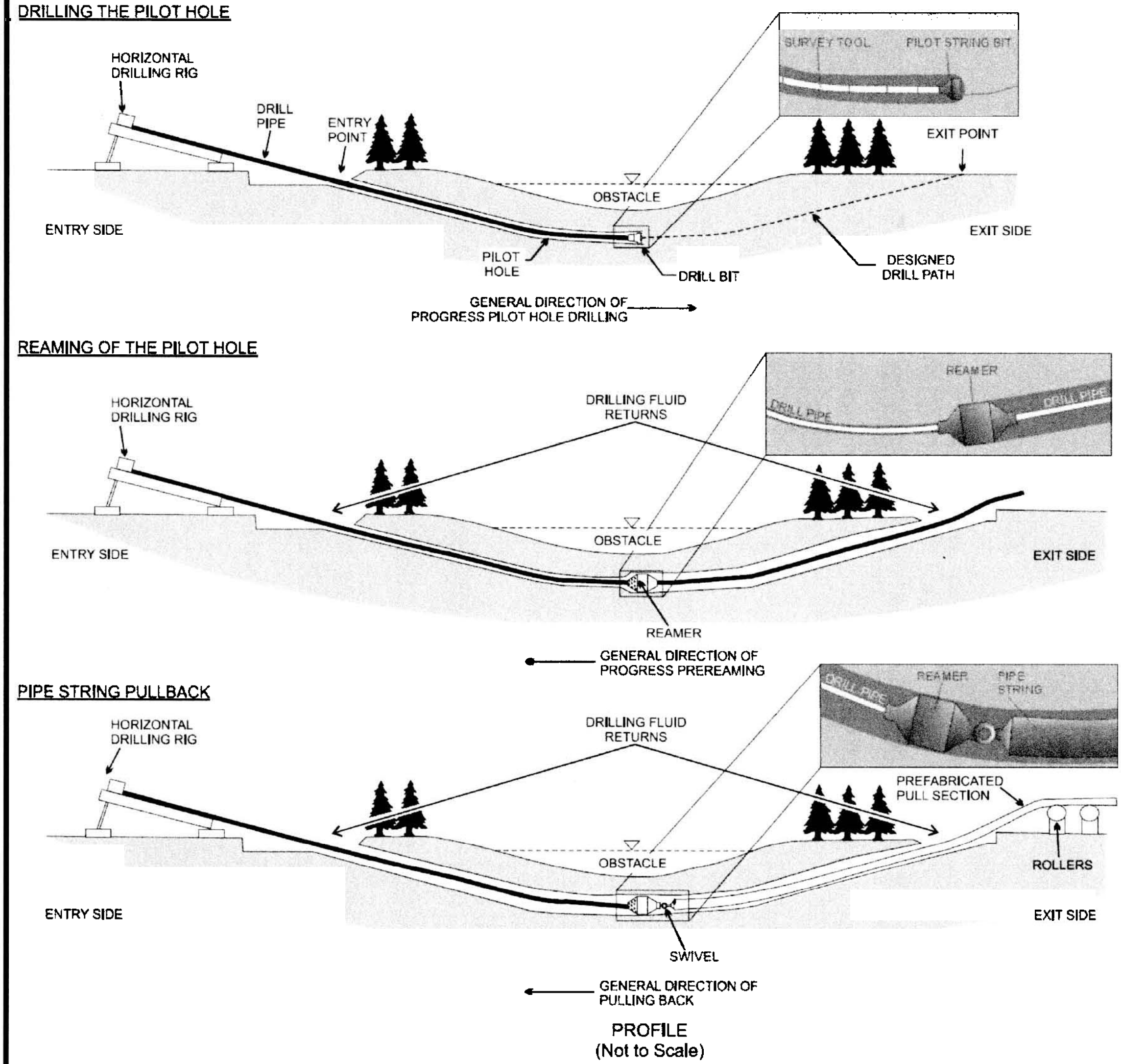
Construction of pipelines and associated facilities also has potential to negatively impact surface and ground water resources (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; Canada NEB 1996, 1998, 2003a; Encana Ekwan Pipeline Inc.

2003; Foothills Pipe Lines (South Yukon) Ltd. 1979; Salmo Consulting Inc. 1999; Taggart and McCracken 2002; U.S. DOI 1972; WCEL 2003). While most effects on water occur during construction, residual effects may remain if a proper mitigation strategy is not implemented. Potential impacts on surface and ground water include:

- Changes in groundwater recharge and discharge regimes due to removal of soil and granular material, flow obstruction, and changes to soil patterns and subsidence;
- Decreased water quality as a result of sediment loads from surface disturbance, dredging, and watercourse crossings;
- Decreased water quantity due to water withdrawal and land settlement during construction and operations; and
- Contamination from solid, industrial and liquid wastes released purposely or inadvertently during construction and operations (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; Canada NEB 1996, 1998, 2003a; Encana Ekwan Pipeline Inc. 2003; Salmo Consulting Inc. 1999).

Mitigation techniques can be implemented to reduce project impacts on surface and groundwater. For example, horizontal directional drilling (HDD) "is a method of installing underground pipes and conduits from the surface along a prescribed bore path (Canada NEB 2003a: 21). HDD techniques are typically used when crossing waterways, roads, congested areas, and environmentally sensitive areas to mitigate potential impacts on water quality and other ecosystem components, such as fish and fish habitat (fig. 3.1) (Canada NEB 2003a; Canadian Association of Petroleum Producers (CAPP) 2004).

Figure 3.1: Horizontal Directional Drilling at a Watercourse Crossing



CAPP Canadian Association of Petroleum Producers	PLANNING HORIZONTAL DIRECTIONAL DRILLING FOR PIPELINE CONSTRUCTION	
	WATERCOURSE CROSSING – HORIZONTAL DIRECTIONAL DRILL	
	1. September 2004	2. FIGURE. NO. 1

Source: © CAPP 2004, by permission

Other mitigation measures that may be used to reduce effects on water include:

- Installing drainage and runoff control measures in areas of significant groundwater flow;
- Monitoring changes in locations or extent of groundwater discharge areas;
- Requiring minimum setbacks from waterways to reduce impacts on local drainage regimes and stream flow;
- Implementing drainage, erosion, and sediment control measures to maintain surface water quality such as grading and ditching, silt fences, sediment traps, vegetation, berms, and/or isolation areas;
- Adjusting pipeline routes to minimize watercourse crossings and to avoid sensitive surface and ground water areas;
- Reclaiming watercourse banks and slopes to stable conditions and contours; and
- Recording and monitoring water quantity to ensure that volumes do not exceed limits set out in water use permits (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; Canada NEB 1996, 1998, 2003a; Encana Ekwan Pipeline Inc. 2003; Salmo Consulting Inc. 1999).

3.2.4 Air Quality

Construction and operation of pipelines and pumping stations may also create negative impacts on regional air quality (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; Canada NEB 1996, 1998, 2003a; Encana Ekwan Pipeline Inc. 2003; Foothills Pipe Lines (South Yukon) Ltd. 1979; Salmo Consulting Inc. 1999; Taggart and McCracken 2002; U.S. DOI 1972; WCEL 2003). Air quality impacts are derived from three main sources:

- Burning of slash and debris during clearance of a pipeline ROW;
- Emissions from construction and operation of pumping stations;
- Emissions and dust generated from vehicles as a result of pipeline construction and maintenance (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; Canada NEB 1996, 1998, 2003a; Encana Ekwan Pipeline Inc. 2003; Salmo Consulting Inc. 1999; U.S. DOI 1972, 2002).

While a certain level of emissions and dust will be generated during construction and operation of pipelines and associated facilities, mitigation strategies can help to reduce potential harmful effects. Mitigation measures with respect to air quality include:

- Implementing a dust control strategy and using appropriate equipment that meets relevant regulations and standards;
- Reducing fuel use by applying best management practices;
- Reducing burn material by salvaging merchantable timber; and
- Requiring emissions control devices on vehicles and developing a plan to reduce vehicle idling (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; Canada NEB 1996, 1998, 2003a; Encana Ekwan Pipeline Inc. 2003; Salmo Consulting Inc. 1999).

3.2.5 Noise

Noise generated from construction activities, pumping station operations, transportation of materials, and routine maintenance flyovers will inevitably occur as a result of pipeline development. Noise emissions are most likely to have negative effects on nearby residents, hunters, and recreational users in the immediate vicinity of a pipeline as well as wildlife migration patterns (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; Canada NEB 1996, 1998, 2003a; Encana Ekwan Pipeline Inc. 2003; Foothills Pipe Lines (South Yukon) Ltd. 1979; Salmo Consulting Inc. 1999; Taggart and McCracken 2002; U.S. DOI 1972; WCEL 2003).

While noise pollution cannot be entirely eliminated, a number of mitigation measures can be used to reduce noise impacts. Such measures include:

- Completing a noise study for proposed projects, which may include implementing engineering noise controls such as silencers, insulation, and specially designed building shells;
- Designing pumping stations and associated facilities to meet all relevant regulations and industry standards;
- Adhering to construction hours and schedules, and notifying residents and other users of construction timelines; and
- Scheduling discretionary construction and operational activities in sensitive areas at appropriate times to avoid noise impacts (Aboriginal Pipeline Group et al.

2004; B.C. Gas Utility Ltd. 1998; Canada NEB 1996, 1998, 2003a; Encana Ekwan Pipeline Inc. 2003; Salmo Consulting Inc. 1999).

3.2.6 Vegetation

Pipeline development will inevitably involve adverse impacts on vegetation. Impacts are due to clearing and grading of a pipeline ROW, dust and air emissions, and changes to the structure and function of soils (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; Canada NEB 1996, 1998, 2003a; Encana Ekwan Pipeline Inc. 2003; Foothills Pipe Lines (South Yukon) Ltd. 1979; Salmo Consulting Inc. 1999; Taggart and McCracken 2002; U.S. DOI 1972; WCEL 2003). The majority of potential adverse impacts on vegetation are realized during the pipeline construction phase, such as:

- Direct loss and alteration of vegetation in forested areas from ROW clearance and grading, which contributes to wildlife habitat loss, instability, decreased quality of soils, and alternation of surface water drainage patterns;
- Changes to physical site conditions due to the presence of reclamation species and potential introduction of nonnative and invasive plant species; and
- Disturbance to rare plants, rare communities, or First Nations' traditional collection sites.

While impacts of pipeline projects on vegetation are not entirely avoidable, a number of mitigation measures may be implemented to ensure that adverse effects are reduced to acceptable levels. Mitigation strategies with respect to pipeline impacts on vegetation include:

- Reducing vegetation and rare species loss through design and routing such as developing a pipeline along existing road or hydroelectric corridors;
- Developing a weed control plan to prevent species invasion, including measures for cleaning mud and debris from construction vehicles and equipment;
- Reclaiming and reseeding sites immediately following their use, in combination with natural re-vegetation of ROWs;
- Implementing timber salvage plans to reduce merchantable timber loss;

- Implementing traffic management plans, salvage, and transplanting techniques, and boring and ramping measures to reduce impacts on rare species and communities; and

- Developing and implementing a comprehensive monitoring plan to assess vegetation composition, cover, health, and the presence of weeds at selected sites (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; Canada NEB 1996, 1998, 2003a; Encana Ekwan Pipeline Inc. 2003; Salmo Consulting Inc. 1999).

3.2.7 Wildlife

Potential impacts of pipeline development on wildlife have been extensively studied in the literature (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; Canada NEB 1996, 1998, 2003a; Encana Ekwan Pipeline Inc. 2003; Foothills Pipe Lines (South Yukon) Ltd. 1979; Salmo Consulting Inc. 1999; Taggart and McCracken 2002; U.S. DOI 1972; WCEL 2003). Construction of pipelines and facilities may involve direct habitat loss, alteration, or fragmentation due to clearance of vegetation and forested areas, leading to reduced habitat availability and species loss. Construction and operational disturbances may also have adverse impacts on wildlife feeding, nesting, denning, or breeding patterns and may cause wildlife to avoid areas entirely (Aboriginal Pipeline Group et al. 2004; Canada NEB 1998). Pipeline development may alter or disrupt seasonal and daily movements of wildlife by creating physical barriers such as trenches or fencing (Aboriginal Pipeline Group et al. 2004; Canada NEB 1996, 1998; Encana Ekwan Pipeline Inc. 2003).

Furthermore, adverse impacts on wildlife are expected as a result of increased access to wildlife areas and increased construction and recreational vehicle traffic (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; Canada NEB 1996, 1998, 2003a; Encana Ekwan Pipeline Inc. 2003; Salmo Consulting Inc. 1999). A recent environmental assessment of a pipeline project noted that "increased mortality is possible because human-wildlife conflicts can result in the destruction of wildlife, and because hunters and predators can access wildlife more readily along roads or pipeline rights-of-way" (Aboriginal Pipeline Group et al. 2004: 28). Direct loss of wildlife may also occur as a result of collisions with construction, maintenance, or recreational vehicles (Canada

NEB 1996). Unrestricted possession of firearms in pipeline construction camps may also lead to direct loss of wildlife (Encana Ekwan Pipeline Inc. 2003).

Mitigation measures may be used to reduce project effects on wildlife include:

- Adjusting a pipeline route to avoid significant habitat areas and reduce vegetation clearance;
- Timing construction activities to avoid calving and feeding seasons or sensitive life-cycle stages;
- Banning firearms and restricting recreational vehicle travel in construction camps;
- Developing and implementing operating guidelines to address effects on wildlife and to reduce sensory disturbance;
- Controlling access and pipeline-related vehicle use in cooperation with communities and regulatory agencies such as by strategic placement of slash rollback along a ROW for access control;
- Using HDD techniques at watercourse crossings to limit habitat clearance in riparian corridors;
- Implementing design and work practices to reduce pipeline effects on wildlife movement;
- Re-establishing wildlife areas after construction through implementing reclamation plans; and
- Developing a waste management plan to avoid attracting wildlife to construction camps and facilities (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; Canada NEB 1996, 1998, 2003a; CAPP 2004; Encana Ekwan Pipeline Inc. 2003; Salmo Consulting Inc. 1999).

3.2.8 Fish and Fish Habitat

Adverse effects on fish habitat, health, abundance, and distribution may also occur as a result of pipeline development. Direct effects on fish and fish habitat occur largely from construction of watercourse crossings (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; Canada NEB 1996, 1998, 2003a; Encana Ekwan Pipeline Inc. 2003; Foothills Pipe Lines (South Yukon) Ltd. 1979; Salmo Consulting Inc. 1999; Taggart and McCracken 2002; U.S. DOI 1972; WCEL 2003). Construction—including blasting—near or over waterways has potential to increase sedimentation and turbidity, including siltation of significant spawning beds, which in turn leads to species loss (Canada NEB 1996, 1998, 2003a). Fish mortality may also occur as a result of in-stream trenching and dredging, or flow disruption caused by construction activities (Canada NEB 1996). Other construction activities that may adversely impact fish populations and migration patterns include disturbances to riparian areas adjacent to streams and physical disturbance of stream banks (B.C. Gas Utility Ltd. 1998).

Pipeline construction may cause indirect effects on fish and fish habitat through water use and increased access to fishing areas. Changes in water levels and water flow patterns from such activities as water withdrawal for construction and hydrostatic testing may lead to habitat loss (Aboriginal Pipeline Group et al. 2004; Encana Ekwan Pipeline Inc. 2003). Furthermore, pipeline development indirectly affects fish and fish habitat through ROW and road construction, which in turn increases opportunities for sport fishing (Aboriginal Pipeline Group et al. 2004; Encana Ekwan Pipeline Inc. 2003).

Mitigation measures to reduce impacts of pipeline development on fish and fish habitat include:

- Implementing HDD techniques to minimize impacts on fish and fish habitat;
- Conducting pipeline construction activities in the winter to reduce riparian disturbances;
- Implementing erosion and sediment controls to direct construction runoff through silt fences, sediment traps, and vegetative berms to decrease sedimentation in streams;
- Avoiding significant habitat areas, such as spawning areas, through pipeline route adjustments;
- Prohibiting fishing by pipeline employees during pipeline construction;
- Building crossing structures for construction traffic to ensure minimal damage to riparian areas;
- Reclaiming and re-vegetating stream banks and riparian areas immediately following construction;
- Limiting water withdrawals from watercourses to reduce impacts on water quantity and stream flows (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; Canada NEB 1996, 1998, 2003a; CAPP 2004; Encana Ekwan

Pipeline Inc. 2003; Foothills Pipe Lines (South Yukon) Ltd. 1979; Salmo Consulting Inc. 1999; Taggart and McCracken 2002; U.S. DOI 1972; WCEL 2003).

3.2.9 Oil Spills and Accidents

While pipelines are perhaps the safest means of transporting hydrocarbons over long distances, accidents and malfunctions may occur during pipeline operations. The Alberta Energy and Utilities Board (1998) stated "a pipeline failure is defined as the failure of the pipeline to contain the substance being transported; and for statistical purposes is designated as either a leak or a rupture" (3). Pipeline leaks and ruptures may occur for a variety of different reasons including, internal or external corrosion, construction damage, damage by third parties, or earth movements (Alberta Energy and Utilities Board 1998).

The Alberta Energy and Utilities Board (1998) study documented the number of pipeline failures in Alberta between 1980 and 1997. The major findings of the report were:

- 12,137 operating pipeline failures were reported for an average of 674 failures per year;
- Crude oil pipelines reported 1.2 failures for every 1,000 kilometers of pipeline between 1980-1997 and 0.8 failures for every 1,000 kilometers between 1993-1997;
- Leaks represented 87% of all pipelines failures, while ruptures accounted for 13% of failures;
- Internal corrosion was responsible for 50% of all pipeline failures;
- Third-party damage was the major cause of ruptures and 8% of all pipeline failures were caused by third parties; and
- Of all liquid hydrocarbon releases from pipelines, 95% were less than 100 cubic meters.

Pipeline failures have potential to cause spills, which may lead to a number of detrimental effects on terrestrial and riparian ecosystems. However, an important distinction must be made between potential effects of an inland/terrestrial spill and a spill that occurs at a river crossing or in a riparian area. If an underground pipeline spill occurs in a terrestrial or inland area, certain adverse impacts on soils, water, wildlife, and vegetation may occur (Canada NEB 1996; U.S. DOI 2002; WCEL 2003). Oil from a subsurface spill is likely to move towards the surface where it would accumulate or flow into low-lying areas (Canada NEB 1996). Depending on soil composition, oil may remain near the surface or it could infiltrate into groundwater (Canada NEB 1996). A recent study by the NEB explained potential impacts as a result of such an oil spill:

> If no near-surface groundwater was contaminated, Express indicated that the total area affected would likely be several hectares at maximum, resulting in the loss or reduction of soil productivity as well as the loss or reduction in productivity of native vegetation communities or crops. Near-surface groundwater contamination could occur to a much greater extent through the dispersal of the oil with natural hydrological and hydrogeological flows in a given area (Canada NEB 1996: 108).

Research on oil spill rates for pipelines suggests that pipeline spills will inevitably occur over the life of a project. Anderson and Labelle (2000) completed a comprehensive assessment of oil spill occurrence rates for the Trans-Alaska Pipeline System between 1977-1998. The main conclusion of the study was that pipeline spills associated with the Trans-Alaska Pipeline System have decreased since 1985 (table 3.1)

Table 3.1: Trans-Alaska Pipeline System Crude Oil Spill Rates

Time Period	Spill Type (BBL)	Number of Spills	Volume Transported (BBBL)	Spill Rate*
1977-1998	>500	6	12.492	0.48
	>1,000	5		0.40
1985-1998	>500	1	8.603	0.12
	>1,000	0		-

* Spill rate calculated as spills per BBBL transported

Source: Anderson and Labelle 2000

In addition, the environmental impact statement for the renewal of the Trans-Alaska Pipeline System ROW concluded that:

- Pipeline spills of up to 100 barrels are anticipated to occur every 2 years, and could contaminate an area of up to 0.15 acres;

- Pipeline spills of up to 10,000 barrels could potentially occur once every 30 years, and could affect an area of up to 15 acres, and
- Pipeline spills of up to 54,000 barrels are unlikely, but may occur once in 1 million years, and could contaminate an area of up to 84 acres (U.S. DOI 2002).

Impacts of terrestrial spills on soils, water, and vegetation may be serious. In addition, oil spills could also have detrimental effects on wildlife (Canada NEB 1996; U.S. DOI 2002; WCEL 2003). Despite this conclusion, potential effects are difficult to predict since impacts on wildlife as a result of an oil spill depend on many factors, such as time of year, volume of a spill, characteristics of the affected habitat, and density of the different wildlife species involved (Canada NEB 1996; U.S. DOI 2002). If an oil spill occurs in winter, effects on wildlife may include direct contamination leading to loss of insulation capacity of fur, ingestion of oil through feeding of oil-contaminated food, and loss of productive feeding and nesting areas (Canada NEB 1996).

However, if an oil spill occurs in the spring or fall, potential adverse impacts on wildlife may be much more severe (Canada NEB 1996; U.S. DOI 2002). This is due to the fact that a greater diversity of species is likely to be present in the general vicinity of spills (Canada NEB 1996). These effects may include:

- Destruction of nests for ground-nesting birds and feather contamination in waterfowl and shorebirds living in wetlands;
- Exposure to contaminated food sources causing ingestion-induced mortality;
- Absorption through skin or inhalation of contaminants by terrestrial mammals;
- Reduction in respiratory function in certain wildlife species; and
- Ingestion of oily water (Canada NEB 1996; U.S. DOI 2002).

Adverse effects of an accident at a watercourse crossing or in a riparian area may be more serious than impacts of a terrestrial spill. U.S. DOI (2002) indicated that during oil spills involving water, an oil sheen develops, or in other words, "a very thin layer of oil that floats on the water surface and is transported downstream with the current" (ES-42). Like terrestrial spills, spills on water are dependent on a number of factors, such as water temperatures and volumes, stream flow and velocity, sediment loads, and contaminant input rates (Canada NEB 1996; U.S. DOI 2002). Adverse impacts as a result of an oil spill to water are most likely to affect water birds, livestock, fish, and other wildlife species.

Water bird mortality may occur through a number of mechanisms, including loss of flight abilities, buoyancy, and insulation properties as a result of oiled feathers, and direct ingestion or inhalation of oil (Canada NEB 1996). Other wildlife species may experience adverse effects as a result of ingestion of oiled-prey or oil-contaminated water (Canada NEB 1996). Livestock may also be negatively affected by ingestion of oil-contaminated water (Canada NEB 1996). Adult fish are not as likely to be directly affected by an oil spill in a stream as fish eggs or larvae (Canada NEB 1996). Fish eggs and larvae are more sensitive to oil pollution, due to their immobility and as a result of their development near the water surface where contamination risks are more severe (Canada NEB 1996).

While adverse effects of terrestrial and watercourse pipeline spills are likely to occur, mitigation measures may be used to minimize impacts. Mitigation measures generally fall into two broad categories: measures used to prevent spills from occurring in the first place and remediation measures used once a spill has occurred. Preventative spill measures may include:

- Minimization of pipeline ruptures through route selection;
- Incorporation of design features into pipeline construction to prevent deterioration of a pipeline, such as automatic shut-off valves, monitoring controls, cathodic protective systems, epoxy coatings, and/or concrete casing;
- Design of facilities to meet standards of the Canadian Standards Association (CSA) and the Canadian Council of Ministers of the Environment (CCME); and
- Development of construction, maintenance, and safety practices plans (Canada NEB 1996, 2003a; U.S. DOI 2002).

In the event of a pipeline oil spill, remediation measures may be employed to contain a spill, notify appropriate authorities, and minimize environmental impacts. Proponents of pipeline projects typically develop an emergency preparedness and response program, detailing procedures in the event of an oil spill (Canada NEB 1996, 2003a; U.S. DOI 2002). Emergency preparedness and response programs include policies and procedures with respect to the assessment of hazards, emergency response training, exercises, and equipment, and incident evaluation (Canada NEB 2003a). Emergency programs may also provide for a continuing public education program or detail specific remediation measures, such as development of oil-spill treatment facilities or procedures in the event of in-situ clean up (Canada NEB 2003a).

3.3 Port Construction and Operations

3.3.1 Description of Activities

Construction and operation of a port may create serious environmental damage if proper mitigation measures are not implemented. Environmental damage is dependent on a variety of factors, including proximity to sensitive natural resources, open pathways between activities and natural resources, extent and frequency of activities, and mitigation measures used to prevent or reduce impacts (American Association of Port Authorities (AAPA) 1998). Port activities can be divided into two main categories: development-related activities and operational-related activities (AAPA 1998).

Development-related activities occur during planning and construction phases of a project (AAPA 1998). Common activities include land and vegetation clearance at the selected port site; channel dredging and disposal of dredge material; landfilling; construction of buildings, storage tanks, and piers; and bulkhead installation (AAPA 1998, 2000). Other development-related activities may include building demolition and renovation; site remediation and rehabilitation; pavement removal and installation; site cleaning; and utility construction (AAPA 1998, 2000).

Once the port has been developed, a number of operational-related activities will occur over the life of the project. Operational-related activities refer to ongoing maintenance of port facilities and equipment, as well as discharges of emissions and materials (AAPA 1998). The most common of these activities includes building and grounds maintenance; chemical storage and handling; air emissions and liquid discharges from ships and port operations; and vessel repair and maintenance (AAPA 1998, 2000). Other activities include vehicle and equipment maintenance; solid waste generation and disposal; ship and vehicle cargo handling; ship and vehicle fueling; and painting and paint stripping (AAPA 1998, 2000).

Adverse impacts on terrestrial ecosystem components that may occur as a result of port construction are similar to the impacts of pipeline construction discussed in the previous section of this report. However, port operational activities may generate even greater environmental effects on various components of the marine environment (AAPA 1998, 2000). Potential environmental impacts and associated mitigation measures are discussed in this section of the report.

3.3.2 Air Quality

Port operations have potential to create adverse impacts on regional air quality as a result of ship and port related vehicle emissions, vessel painting and cleaning, and other activities (AAPA 1998, 2000; Bailey and Solomon 2004; U.S. DOI 1972, 2002). A recent report from the AAPA (2000) stated "emissions from motor vehicles and vessels account for 80 percent of air pollution and are in many regions among the highest contributors of hydrocarbons and nitrogen oxides to the atmosphere" (5). Port operations may also include other types and sources of air pollution such as:

- Xylene, toluene, and methylene bromide which may be released during ship painting and cleaning;
- Benzene, toluene, and other toxins found in vapors released from fueling facilities or during the loading and unloading of marine vessels;
- Sulfur dioxide generated from port power plants; and
- Hydrocarbons generated from marine engine diesel soot (AAPA 2000; Bailey and Solomon 2004).

Air pollution can have a number of negative consequences including adverse human health effects, destruction of upper-atmosphere ozone, generation of acid rain, global warming, and destruction of agricultural resources, forests, and plant communities (AAPA 2000; Bailey and Solomon 2004).

While air pollution as a result of port operations cannot be eliminated, several strategies can be used to reduce impacts on air quality. Mitigation measures to reduce negative impacts on air quality may include:

- Siting new marine terminals away from residential areas to protect communities from air pollution and close to harbor entrances to decrease ship travel times;
- Enforcing idling limits on vehicles;
- Using alternative fuels in vehicles and equipment, such as electricity and natural gas;
- Controlling emissions through filtration, chemical reaction, and reuse techniques;
- Retrofitting diesel engines to improve efficiency and reduce emissions;
- Installing vapor control systems for use during loading and unloading of tankers;
- Painting vessels with Teflon-based material to reduce the need for vessel painting and to facilitate easier cleaning; and
- Monitoring air quality through periodic completion of regional air quality studies (AAPA 1998, 2000; Bailey and Solomon 2004; U.S. DOI 2002).

3.3.3 Water and Contaminant Discharges

Liquid discharges to water as a result of port operations may also contribute to gradual environmental deterioration if not properly managed. Three types of discharges to water exist: storm water (which may include contaminated runoff), industrial wastewater (including ballast water from tankers), and domestic sanitary wastewater (AAPA 1998, 2000; U.S. DOI 1972, 2002). Discharge of contaminated effluent into the environment can result in a number of negative impacts on environmental resources, including direct and indirect loss of marine biodiversity and fishery resources due to eutrophication of the water column, depletion of oxygen supply, introduction of heavy metals into the environment, and increased levels of nutrients in water (AAPA 2000; U.S. DOI 2002). Toxins discharged through water may also settle on the ocean floor and contribute to contamination of a number of organisms in the marine environment (AAPA 2000).

One of the most common methods of dealing with liquid discharges is through development of treatment facilities (AAPA 1998, 2000; U.S. DOI 1972, 2002). For example, the Valdez Terminal in Alaska uses two separate facilities for the treatment of wastewater discharges (U.S. DOI 2002). The Ballast Water Treatment Facility (BWTF) is used to treat storm water runoff and industrial wastewater (including ballast water from tankers) to reduce pollutant discharge into the harbor area (U.S. DOI 2002). The Valdez Terminal also operates a facility used to treat domestic sanitary wastewater generated as a result of port and tanker activities (U.S. DOI 2002).

Other techniques to reduce environmental effects of liquid discharges include:

- Ensuring compliance with all applicable regulations, permits, and best management practices through ongoing monitoring programs;
- Designing a comprehensive program for water quality management, including an evaluation of pollution sources, pollution distribution, control measures and management options;
- Developing storm water management plans which may include, for example, a system of leaching basins to treat polluted water or foliage buffer zones to serve as natural water treatment;
- Using porous piping techniques to reduce volumes of point-source discharges; and
- Using less chemically dependent methods of pest control (AAPA 1998, 2000).

3.3.4 Dredged Material Disposal and Contaminated Sediments

In certain cases, dredging of harbors is an inevitable activity to ensure safe and efficient movement of tankers and other vessels (AAPA 1998, 2000). However, dredging activities related to port development and operations can have significant environmental effects. Heavy metals, polychlorinated biphenyls (PCBs), polyaromatic hydrocarbons (PAHs), dioxins, and other substances can contaminate suspended particles in the ocean (AAPA 2000). Once contaminated particles settle on the ocean floor, marine sediment composition can be significantly altered. While ports are not the only contributor to contaminated ocean sediments, ports are responsible for safe environmental disposal of contaminated sediments that can be present in dredged material (AAPA 2000). Disposal of potentially contaminated dredged material is often controversial and can negatively affect environmental resources if proper techniques are not implemented (AAPA 2000).

Disposal of dredged material is carried out in three ways: through open water disposal; at confined disposal sites; or through beneficial use (AAPA 2000). Open water disposal involves placement of dredged material in oceans through direct pipeline discharges, direct mechanical placement, or other methods (AAPA 2000). Open water disposal sites may be non-dispersive, where material is intended to stay on the ocean floor, or dispersive, such that material is gradually transported away from the site by currents and waves (AAPA 2000). Capping techniques may also be used at open water disposal sites, a technique that involves covering dredged material with clean isolating material to prevent movement (AAPA 2000). Confined disposal involves placement of dredged material "within diked nearshore or upland confined disposal facilities (CDFs) (AAPA 2000: 20). The primary purposes of CDFs are to maximize retention of solids and to control release of contaminants (AAPA 2000). Disposal of dredged material through beneficial use involves the use of material for a productive purpose, such as for habitat restoration or enhancement, shoreline stabilization and erosion control, strip mine reclamation, or landfilling (AAPA 2000).

Disposal of dredged material has potential to create adverse impacts on a number of environmental resources (AAPA 1998, 2000; U.S. DOI 2002). For example, if dredged material contains contaminants and toxins, they can "present a considerable threat to ecosystem health, particularly as they work their way up the food chain" (AAPA 2000: 18). Placement of contaminated dredged material at open water sites may also generate adverse impacts on water quality and contribute to further contamination of ocean sediments. The AAPA states that at open water disposal sites "the overlying water or underlying 'clean sediments' can be affected by contaminated sediment as biological and mechanical mixing of the top layer remobilizes contaminants and mixes them back into the water column or into deeper sediment layers" (AAPA 2000: 18). These events may further contribute to loss of species and plant communities in marine environments (AAPA 2000).

Despite the potential for adverse environmental effects, several mitigation measures may be used to reduce impacts of dredged material extraction and disposal on environmental resources. For example, mitigation measures can include:

- Coordinating the timing of dredging activities so that impacts on sensitive animal and plant communities are minimized;
- Using sediment control techniques and appropriate dredging equipment to reduce re-suspension and transport of contaminants;
- Considering use of lateral containment techniques such as borrow pits and dikes in open water disposal to reduce impacts on benthic organisms and communities;
- Requiring treatment of effluent liquids from confined disposal sites to remove suspended solids, metals, and organics; and
- Committing to ongoing assessment and monitoring programs (AAPA 1998, 2000).

3.3.5 Ship and Port Generated Solid Waste

Debris and solid waste disposal by ships and ports can potentially cause severe environmental consequences. Common types of debris generated by ships and ports include glass, metals, paper, cloth, food wastes, wood, rubber, and packing materials (AAPA 2000). Furthermore, most of these materials can be discharged overboard at prescribed distances from shorelines under various international marine conventions (AAPA 2000). The AAPA notes that ships alone account for over 111,000 tons of garbage each year in the U.S. (AAPA 2000). Disposal of these materials has a number of negative effects on the marine environment.

Marine organisms experience the most significant adverse effects as a result of solid waste disposal. The AAPA characterizes environmental impacts of marine debris in the following manner:

> Hundreds of thousands of marine mammals, sea turtles, seabirds and fish die each year from exposure to marine debris, either through entanglement or ingestion. Animals may become entangled in loops or openings of submerged, floating debris and consequently drown or lose their ability to catch food or avoid predators. Some animals also can ingest plastic material resulting in choking, damage to stomach lining, intestinal blockage, reduced capacity to forage efficiently, inability to digest food,

reduced rate of absorption of nutrients, and other physiological effects from the absorption of toxins (AAPA 2000: 48).

While solid wastes from ships and ports cannot be entirely eliminated, certain mitigation measures can be employed to reduce negative environmental effects associated with marine disposal. Use of on-board technologies and handling techniques, such as compactors, pulpers, and shredders, can help minimize storage requirements and disposal costs of waste from ships (AAPA 1998, 2000). Source reduction through recycling programs is another commonly used method to reduce waste volumes from ports and ships (AAPA 1998, 2000). While incineration of waste is also an option and can potentially reduce wastes volumes intended for landfills or marine disposal, it is often discouraged due to generation of toxic pollutant emissions (AAPA 2000). Despite use of these mitigation strategies, generation and disposal of solid wastes are inevitable consequences of port and ship operations (AAPA 1998, 2000).

3.3.6 Oil Spills and Accidents

Oil spills and accidents during port operations have potential to generate adverse effects on the marine environment (AAPA 1998, 2000; Thompson 1978; U.S. DOI 1972, 2002; Westwater Research Centre 1977). Oils spills and discharges may occur at ports in a number of different ways. Storage tanks used at ports to temporarily store oil from pipelines prior to tanker loading may leak or rupture as a result of earthquakes, fires, or third party damage (U.S. DOI 1972). Discharges or accidental spillage may also occur from docks or ships due to routine operations, such as loading and off-loading, tank washing, and wastewater discharging (AAPA 2000; U.S. DOI 1972, 2002). Other oil discharges may be generated from bilge tanks, greases and oils used to maintain engines, machinery and equipment, and engine drippings (AAPA 2000).

Furthermore, disposal of oil wastes has become a serious problem at ports (AAPA 2000). Some oil wastes generated at ports are mixed into ballast water from ships and end up at ballast treatment plants. Not only are such actions illegal, but they also put enormous strain on treatment facilities that are not designed to handle such wastes (AAPA 2000). Many ports lack appropriate treatment facilities altogether (AAPA 2000).

While chronic oil pollution from routine operations and activities at ports are important to consider, the most severe environmental impacts occur as a result of tanker accidents at a port or within a harbor (AAPA 1998, 2000; Thompson 1978; U.S. DOI 1972, 2002; Westwater Research Centre 1977). Catastrophic tanker oil spills may occur while ships are in transit or when ships are in berth (U.S. DOI 2002). While in transit, tanker accidents may occur either through collisions with other tankers, groundings, striking floating objects, or impacting a fixed object (U.S. DOI 2002). While in berth, a number activities have potential to cause oil spills, including tanker berthing or un-berthing collisions, mooring line failures, structural failures, and general mishaps during transfer operations (U.S. DOI 2002). Impacts associated with tanker accidents will be presented in the next section of the report. This part of the report will specifically focus on oil spills and accidents during port operations.

Risks and probabilities associated with oil and diesel spills at ports have received extensive review in the literature. For example, a recent environmental impact statement for the Trans-Alaska Pipeline System and Valdez Marine Terminal provided some important insight into risks and probabilities of oil and diesel spills at ocean ports (U.S. DOI 2002). The report stated that severity and overall risk to the environment as a result of oil and diesel spills depends on a number of factors, such as:

- Type of petroleum spilled;
- Spill location, duration and size;
- Frequency of spill events;
- Time of year in which the spill occurs;
- Local environmental conditions, such as wind or current speeds, surface roughness and porosity at the time of the spill;
- Location and susceptibility of downstream receptors; and
- Effectiveness of emergency response and remediation measures (U.S. DOI 2002).

The report also presented a comprehensive analysis of crude oil and diesel spill scenarios that may occur at the Valdez Marine Terminal. Spill scenarios took into account a variety of factors, including spill location, duration, magnitude and frequency, as well as sensitive environmental receptor locations (U.S. DOI 2002). Key findings of the analysis of scenarios are that spills of up to 15 BBL are anticipated to occur every 2 years, while occurrence of larger spills is less likely (table 3.2).

Table 3.2: Spill Scenarios and Frequencies at the Valdez Marine Terminal

Scenario Description	Spill Product	Estimated Frequency (per year)	Frequency Range (per year)	Spill Volume (BBL)
Small leak	Crude oil	0.5	>0.5	0.5-13
	Diesel fuel	0.5	>0.5	0.02-15
Moderate leak	Crude oil	0.03	0.03-0.5	1,700-3,200
	Diesel fuel	0.03	0.03-0.5	0.7-300
Catastrophic rupture of storage tank	Crude oil	1.8×10^{-6}	10^{-6}-10^{-3}	50,350-143,450
	Diesel fuel	2.2×10^{-6}	10^{-6}-10^{-3}	40,000
Aircraft crash into tank	Crude oil	2.1×10^{-5}	10^{-6}-10^{-3}	382,500

Source: U.S. DOI 2002

The report clearly pointed out that catastrophic rupture or failure of crude oil storage tanks is an extremely rare occurrence, as only "eight cases of crude oil tank rupture are known from around the world – three caused by foundation failure, one caused by weld failure, one caused by impact of a rail truck, and three caused by flooding" (U.S. DOI 2002: 4.4-20).

Furthermore, the report drew a number of conclusions about environmental impacts of spills that occur on land and water at marine terminals. For example, the report stated that a large land spill would have a number of effects on vegetation communities, bird and mammal populations, threatened and endangered species, fish populations, and adjacent water bodies. However, the report also pointed out that rapid containment and cleanup of a land spill can substantially reduce the magnitude and duration of potential environmental impacts (U.S. DOI 2002).

The report also made some general conclusions concerning adverse environmental impacts that may occur as a result of large spills to water at the Port of Valdez. A large spill at the marine terminal could generate negative effects on shoreline and riparian vegetation, fish communities and their habitat, marine birds and mammals, benthic communities, and other aquatic organisms (U.S. DOI 2002). Oil spills have potential to reduce, fragment, and degrade coastal habitats, poison marine life, disrupt feeding patterns, contribute to chronic disease of species, and negatively affect survival rates (AAPA 2000).

While oil spills and other discharges at marine ports may cause significant adverse environmental effects, a number of procedures can be implemented at ports to limit hydrocarbon releases from operational activities (AAPA 1998, 2000; Thompson 1978; U.S. DOI 1972, 2002; Westwater Research Centre 1977). Procedures may include a variety of activities including, for example, requiring that oil tankers are surrounded by containment booms (AAPA 1998, 2000; Thompson 1978; U.S. DOI 1972, 2002). This procedure involves placement of an oil spill containment boom around each tanker as soon as the tanker is moored to mitigate potential effects of an oil spill during off-loading, on-loading, and disposal of ballast water to the treatment facility (U.S. DOI 2002). Some ports restrict entry of ships that have a history of accidents, pollution, or poor maintenance (AAPA 1998, 2000). Other ports attempt to prevent oil from entering the port waste stream through development of oil collection and recycling programs (AAPA 1998, 2000). Stormwater management procedures are also essential in controlling hydrocarbon releases, such as use of porous pavement, soak-away pits or drywells, seepage or infiltration trenches, grass swales, and recharge or percolation basins (AAPA 1998, 2000).

Other common mitigation measures used at ports to prevent and control hydrocarbon spills and discharges include:

- Visual inspections during loading and camera surveillance of both grounds and equipment to detect hydrocarbon spills and discharges;
- Installation of overfill alarms, locking valves, and backpressure automatic shutdown devices on tankers to prevent spills during loading activities;
- Development of inspection and maintenance procedures for transfer operations, storage tanks, and secondary containment;
- Implementation of oil spill prevention and contingency plans, including procedures for leak detection, remediation techniques, earthquake monitoring, and compensation;

- Tanker size limitations for berths and minimum mooring line requirements; and
- Establishment of a tax on the petroleum industry to be used to develop an oil spill cleanup fund (AAPA 1998, 2000; Thompson 1978; U.S. DOI 1972, 2002).

3.4 Tankers

3.4.1 Air Quality

Tankers contribute to air pollution mainly through use of diesel combustion engines while in transit or in port (AAPA 2000; Environment Canada and United States Environmental Protection Agency (U.S. EPA) 2004; Canada 1978; Thompson 1978). Diesel engines are known contributors to increased levels of nitrogen oxide and sulfur dioxide emissions in the atmosphere. For example, a recent report by Environment Canada and the U.S. EPA (2004) studied natural and anthropogenic sources of air pollution in order to characterize air quality in the Georgia Basin/Puget Sound airshed. The report found that marine vessels emit 33 percent of the region's sulfur dioxide emissions and are the largest single source of sulfur dioxide in the airshed (Environment Canada and U.S. EPA 2004). Furthermore, marine vessels account for 22 percent of nitrogen oxides in the Georgia Basin/Puget Sound region. The report projected that nitrogen oxide emissions from the marine sector will likely surpass emissions of light and heavy-duty on-road vehicles by 2010 (Environment Canada and U.S. EPA 2004).

Environmental impacts of air pollution include depletion of upper-atmosphere ozone, damage to agricultural resources, and production of acid rain, which has effects on soil chemistry, forestry resources, and plant communities (AAPA 2000). Mitigation measures typically focus on emissions reduction and may involve mandating decreased sulfur content in fuel, retrofitting diesel engines to increase efficiency, and controlling emissions through filtration or chemical reaction (AAPA 2000; Environment Canada and U.S. EPA 2004).

3.4.2 Ballast Water Discharges

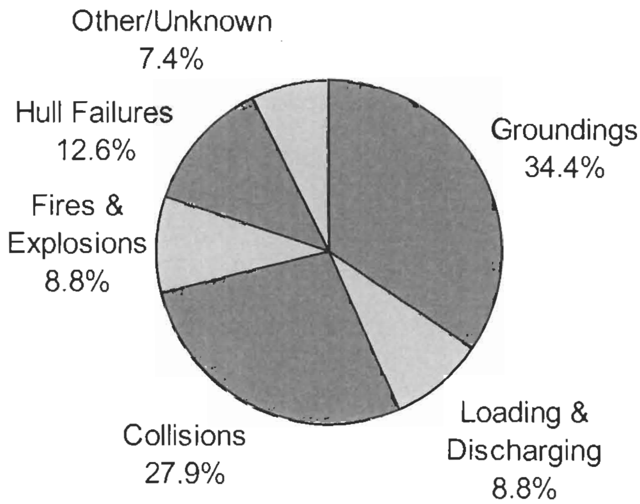
Discharge of ballast water from tankers also has potential to create adverse environmental effects. Ballast water is used to maintain vessel stability and is routinely discharged into the ocean. Allowable concentrations of oil in ballast water remain a source of pollution, despite regulations in Canada requiring that ballast water be cleaned of oil (JWEL 2001 in OOGRG 2004). Alien species introductions are known to be a consequence of ballast water discharge, since ships collect waters in one area and discharge them at other locations (JWEL 2001 in OOGRG 2004). One recent study notes that "the European green crab was recently introduced to San Francisco Bay through ballast water and is currently migrating up the West Coast threatening indigenous crab populations" (Strong et al. 2002 in OOGRG 2004: 17). Alien species have potential to cause numerous impacts on the marine environment (International Maritime Organization (IMO) undated; Primack 1993; Strong et al. 2002 all in OOGRG 2004).

In addition, discharge of ballast water may cause increased mortality in marine birds and may cause production of beach tar (Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP) 1993 in OOGRG 2004). Ballast water may contain hydrocarbons, lead, and other contaminants (GESAMP 1993 in OOGRG 2004). However, "while the acute toxic impacts of these discharges may be negligible, these contaminants contribute to chronic pollution of waters, tend to concentrate at the sea surface, in seabed sediments, and may be chronically toxic to species using these areas" (GESAMP 1993; Patin 1999 both in OOGRG 2004: 17).

3.4.3 Tanker Accidents and Oil Spill Risks

The most significant environmental concern with tankers is the risk of oil spills from tanker accidents. Oil spills from tankers occur through collisions, groundings, hull failures, fires and explosions, striking floating objects, or impacts with fixed objects (fig. 3.2) (International Tanker Owners Pollution Federation (ITOPF) 2004, 2005; U.S. DOI 2002). Between 1974 and 2003, tanker spills greater than 51 barrels have resulted in the loss of over 39 million barrels of oil (fig. 3.3) (ITOPF undated(a) in OOGRG 2004). The spill of the *Atlantic Empress* remains the largest tanker spill in history. In 1979, the vessel discharged approximately 287,000 tonnes of oil near Tobago (table 3.3).

Figure 3.2: Large Spills by Cause (>700 tonnes), 1974-2004



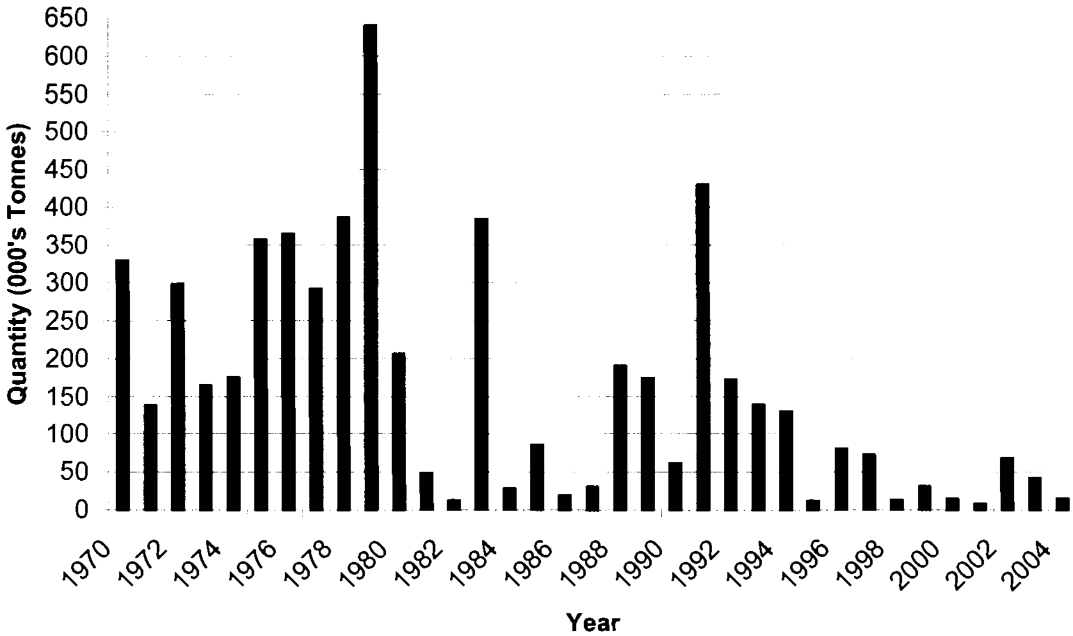
Source: Data from ITOPF 2005

Table 3.3: Major Oil Spills from Tankers since 1967

Rank	Spill	Location	Size (Tonnes)	Year
1	Atlantic Empress	Off Tobago, West Indies	287,000	1979
2	ABT Summer	700 nautical miles off Angola	260,000	1991
3	Castillo de Bellver	Off Saldanha Bay, South Africa	252,000	1983
4	Amoco Cadiz	Off Brittany, France	223,000	1978
5	Haven	Genoa, Italy	144,000	1991
6	Odyssey	700 nautical miles off Nova Scotia	132,000	1988
7	Torrey Canyon	Scilly Isles, United Kingdom	119,000	1967
8	Sea Star	Gulf of Oman	115,000	1972
9	Irenes Serenade	Navarino Bay, Greece	100,000	1980
10	Urquiola	La Coruna, Spain	100,000	1976
35	Exxon Valdez	Prince William Sound, Alaska	37,000	1989

Source: ITOPF 2005

Figure 3.3: Quantities of Oil Spilled, 1970-2004



Source: Data from ITOPF 2005

The Gateway Project is not the first comprehensive pipeline and marine terminal project to consider using tankers on the north coast of B.C. to ship oil. In the 1970s, Kitimat Pipeline Limited (KPL) proposed a similar project that would transport crude oil from Alaska and foreign offshore markets via tanker to a marine terminal at Kitimat and then through a pipeline to Edmonton (Westwater Research Centre 1977). Specifics of the KPL proposal included:

- Construction of floating dock facilities and an on-shore tank farm at Kitimat to receive crude oil;
- Development of a 30" pipeline from Kitimat to Edmonton with an initial capacity of 300,000 BPD and a full capacity of 600,000 BPD;
- Operation of 7 to 13 tanker shipments per month on vessels ranging from 16,000 to 320,000 DWT in size; and
- Total costs of approximately $494 million (Westwater Research Centre 1977).

By 1977, the Kitimat proposal had been reviewed and analyzed by CCG through the TERMPOL review process (Canada Transport Canada 1977). After evaluating various environmental and navigational issues associated with the Kitimat proposal, CCG drew the following conclusions:

- No difficulties in docking and maneuvering of tankers were anticipated at Kitimat due to very deep water close to shore;
- Favorable weather conditions for ships traveling to Kitimat would be experienced 75-85% of the time and ships would require tug assistance in adverse weather conditions;
- The application was deficient due to design weaknesses and lack of pertinent environmental information;
- Oil spills would be an inevitable result of the proposed oil terminal operation and oil spill effects could be serious;
- Oil spills within the Prince Rupert area would concentrate on northern shores and would be extremely difficult to contain and clean up;
- Oil spills could be more easily contained in the Kitimat region due to its sheltered location;
- Tanker traffic to Kitimat had high potential for major adverse impacts on fisheries populations in the north coast region; and
- Lack of knowledge relating to seasonal distribution of marine birds and probabilities for oil spills was of particular concern (Canada Transport Canada 1977).

In response to the KPL proposal, and as a result of a competing proposal by the Trans Mountain Pipe Line Company to expand pipeline and port systems in western Canada and the United States, the federal government launched the *West Coast Oil Ports Inquiry* under the direction of Dr. Andrew R. Thompson. The inquiry was to investigate environmental, social, and navigational issues associated with development of oil ports and tanker operations on the west coast of B.C. While the KPL proposal was officially withdrawn prior to commencement of the inquiry, the parties involved believed that a comprehensive investigation of potential impacts of oil transportation was warranted, since the Trans Mountain proposals were still under consideration. After completing an extensive stakeholder consultation process in many of B.C.'s coastal communities, the inquiry reached the following conclusions:

- If a marine terminal were developed at Kitimat, oil spills on the coast of B.C. would inevitably occur;

- Risk of navigation accidents depends on design and construction of tankers, effectiveness of navigational aids and vessel traffic management measures, and physical characteristics of the selected coastal tanker routes;

- Oil spills may generate a variety of adverse impacts, including effects on fish populations, the commercial fishing industry, and recreational users;

- Issues such as air quality maintenance, management of traffic conflicts, amelioration of social and economic impacts of port construction and operation, and effects on marine species require further research and investigation; and

- Canadian regulatory structures for marine transportation and terminals are deficient in several areas, including tanker safety, marine oil-spill response, and oil spill compensation for people who may suffer injuries as a result of an oil spill (Thompson 1978).

As a result of the *West Coast Oil Ports Inquiry,* and due to fluctuations in the price of crude oil, the KPL project was never developed. However, many of the issues related to the KPL proposal are relevant to the current review of the Gateway Project.

Concurrent to the *West Coast Oil Ports Inquiry*, Fisheries and Environment Canada (Canada 1978) completed a comparative environmental risk analysis for eleven potential oil ports and associated tanker routes in B.C. and Washington. The report compared eleven potential ports, on a relative ranking basis, in terms of potential environmental risks from marine oil spills (Canada 1978). The study assessed a number of factors, including navigational, biological, economic, and social factors, to determine the relatively "least risky" or "most risky" port and tanker route alternatives (Canada 1978). The report also considered a variety of other matters, including issues of oil spill prevention, clean-up, and compensation (Canada 1978). The report concluded that:

- Port and tanker routes at Port Moody, Britannia Beach, Roberts Bank, and Cherry Point posed the highest relative risks;

- Port and tanker routes at Port Simpson, Ridley Island, Kitimat, and Port Angeles presented the least marine risk; and

- Port Angeles and Kitimat options showed similar relative marine risk and did not allow for clear conclusion as to which option was more risky (Canada 1978).

In a more recent report, the Pacific States/B.C. Oil Spill Task Force (2002) studied the risk of tanker collisions and groundings off the west coast between Cook Inlet, Alaska in the north and San Diego, California in the south. Between 1999-2002, the West Coast Offshore Vessel Traffic Management Project:

> . . . collected and reviewed data on typical coastwise traffic patterns, traffic volume, existing management measures, weather data and ship drift patterns, historic casualty rates by vessel type, the availability of assist vessels, the environmental sensitivity of the coastlines, socioeconomic consequences of a spill, and projections of relevant future initiatives (Pacific States/B.C. Oil Spill Task Force 2002: 1).

The report concluded that a heavy concentration of reported accidents occur near major ports due to higher traffic density (Pacific States/B.C. Oil Spill Task Force 2002). Cracks and fractures in vessel cargo tanks were the most common type of structural failure. The study concluded that the risk of groundings and collisions generally increased the closer a vessel gets to shore, as higher risk areas were generally 25 nautical miles from the west coast shore. However, higher risk areas extended to greater distances in certain regions such as in northwest B.C., where risky areas extended to 100 nautical miles offshore (Pacific States/B.C. Oil Spill Task Force 2002).

Tanker spill frequency is another important factor and has been extensively studied in the literature. Anderson and Labelle (2000) reviewed occurrence rates for crude oil spills from tankers in coastal and offshore waters internationally and in the U.S. In terms of international crude oil tanker spills between 1974 through 1999, the study found that there were 278 crude oil spills greater than, or equal to, 1,000 BBL (table 3.4). In addition, 46 crude oil spills of at least 1,000 BBL from tankers occurred in U.S. waters, including 11 spills associated with Alaska North Slope crude oil transportation.

Table 3.4: International, U.S., and Alaska North Slope Crude Oil Tanker Spill Rates

Location	Period	Spill Size (BBL)	Number of Spills	Volume Transported (BBBL)	Spill Rate*
International waters	1974-1999	>1,000	278	239.67	1.16
		>10,000	143		0.59
		>100,000	58		0.24
	1985-1999	>1,000	113	138.31	0.82
		>10,000	51		0.37
		>100,000	16		0.12
U.S. coastal and offshore waters	1974-1999	>1,000	46	44.50	1.03
		>10,000	19		0.43
	1985-1999	>1,000	20	27.57	0.72
		>10,000	7		0.25
Shipments from Valdez, Alaska	1974-1999	>1,000	11	12.60	0.88
		>10,000	3		0.23
	1985-1999	>1,000	8	8.72	0.92
		>10,000	3		0.34

* Spill rate calculated as spills per BBBL transported

Source: Anderson and Labelle 2000

Crude oil spill rates in coastal and offshore waters in the U.S. reported by Anderson and Labelle (2000) can be applied to the Gateway Project to estimate spill frequencies. For example, a spill greater than or equal to 1,000 BBL could occur every 6.65 years, and a spill greater than or equal to 10,000 BBL could occur every 15.96 years assuming a pipeline flow rate of 400,000 BPD (table 3.5). Despite these results, the spill rates reported by Anderson and Labelle (2000) are based on historical data and may not be applicable to the Gateway Project. Gateway will require a comprehensive oil-spill risk analysis to determine specific spill rates and probabilities. However, the spill rates reported by Anderson and Labelle (2000) indicate that the risk of a crude oil spill is significant.

Table 3.5: Estimated Crude Oil Spill Frequencies for the Gateway Project

Spill Size	Spill Rate* (U.S. waters)	Pipeline Flowrate (BPD)	Volume Transported per year (BBL)	Time to Transport 1 BBBL (Years)	Spill Frequency (Years)
>1,000	1.03	400,000	146,000,000	6.85	6.65
>10,000	0.43	400,000	146,000,000	6.85	15.96

* Spill rate calculated as spills per BBBL transported. Rate for spills >1,000 BBL includes spills >10,000 BBL.

Source: Anderson and Labelle 2000

3.4.4 Impacts of Oil Spills on the Marine Environment

Several physical, chemical, and biological processes occur when oil is spilled. Surface spills cause the formation of slicks, which can spread and cover large marine surface areas (Patin 1999 in OOGRG 2004). A recent study reported "a spill from a tanker carrying 5,000 to 50,000 tons (roughly 36,500 to 365,000 barrels) can spread to an area of 50,000 km^2 (Patin 1999 in OOGRG 2004: 23). The report also described the nature of oil slicks:

> Slicks immediately begin moving with the prevailing water flow regime and may break into many 'windrows' parallel to the wind direction. In the process, slicks may travel very long distances. In underwater releases, hydrocarbons spread through the water column and drift with currents; portions of underwater spills will be expressed at the surface.
>
> Concurrently, hydrocarbons dissolve, evaporate, emulsify, disperse within the water column, aggregate into lumps or tar balls, oxidize, enter the sediment, adhere to shorelines or other surfaces, and absorb into the ecosystem (Crawford et al. 2002; Environment Canada undated; ITOPF undated(b); Patin 1999 all in OOGRG 2004: 23).

In addition, ocean waves and currents transport oil on exposed shorelines to other sensitive areas, such as subtidal areas (Carlson and Kvenvolden 1996; O'Clair et al. 1996; U.S. National Oceanic and Atmospheric Administration (NOAA) 1997 all in OOGRG 2004). Transportation of spilled oil was discussed in a recent environmental impact assessment for Cook Inlet, Alaska (OOGRG 2004). The assessment indicated that:

> If a spill >1,000 barrels did not strike shore first, 50% would remain after 30 days and would cover an area on the sea surface greater than 1,000 km^2. Spills <1,000 barrels would degrade in less than 10 days over about 50 km^2 (U.S. DOI 2002a in OOGRG 2004: 23).

Oil spills have been known to generate significant adverse effects on the marine environment. For example, as a result of the *Exxon Valdez* oil spill, "an estimated 2,800 sea otters, 250,000 birds, 1.9 million salmon, and 12.9 billion herring were killed" (Brown et al. 1996; Garrott et al. 1993 in Rice et al. 2000; Geiger et al. 1996; Piatt and Ford 1996 all in OOGRG 2004: 23). However, impacts of spills depend on several factors and this makes potential effects difficult to predict (OOGRG 2004). Furthermore, effects of oil spills on the marine environment are not adequately understood in the literature and largely depend on the characteristics of material spilled and the local marine environment (Strong et al. 2002; Wells et al. 1995 both in OOGRG 2004).

For example, hydrocarbon toxicity is one factor that contributes to the magnitude of oil spill impacts. Hydrocarbon toxicity refers specifically to the chemical composition of spilled material (OOGRG 2004). Once dissolved oil concentrations reach about 0.01 to 0.001 mg/L, impacts on the marine environment are likely to occur (Leonov 1999; Patin 1999 both in OOGRG 2004). As a result, areas in the vicinity of ports and marine traffic areas have elevated levels of toxic contaminates (OOGRG 2004).

Marine oil spill effects are also influenced by several biological factors. Significant impacts on birds, juvenile fish, larvae, and mollusks are generated, since these species typically live in risk areas, such as at the ocean surface, in intertidal zones, and in river estuaries (GESAMP 1993; Strong et al. 2002 both in OOGRG 2004). Other species are even more likely to be adversely affected, due to inability to detect pollution or to leave contaminated areas (OOGRG 2004). Marine organisms in early life stages in marine life are also at risk when an oil spill occurs (GESAMP 1993; Kovaleva and Mazmanidi 1978 in Leonov 1999 both in OOGRG 2004). OOGRG (2004) notes that "early life stages are up to 10 times as sensitive as adults to hydrocarbon pollution and are adversely affected at concentrations less than one part per billion (OOGRG 2004: 26).

Other factors that influence impacts of oil spills include spill size, location and timing, and ecological vulnerability (Burger 2003; U.S. National Academy of Sciences

(NAS) 2003b; Wiese and Montevecchi 2003 all in OOGRG 2004). In some cases, small spills may generate more significant environmental impacts than larger spills. For example, the *Braer* spill near the U.K. released almost 600,000 barrels, but only significantly affected gray seal populations (OOGRG 2004). However, the smaller *Exxon Valdez* spill caused significant mortality in numerous marine species (OOGRG 2004). Even small spills can have significant impacts. A recent analysis of potential impacts of a relatively small 1,500-barrel spill in Cook Inlet, Alaska, include:

- Water quality in the vicinity of the spill would be at chronic toxicity levels for up to 30 days;
- Up to 38 km of shoreline would be contaminated for up to a decade;
- Local intertidal and subtidal organisms would be affected for up to a year;
- Mortalities of some adults and millions of young fish would occur, and recovery could require multiple generations;
- Fish may also become tainted, resulting in closure of some or all of the affected fishery;
- Impacts to fish habitat would last for more than a decade due to resident oil;
- Tens of thousands of birds would be killed and recovery could take up to a few generations;
- Small numbers of resident marine mammals would be killed and recovery would be expected within five years; and
- A small number of terrestrial mammals would be killed with expected recovery within three years (U.S. DOI 2002a in OOGRG 2004: 26).

Assessing risks associated with oil spills must also take into account duration of environmental effects. While species generally recovered in approximately five years following the *Exxon Valdez* oil spill in Alaska, some researchers have suggested that oil spill effects may persist in the long term (OOGRG 2004). For example, "a number of species were still showing signs of serious impacts from the *Exxon Valdez* oil spill by 2003, 14 years after the spill" (Peterson et al. 2003 in OOGRG 2004: 27).

Duration of environmental effects is largely influenced by the ability of shoreline sediments to retain oil (OOGRG 2004). Hydrocarbons can be retained for long periods of time in shorelines with coarse materials such as gravel and cobbles (GESAMP 1993; U.S. NOAA 1997 both in OOGRG 2004). OOGRG (2004) explained oil can infiltrate coastal sediments up to 10 meters, while in other cases hydrocarbons may remain in the environment indefinitely. For example, one researcher "found that near surface marsh sediments in the eastern U.S. retained appreciable amounts of oil from a 1969 spill, and concluded that oil could persist indefinitely in the sedimentary record" (Reddy et al. 2002 in OOGRG 2004: 27).

As a result, oil spills have potential to generate significant long-term impacts on the marine environment. OOGRG (2004) explained that continued retention of oil in sediments:

> . . . allows for a long period of leaching of hydrocarbon compounds into the marine environment. In turn, weathering removes lighter aromatic fractions of hydrocarbons at a faster rate than heavier, more toxic fractions (Rice et al. 2000; Carls, Rice, and Hose 1999; Heintz, Short, and Rice 1999; Spies et al. 1996; GESAMP 1993). The end result is a long period of toxic contamination of marine ecosystems. In light of these facts, Strong et al. (2002) described the *Exxon Valdez* oil spill's legacy of impact as a transformation from a point source problem to a non-point source problem (27-28).

Oil spill remediation may be carried out in a variety of different ways. Surface spills may be controlled by using floating containment booms or by spraying chemicals over a spill to contain dispersion (OOGRG 2004). In addition, chemical dispersants may also be used prior to an oil spill event, by coating shorelines to minimize hydrocarbon adhesion (OOGRG 2004). Other spill clean-up techniques include use of oil-eating bacteria (also called bioremediation) and elimination of hydrocarbons through ignition (OOGRG 2004). However, oil spill remediation techniques are only partially effective. For example, one study found that only about 14% of oil spilled from the *Exxon Valdez* was recovered in 2.5 years following the accident (Spies et al. 1996 in OOGRG 2004). Other studies suggested that approximately 5-15% of spilled oil was recovered or cleaned-up (Holing 1990; Ocean Conservancy 2003 both in OOGRG 2004).

In addition, remediation measures can have numerous other impacts on marine environmental resources. Oil spill clean-up techniques may:

- Cause increased wildlife mortality, injure specific species, or hamper recovery of organisms;
- Negatively affect breeding patterns in birds and contribute to low survival rates;
- Generate adverse impacts on juvenile fish and eggs due to increases in toxicity as a result of chemical dispersant use; and
- Effect fur- or feather-bearing animals, by destroying insulation and water-repelling abilities due to application of chemical dispersants (OOGRG 2004).

3.4.5 Marine Oil Spill Prevention and Mitigation

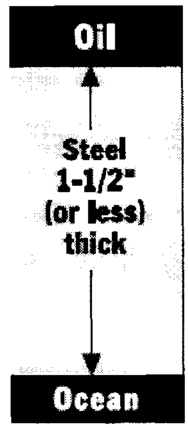
Risks associated with marine oil spills cannot be entirely eliminated, but several mitigation measures can be used to reduce such risks. Use of double hull tankers to transport crude oil is one of the most commonly suggested measures to decrease likelihood of an oil spill (fig. 3.4) (Anderson 1989; DF Dickins Associates Ltd. 1995). Replacement of existing tankers with double hull technology could result in a 50% reduction in the volume of oil spills as a result of tanker accidents (DF Dickins Associates Ltd. 1995). One study noted that approximately 80% of all crude oil carried through Puget Sound, the Juan de Fuca Strait, and B.C. coastal waterways is still transported in single-hulled vessels (DF Dickins Associates Ltd. 1995).

Tanker traffic management can also help prevent oil spills in the marine environment. Ship escorting measures, vessel traffic lanes, tanker exclusion zones, maximum transit speeds, and weather restrictions are commonly used (Anderson 1989; Merrick et al. 2002; U.S. DOI 1972, 2002). For example, tankers transporting oil to and from the Port of Valdez in Alaska are assisted by the Ship Escort/Response Vessel System (SERVS) (Merrick et al. 2002; U.S. DOI 2002). SERVS assists tankers from the Valdez Marine Terminal to international waters primarily through vessel escorts (Merrick et al. 2002; U.S. DOI 2002). U.S. DOI (2002) provided a brief description of the system:

> SERVS has nine vessels assigned to escorting, docking, and response duties, and at least two escort vessels are required for each laden tanker transiting the sound. Tethered escort is required through Valdez Narrows. In the northern sound, the escort vessels must be within one-quarter nautical mile of the tanker when not tethered. In the central sound, a conventional tug or a prevention and response tug must maintain close

escort, while the second escort vessel goes on sentinel duty to provide response coverage to a larger area (3.11-6).

Figure 3.4: Types of Tanker Designs

Tanker Design	Description
Single Bottom	• Single bottom tankers have only one layer of steel measuring 1.5 inches thick that separates oil from the ocean 
Double Bottom	• Two layers of steel on the bottom of the vessel • Experts have suggested that a double bottom on the *Exxon Valdez* could have reduced the amount of oil spilled
Mid-deck	• Mid-deck tankers have a single bottom but the oil tank is divided into an upper and a lower section • Tankers are designed with protective space along the sides of the vessel • Mid-deck tankers provide better protection than double hulls in collisions
Double Hull	• Double-hulled ships have double bottoms and double sides • Provides the most protection against spills • On a double-hull tanker, suggested space ratio is 1/15 of the width of the tanker all around or about seven to nine feet

Source: The Seattle Times in DF Dickins Associates Ltd. 1995

Vessel traffic lanes can be used to ensure safe separation distances between tankers that are in transit. In areas that are narrow or pose significant navigational safety risks, prohibition of two-way traffic may be used (Merrick et al. 2002; US DOI 1972, 2002). Tanker exclusion zones are also used to help reduce potential traffic conflicts between tankers and other marine vessels, such as in significant fishing areas (Anderson 1989). In addition, requirements for maximum transit speeds are used in certain areas to reduce potential for tanker accidents (U.S. DOI 2002). Regulations may also be used to restrict movement of tankers under certain weather conditions. For example, for tankers entering Prince William Sound in Alaska, the following weather restrictions with respect to wind speeds are applied:

- If winds are less than 30 knots, tankers may loiter in the Port of Valdez for up to three hours;
- The Port of Valdez and the Valdez Narrows are closed when wind speeds are over 40 knots;
- For tankers smaller than 150,000 DWT, a third escort vessel participates in outbound transits when wind speeds are greater than 30 knots (the speed at which transits for larger tankers are prohibited) (U.S. DOI 2002).

Development of oil spill and contingency plans is also important to outline policies and procedures for oil discharge prevention, control, containment, cleanup, and disposal (U.S. DOI 2002). Contingency plans typically address issues such as pollution prevention, inspection, and maintenance programs, history and analysis of known oil discharges, and proposed methods of detecting discharges (U.S. DOI 2002).

Other mitigation measures to prevent or reduce risks of oil spills as a result of tanker traffic include use of special navigational aids in sensitive areas; requirements for local pilots to negotiate difficult areas; and provision of adequate crew sizes with adequate skill sets to respond appropriately in emergency situations (Anderson 1989; Merrick et al. 2002; U.S. DOI 1972, 2002). Finally, should an oil spill occur as a result of a tanker casualty, emergency response measures should be in place to manage potential negative spill effects. Emergency response plans include:

- A checklist of immediate response and notification steps to be taken;
- A description of the spill reporting actions to be taken;
- Steps necessary to develop an incident-specific safety plan for conducting a response;
- A description of proposed initial response actions that may be taken, including procedures for transport of equipment, personnel, and other resources to the spill site; and
- Discharge containment, control, and cleanup actions to be taken (U.S. DOI 2002).

3.5 Conclusion

Development of pipeline, port, and tanker projects has potential to generate a number of negative environmental impacts. Construction and operation of pipelines may create adverse effects on physiography and soils; surface and ground water; air quality; noise; vegetation; wildlife; and fish and fish habitat. Adverse impacts on terrestrial and marine ecosystems may occur as a result of port development and operational activities, such as air pollution; water and contaminant discharges; dredged material and contaminated sediment disposal; ship and port solid waste generation; and oil spills. In addition, tankers have potential to severely damage the marine environment due to air pollution and ballast water discharge. However, the most significant potential impact is due to an accidental oil spill. While various measures can be taken to reduce the magnitude and frequency of spills, previous studies suggest that the risk of a catastrophic spill cannot be eliminated.

CHAPTER 4: SOCIOECONOMIC IMPACTS AND MITIGATION MEASURES

4.1 Overview

This chapter summarizes potential socioeconomic impacts of pipeline, port, and tanker projects, and measures to mitigate impacts. Information in this section was derived from government reports, socioeconomic impact assessments of similar projects, literature on impact and benefits agreements (IBAs), and other information sources provided by Enbridge.

4.2 Socioeconomic Impacts and Mitigation Measures

4.2.1 Employment and Economic Development

Pipeline, port, and tanker projects have potential to generate significant economic development impacts (Aboriginal Pipeline Group et al. 2003, 2004; B.C. Gas Utility Inc. 1998; Canada NEB 1996, 1998, 2003a; Dixon 1978; EnCana Ekwan Pipeline Inc. 2003; Salmo Consulting Inc. 1999; Thompson 1978; U.S. DOI 1972, 2002; Yukon Department of Energy, Mines and Resources 2002). However, when assessing these potential impacts, two points must be considered. First, development of a project must take into account more than simply economic growth. Justification of a resource development project must also include a cost-benefit study, to assess whether benefits of project development outweigh costs (OOGRG 2004). Second, economic impacts of projects are often overstated, due to an assumption "that the capital and labor used in a project would otherwise not be employed; thus gross impacts instead of net impacts are forecast" (OOGRG 2004: 49).

Pipeline, port and tanker projects can generate positive effects on the regional economy through direct investment in the project and through the generation of secondary or "multiplier effects". OOGRG (2004) explained multiplier effects in the following manner:

> Potential multiplier effects can be divided into four categories: forward linkages involving processing of natural resources prior to export; backward linkages involving production of inputs such as resource machinery and transportation infrastructure required to extract oil and gas; final demand linkages involving production of consumer goods and services to meet the regional needs of those employed in the oil and gas sector; and fiscal linkages involving the expenditure of rents and profits generated by oil and gas. Backward and forward linkages are sometimes classified as indirect impacts, and final demand and fiscal linkages as induced impacts (49).

Direct, indirect, and induced economic and employment effects may be generated from a variety of activities during construction and operation of pipeline, port, and tanker projects. The most obvious regional economic effects include potential to increase direct and indirect business opportunities and regional incomes, diversification or expansion of the local economic base, and generation of taxes and royalties for government (Cocklin and Kelly 1992; Detomasi 1997; Dixon 1978; Hua 1985; Yamaguchi and Kuczek 1984). During construction and operation, employment effects typically result from:

- Capital expenditures for contract services, supplies, and materials for pipeline and port development;
- Construction mobilization, pipeline ROW slashing and clearing, timber salvage and hauling, and pipeline installation;
- Construction camp set up and operation, including management, clerical, maintenance, kitchen, catering, and camp attendant jobs;
- Employment needs for port and tanker facilities and operations; and
- Other employment needs, such as environmental and heritage resources field assistants and construction inspectors (Aboriginal Pipeline Group et al. 2004; EnCana Ekwan Pipeline Inc. 2003; Salmo Consulting Inc. 1999; Thompson 1978; U.S. DOI 1972, 2002).

In addition, local and regional business opportunities during project construction and operation may also be generated. Potential business opportunities include ROW surveying; horizontal drilling at watercourse crossings; timber salvage and hauling; fuel distribution; industrial hardware; welding supplies and services; passenger and freight transportation; telecommunication supplies; waste storage removal and disposal; and heavy equipment parts, supplies, repair, and cleaning (EnCana Ekwan Pipeline Inc. 2003; Salmo Consulting Inc. 1999).

While pipeline, port, and tanker projects may create economic and employment opportunities, projects may also generate negative impacts. Resource megaprojects typically generate significant short-term employment during development and construction phases that disappears once the project is operational (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Inc. 1998; Cocklin and Kelly 1992; Detomasi 1997; Dixon 1978; EnCana Ekwan Pipeline Inc. 2003; Hua 1985; Salmo Consulting Inc. 1999; Yamaguchi and Kuczek 1984; Yukon Department of Energy, Mines and Resources 2002). The large increase in construction phase employment creates a temporary population increase followed by a sharp population decline once the project construction period ends (Cocklin and Kelly 1992; Detomasi 1997; Hua 1985; Yamaguchi and Kuczek 1984).

This trend is commonly referred to in the literature as the boom-town phenomenon where an existing community "experiences a period of extraordinary growth and expects a period of rapid decline as the project is phased out" (Hua 1985: 216). During boom periods, population increases are driven by an influx of migrants looking for project-related employment. This rapid growth can cause numerous negative effects on local communities, such as inflation, social upheaval, unrealistic expectations for future growth, excess investment in project expansion, and housing shortages (Cocklin and Kelly 1992; Detomasi 1997; Hua 1985; OOGRG 2004; Yamaguchi and Kuczek 1984).

In addition, employment opportunities generated by large-scale projects largely accrue to in-migrants. In-migrant workers typically possess necessary project employment skills, while local and Aboriginal people are rarely employed due to mismatches between employment requirements and local skills, lack of training, or unwillingness to work on project activities (Cocklin and Kelly 1992; Detomasi 1997; Dixon 1978; Hua 1985; Kennett 1999; Yamaguchi and Kuczek 1984). For example, a recent impact assessment of the Mackenzie Valley pipeline in the Northwest Territories concluded that:

> Project construction will require a large workforce with a variety of skills, and most of the construction work will take place during four brief winter construction months. Given the construction scenario and the capacity limitations of the available Northwest Territories labour force, many of the required skills will not be readily available in the regions. As a result, most of the required project labour will have to be brought in from outside the Northwest Territories (Aboriginal Pipeline Group et al. 2004: 6-4).

Furthermore, Aboriginal people may prefer existing economic and cultural conditions in the community, such as maintaining traditional hunting and fishing economies, which further decreases participation in project-related wage employment (Cocklin and Kelly 1992; Detomasi 1997; Hua 1985; Kennett 1999; Yamaguchi and Kuczek 1984). In some cases, local unemployment may increase as a result of a large-scale project, since prospective in-migrants may be unsuccessful at finding jobs (Cocklin and Kelly 1992; Detomasi 1997; Hua 1985; Kennett 1999; Yamaguchi and Kuczek 1984).

Regional economic multiplier impacts of oil and gas projects are often limited. Due to the highly technical and specialized nature of production processes, equipment and materials needed for development of projects are often produced in other areas, thus minimizing backward linkages (OOGRG 2004). For example, one report indicates that only 0.26 additional jobs as a result of backward linkages are created for each job generated in the oil and gas industry in northeast B.C. (B.C. Stats 2004a in OOGRG 2004). Furthermore, OOGRG (2004) indicated that forward linkages, including oil and gas processing and refining, are limited since many of these activities are undertaken in other regions. In terms of final demand linkages, OOGRG (2004) noted the following:

> Final demand linkages are determined by the income and expenditure patterns of oil and gas employees. Estimates for northeast B.C. indicate that each job in the oil and gas sector generates an additional 0.31 jobs to provide goods and services to workers (B.C. Stats 2004a). When combined with indirect impacts based on backward linkages, each job in the oil and gas sector generates an additional 0.57 jobs in the region (53).

Large-scale resource projects also can create inflation effects. Increased demand due to the rapid influx of workers to local communities can create shortages of key goods and services (Cocklin and Kelly 1992; Detomasi 1997; Dixon 1978; Hua 1985; Yamaguchi and Kuczek 1984). Shortages, in turn, generate price inflation that decreases real income of local residents. For example, rapid growth in a community typically may cause inflation in housing prices, accommodations, and rents, leading to displacement of low-income tenants, an unsustainable real estate market, and an oversupply of housing after the construction period ends (Cocklin and Kelly 1992; Detomasi 1997; Dixon 1978; Hua 1985; Yamaguchi and Kuczek 1984).

To ensure that local and regional communities benefit from development projects, a variety of mitigation measures may be used (Aboriginal Pipeline Group et al. 2003, 2004; B.C. Gas Utility Inc. 1998; Canada NEB 2003a; EnCana Ekwan Pipeline Inc. 2003; Salmo Consulting Inc. 1999; U.S. DOI 2002; Yukon Department of Energy, Mines and Resources 2002; Zanasi and Taggart 2002). The most commonly used mitigation tools are IBAs and procurement plans (Aboriginal Pipeline Group et al. 2004; Kennett 1999; Zanasi and Taggart 2002). IBAs are used to ensure that local residents and communities have the opportunity to obtain benefits from resource development projects that occur in their region (Kennett 1999). The purpose and content of IBAs are discussed later in this chapter.

4.2.2 Demography

As discussed in the previous section, economic benefits resulting from project development may affect regional and community population levels (Aboriginal Pipeline Group et al. 2004; Dixon 1978; EnCana Ekwan Pipeline Inc. 2003). Most aspects of project construction and operation generate demands for labor and local business opportunities, which may encourage in-migration to communities where project activities occur (Aboriginal Pipeline Group et al. 2004). Increases in population, in turn, have the potential to create adverse effects on community infrastructure and services (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; Canada NEB 1998; Dixon 1978; EnCana Ekwan Pipeline Inc. 2003; Salmo Consulting Inc. 1999).

Mitigation measures have been used to address issues of demographic change. For example, to address issues of in-migration in the Northwest Territories as a result of the development of the Mackenzie Valley pipeline, project developers have proposed the following measures:

- Meeting employment demands through local and regional hiring of Aboriginal and non-Aboriginal residents, where possible;
- Implementing a Northern Procurement Plan and an Education, Training and Employment Program to reduce in-migration of southern workers; and
- Requiring that Human Resources Skills Development Canada indicate that only qualified people who have lived in the North for at least one year and have a Northwest Territories medical card will be eligible for direct project hiring (Aboriginal Pipeline Group et al. 2004).

However, project proponents have indicated that these measures may be only partially effective and that demographic effects are difficult to predict. The study concluded "the inherently uncertain nature of speculative in-migration makes construction-effect predictions subject to a relatively low level of confidence" (Aboriginal Pipeline Group et al. 2004: 6-11). Demographic effects of operational employment are easier to assess, since estimates "are based on more reliable predictions of migrant response to longer-term and more stable economic conditions" (Aboriginal Pipeline Group et al. 2004: 6-11).

4.2.3 Infrastructure

Pipeline, port, and tanker projects also have potential to generate adverse effects on regional transportation infrastructure, energy, and utilities infrastructure, housing, and recreation resources. Impacts on transportation infrastructure generally occur during project construction phases, as increased demands are placed on highways, railways, and air transportation services (Aboriginal Pipeline Group et al. 2003, 2004; B.C. Gas Utility Ltd. 1998; Dixon 1978; EnCana Ekwan Pipeline Inc. 2003). Adverse effects on energy and utilities infrastructure in communities may be generated as a result of worker in-migration (Aboriginal Pipeline Group et al. 2004). Increases in population in certain communities may result in increased demand on water treatment, sewage, and solid waste treatment and disposal, and power supplies (Aboriginal Pipeline Group et al. 2004; Dixon 1978).

While construction camps normally address issues related to short-term accommodation for direct hires, demand for housing in communities may still be affected as a result of in-migrants seeking indirect and induced employment opportunities (Aboriginal Pipeline Group et al. 2004). Recreation resources in regional centers may also be adversely affected, since in-migration could potentially increase demand for recreation complexes and other facilities (Aboriginal Pipeline Group et al. 2004). Adverse effects on infrastructure may be reduced by:

- Developing traffic mitigation plans and implementing timely maintenance and repairs to roads and highways damaged by heavy project traffic;
- Chartering planes to avoid crowding travelers not related to project construction or operations;
- Developing programs to encourage local hiring to reduce effects of in-migration on housing and other community infrastructure;
- Developing self-contained camps and temporary infrastructure for construction workers; and
- Increasing recreation fees for project employees and ensuring that employee recreation needs are met to the greatest possible extent at construction camps (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; EnCana Ekwan Pipeline Inc. 2003).

4.2.4 Individual, Family and Community Wellness

Adverse impacts on individual, family and community wellness may also result from development of oil and gas projects (Aboriginal Pipeline Group et al. 2003, 2004; B.C. Gas Utility Ltd. 1998; EnCana Ekwan Pipeline Inc. 2003). The term wellness is used to describe physical, emotional, and mental health characteristics, as well as the quality of relationships in a given population (Aboriginal Pipeline Group et al. 2004). Oil and gas projects have potential to negatively affect a variety of attributes related to community wellness, including:

- Individual, family, and community well-being and the delivery of social services;

- Current physical and mental health conditions, and health care services;
- Protection and policing services; and
- Education attainment, facilities, and services (Aboriginal Pipeline Group et al. 2004).

Potential project effects on wellness and delivery of social services occur as a result of increased local earnings and disposable incomes (Aboriginal Pipeline Group et al. 2004). In some instances, increased consumption of alcohol and other related problems may occur as a result of increased income levels in northern communities (Aboriginal Pipeline Group et al. 2004). Such problems, in turn, place increased demands on social, police, and ambulance services in order to address issues related to substance abuse and violence (Aboriginal Pipeline Group et al. 2004).

Community health conditions may improve as a result of project development, since potential employment opportunities and increased income levels may lead to improved diets, clothing, and housing arrangements (Aboriginal Pipeline Group et al. 2004). However, negative impacts on community health may include social tension between project workers and local residents, potential exposure to contagious diseases and sexually transmitted infections, and injuries related to alcohol abuse (Aboriginal Pipeline Group et al. 2004). Education attainment and services may also be affected by oil and gas projects, largely during construction. For example, adolescents may leave school early to obtain project-related jobs, residents may return to school for employment training, and children of in-migrants could increase regional enrollment demands (Aboriginal Pipeline Group et al. 2004).

Mitigation measures to reduce potential impacts of project development on community wellness include enforcing alcohol-free construction camps and workplaces; implementing alcohol abuse prevention programs; developing community-based programs in financial management; designing project health and work environment guidelines; and working closely with local police, ambulance, and fire services to identify and address issues (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; EnCana Ekwan Pipeline Inc. 2003).

4.2.5 Traditional Aboriginal Use and Culture

Oil and gas projects may impact traditional Aboriginal use and culture (Aboriginal Pipeline Group et al. 2003, 2004; Canada NEB 1998, 2003a; Mackenzie Valley Pipeline Inquiry (MVPI) 1977; Salmo Consulting Inc. 1999; Thompson 1978; U.S. DOI 1972). First Nations often rely on land and resources for traditional purposes such as harvesting berries, medicinal plants, food, firewood, and other special plants and woods at traditional sites (Canada NEB 2003a). First Nations also rely on fishing and other marine resources, as well as hunting and trapping for subsistence (Aboriginal Pipeline Group et al. 2004; Canada NEB 2003a; MVPI 1977; OOGRG 2004; Thompson 1978; U.S. DOI 1972). Oil and gas development projects have potential to generate significant adverse effects on traditional Aboriginal land use and culture due to potential environmental impacts on various ecosystems components as discussed previously in this report and interaction between Aboriginals and non-Aboriginals (Aboriginal Pipeline Group et al. 2004; Canada NEB 2003a; MVPI 1977; OOGRG 2004; Thompson 1978; U.S. DOI 1972).

Interactions between Aboriginals and non-Aboriginals may result in negative impacts on retention of traditional language and identification with traditional culture (Aboriginal Pipeline Group et al. 2004). For example, the impact assessment of the Mackenzie Valley pipeline characterized potential impacts as a result of relationships between Aboriginals and non-Aboriginals as follows:

> Project employment could jeopardize harvester lore and disciplines by bringing Aboriginal and non-Aboriginal workers together on the job, and by pre-empting harvesting activities, because of time needed for long-rotation employment cycles. Some Aboriginal people might experience the paid work more rewarding than harvesting, promoting interest in a southern lifestyle (Aboriginal Pipeline Group et al. 2004: 6-29).

Furthermore, as discussed previously in this chapter, pipeline, port, and tanker projects increase potential risks of oil spills in terrestrial and marine environments. Previous studies indicate that subsistence harvesting forms an important component of the socioeconomic health of the North Coast region (OOGRG 2004). However, after the *Exxon Valdez* oil spill, subsistence practices in the region were heavily affected. A recent report indicated "after the Exxon Valdez spill in 1989, harvests in affected areas declined by 9-77% and the number of households sharing wild food resources fell significantly" (Fall and Utermohle 1995 in OOGRG 2004: 64). While initial declines in harvesting were the result of oil contamination, harvests remained low and continued to decline in some areas (Fall and Utermohle 1995 in OOGRG 2004). Other issues with respect to the impact of the *Exxon Valdez* spill on traditional culture included declining childhood education in traditional harvesting methods, increased costs of harvesting, and other negative impacts on community health (Fall and Utermohle 1995 in OOGRG 2004).

Mitigation strategies to minimize project effects on traditional Aboriginal use and culture may involve:

- Negotiating IBAs to include provisions addressing cross-cultural issues and protection of cultural resources and areas of cultural significance;
- Undertaking traditional land use studies and implementing study recommendations;
- Developing compensation agreements to address issues related to oil spills in terrestrial and marine environments; and
- Restricting construction personnel from engaging in hunting, fishing, and other harvesting practices while at job sites (Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; EnCana Ekwan Pipeline Inc. 2003; International Petroleum Industry Environmental Conservation Association (IPIECA) and ITOPF 2004; Kennett 1999; Zanasi and Taggart 2002).

4.2.6 Impacts on Other Sectors of the Economy

Potential impacts on other economic sectors as a result of pipeline, port, and tanker projects may also be significant. Adverse effects may be generated on other land and resource use interests including forestry, mining, agriculture, commercial fishing, recreation, tourism, and protected areas (Aboriginal Pipeline Group et al. 2003, 2004; Canada NEB 1996, 1998, 2003a; Salmo Consulting Inc. 1999; Thompson 1978; U.S. DOI 1972, 2002). For example, pipeline development has potential to decrease land available for timber harvesting, disrupt existing forest industry practices, and contribute to the direct loss of timber resources (Aboriginal Pipeline Group et al. 2004). However, several studies indicate that oil and gas projects may cause the most severe damage to commercial fisheries and tourism resources (OOGRG 2004; Thompson 1978; U.S. DOI 1972).

Commercial fishing on the north coast of B.C. is a significant contributor to the local economy. A recent report indicates that fishing and trapping activities directly and indirectly account for 9% and 6% of total employment in the regions of Skeena-Queen Charlotte and Mount Waddington respectively (B.C. Stats 2004c in OOGRG 2004). Therefore, negative effects on the regional economy are likely to be generated if an oil spill were to adversely affect fish populations. OOGRG (2004) summarized the importance of commercial fishing to the region:

> The QCB is an important spawning and migratory habitat for a number of commercially important fish stocks including sockeye, Chinook, Coho, pink, chum, steelhead, Pacific hake, Pacific cod, walleye Pollock, lingcod, sablefish, spiny dogfish, numerous species of rockfish, sole, herring, sand lance, and eulachon (RSC 2004). The commercial fishing industry operating out of Prince Rupert employs an estimated 2,400 workers using over 700 vessels and 11 processing plants (Prince Rupert Community Profile 2001 in RSC 2004). According to the Terrace Economic Development Authority (TEDA), annual income from the fishery is estimated to be around $150 million (TEDA no date in RSC 2004) (63).

Furthermore, negative impacts on the fishing industry may also be generated as a result of tanker traffic. Tanker traffic has potential to restrict access to fishing grounds, cause damage to vessels and gear, alter fish migration, and increase stock mortality (Canada 1978; OOGRG 2004; Thompson 1978; U.S. DOI 1972). For example, in Prince William Sound, Alaska, a recent tanker risk analysis study determined that a significant number of collisions occur between tankers and fishing vessels near ports (Merrick et al. 2002).

The tourism sector may also be negatively affected as a result on large-scale resource projects. OOGRG (2004) characterized the importance of tourism to the north coast region of B.C.:

> In 1998, tourism created 113,000 direct jobs in B.C. of which an estimated 13,000 were in ecotourism (Clover Point Cartographics Ltd. 2000). In the Skeena-Queen Charlotte, Mount Waddington, and Kitimat-Stikine

> regions, tourism directly and indirectly accounts for 7%, 8%, and 5% of employment respectively (B.C. Stats 2004c) (61).

In regions where traditional resource industries are in decline, tourism has potential to contribute to economic development and diversification (OOGRG 2004). However, the tourism sector may experience periods of decline due to environmental degradation, including oil spills, as a result of the development of large-scale resource projects (OOGRG 2004; Thompson 1978; U.S. DOI 2002). Project development may also result in decreases in the available land base for tourism and outdoor recreation activities, as well as changes to the quality of tourism and recreation activities (Aboriginal Pipeline Group et al. 2004).

In addition, inflation effects may create negative impacts on the tourism industry. Due to an influx of migrants seeking project employment, increased demand for housing and accommodation often leads to inflated prices (Cocklin and Kelly 1992; Detomasi 1997; Hua 1985; Yamaguchi and Kuczek 1984). Since the tourism and recreation industry relies heavily on the accommodations sector, increased accommodation cost during project development may undermine the tourist sector.

Labor needs of resource megaprojects and higher wages may attract workers from other sectors. Yamaguchi and Kuczek (1984) described this trend in the following manner:

> Despite the limited use generally made of local labour in operating an energy project, the construction phase of a project will normally require unskilled labour which will be attracted from other local industries or from agriculture, which are often unable to compete with the wages being offered (155).

Recruitment of labor from other sectors of the economy for large-scale resource projects could contribute to economic decline in other sectors unable to compete for labor. These sectors may suffer permanent damage and may have difficulty recovering when the construction phase of the project is over and the labour shortage eases.

Mitigating such impacts involves negotiating IBAs with potentially affected resource users, developing compensation programs for losses to fishers, developing and adhering to all applicable land use plans and regulations, and engaging in multi-stakeholder monitoring programs to identify and address issues (Aboriginal Pipeline Group et al. 2004; Canada NEB 2003a; Kennett 1999; OOGRG 2004).

4.2.7 Heritage and Archaeological Resources

Heritage and archaeological resources may exist on the surface or underground in terrestrial environments and underwater in marine environments (Aboriginal Pipeline Group et al. 2004). These nonrenewable resources are highly susceptible to damage or loss as a result of activities disturbing land and marine systems. Heritage and archaeological resources include culturally or spiritually sensitive areas, culturally modified trees, historic sites and cabins, heritage trails, and burial sites (Aboriginal Pipeline Group et al. 2004; Canada NEB 2003a; EnCana Ekwan Pipeline Inc. 2003; Salmo Consulting Inc. 1999). Potential adverse effects on heritage and archaeological resources typically occur during pipeline construction due to high levels of disturbance, but may also occur as a result of operational activities occurring in the marine environment (Aboriginal Pipeline Group et al. 2004; Canada NEB 2003a; EnCana Ekwan Pipeline Inc. 2003; Salmo Consulting Inc. 1999; Thompson 1978).

Mitigation measures that may be used to reduce potential impacts on heritage and archaeological resources include:

- Conducting heritage and archaeological impact assessment studies, both terrestrial and marine, and traditional use studies to identify resources and record sites;
- Developing heritage resources management plans;
- Adjusting pipeline and tanker routes to avoid significant areas and sites; and
- Collecting and excavating archaeological resources and cultural material according to approved plans (Aboriginal Pipeline Group et al. 2004; Canada NEB 2003a; EnCana Ekwan Pipeline Inc. 2003; Salmo Consulting Inc. 1999).

4.3 Impact and Benefits Agreements (IBAs)

4.3.1 Purpose and Use of IBAs

IBAs have emerged as the primary mitigation tool used by project proponents, governments, and First Nations to establish formal long-term relationships with respect to large-scale resource development projects (Keeping 1998, 1999; Kennett 1999; National Round Table on Environment and Economy (NRTEE) 2001; O'Reilly and Eacott 1998; Sosa and Keenan 2001). According to Kennett (1999), IBAs have two main purposes:

> First, they are intended to address the concerns of aboriginal people and other local residents regarding the adverse effects that large-scale mineral development may have on their communities, culture, way of life, natural environment and land-based economic activities. Second, IBAs are intended to ensure that local people and communities have the opportunity to obtain both short-term and long-term benefits from mineral development occurring in their region (1).

The emergence of IBAs has been largely a result of mineral development in northern Canada (Keeping 1998, 1999; Kennett 1999; NRTEE 2001; O'Reilly and Eacott 1998; Sosa and Keenan 2001). Kennett (1999) noted that IBAs have been used in many mining projects in remote Canadian regions, such as the Diavik and Ekati diamond mines in the Northwest Territories and the Inco nickel mine in Voisey's Bay, Labrador. While IBAs are frequently used for large-scale mining projects, such agreements are a useful mitigation tool for other large resource development projects, such as oil and gas activities (Keeping 1999; NRTEE 2001; O'Reilly and Eacott 1998).

Kennett (1999) completed a comprehensive review of IBAs initiated and developed in Canada and the U.S. over a period of approximately 25 years. Kennett (1999) noted that while the earliest IBAs existed as agreements between resource development companies and government, more recent agreements have involved direct participation of First Nations at negotiating tables (Kennett 1999). Keeping (1998) noted that direct involvement of First Nations in IBAs was not surprising, since "increasingly Aboriginal communities are expected to protect their own interests through direct negotiations with resource development companies" (5). Sosa and Keenan (2001) argued that increasing Aboriginal involvement in IBA negotiation has been largely a result of judicial and political recognition of Aboriginal rights and title, as well as the increasing number of settled land claims requiring negotiation of IBAs prior to the development of resource projects.

While government has traditionally played a role in IBA development, Kennett (1999) noted that in some cases IBAs have been completed without government playing any direct role in the negotiations. The author suggested that this trend can be explained by:

> . . . the strengthened bargaining power of many aboriginal organizations, the greater expertise and financial resources that they have available, an unwillingness of aboriginal people to rely on government to protect their interests, and increasing recognition of the direct benefits that a successful IBA can bring to aboriginal communities (Kennett 1999: 29).

However, even if governments do not participate in actual IBA negotiations, they still have an important role to play. Kennett (1999) explained six ways in which government may be involved in development of IBAs:

- Government may require negotiation of IBAs prior to approval of a resource development project;
- Government may play a critical role in determining the incentive structure for IBAs and bargaining powers of each party, even when IBAs are not formally required;
- Government may provide guidance, for example in terms of identifying Aboriginal issues in the project development area and support in terms of financial resources for Aboriginal participation to IBA negotiation processes;
- Government may be involved in designing and implementing programs that have been included in IBAs;
- Government may be involved in other initiatives or processes that are related to IBA negotiation processes, such as EA processes; and
- Government may be involved in broader public policy issues with respect to IBAs, such as environmental, socioeconomic, and fiscal implications of such agreements.

4.3.2 Content of IBAs

Over the past decade, IBAs have become increasingly comprehensive. Two trends are noteworthy with respect to IBA content. First, IBAs are increasingly being used to address a broad range of resource management issues. In the 1970s and 1980s, IBAs typically focused only on socioeconomic issues, such as employment, training, and business opportunities (Keeping 1998; Kennett 1999; O'Reilly and Eacott 1998; Sosa and Keenan 2001). More recent IBAs have addressed a broader range of matters, including, environmental protection; compensation; traditional economic activities; social and cultural programs; revenue sharing provisions; dispute resolution mechanisms; and implementation and monitoring of agreements (Keeping 1998; Kennett 1999; O'Reilly and Eacott 1998; Sosa and Keenan 2001).

Second, earlier agreements included only general provisions for implementation of training programs, need for Aboriginal employment, and promotion of contracting opportunities for Aboriginal businesses (Kennett 1999). Recent IBAs set out detailed commitments, targets, and procedures with respect to Aboriginal employment, contracting opportunities, environmental restrictions, and other matters (Keeping 1998; Kennett 1999; O'Reilly and Eacott 1998; Sosa and Keenan 2001). For example, Kennett (1999) noted "one recent agreement establishes a formal procedure for rating the Aboriginal content of contract bids and factoring that rating into the competitive bidding process" (38).

The structure of an IBA is divided into seven broad categories: introductory provisions; employment and training; economic development and business opportunities; social cultural and community support; financial and equity provisions; environmental and cultural resources; and other substantive and procedural provisions (table 4.1) (Kennett 1999).

The first section of an IBA includes a number of introductory provisions related to context of the agreement and relationships between the parties involved (Kennett 1999). The content of the introduction includes topics such as purpose, goals, and objectives of the IBA and of parties involved; a description of the resource development project; definitions; and other provisions that are usually part of formal contracts are addressed (Kennett 1999).

The second section typically addresses employment and training, often considered the most important part of the IBA (Keeping 1998; Kennett 1999; O'Reilly and Eacott 1998; Sosa and Keenan 2001). However, for IBAs to be successful, they must include more than general provisions with respect to local and Aboriginal employment opportunities. Indeed, Kennett (1999) stated that "specific measures are often required to prepare potential employees for work at the mining project, facilitate their recruitment when positions become available, and retain employees over the long term once they have joined the workforce" (47). Accordingly, this IBA section addresses issues such as recruitment and hiring; training; contracting and subcontracting; apprenticeship and educational programs; as well as formulation of labor development plans (Kennett 1999). Some IBAs may also include establishment of an Aboriginal employment coordinator, or a committee on employment opportunities, and issues to further the involvement of Aboriginal people in project development workforces (Kennett 1999).

Table 4.1: The Content of IBAs

Category	Topics Addressed
Introductory Provisions	- Purpose of agreement, definitions, identification of parties involved, term of the agreement, description of the project, project phases, and Aboriginal support for the project
Employment and Training	- Employment opportunities and labor supply, formulation of labor development plans, and establishment of an Aboriginal employment coordinator and/or committee on employment opportunities and issues - Recruitment and hiring, training, contracting and subcontracting, apprenticeship programs, educational programs, employee evaluation and advancement, labor relations, transportation, work site conditions, counseling and employee support, and cross-cultural issues
Economic Development and Business Opportunities	- Businesses and business opportunities, and establishment of a committee on economic and business development - Preferences for Aboriginal businesses, procedures for securing contract goods and services, monitoring of contracting, assistance for local business development, research and development, and right of first refusal on surplus project equipment and property
Social, Cultural and Community Support	- Communication and consultation, social and community assistance, community projects and physical infrastructure, Aboriginal cultural and economic activities, and monitoring of social impacts
Financial and Equity Provisions	- Fixed and variable cash payments, development and remedial funds, inflation adjustments, tax implications, compensation, equity interests and joint ventures, and IBA expenses related to administration, management, negotiation, and implementation costs
Environmental and Cultural Resources	- Environmental compliance, protection, and monitoring, abandonment and reclamation, and protection of cultural resources and areas
Other Substantive and Procedural Provisions	- Provisions regarding amendment and renegotiation of the IBA, potential project expansion, confidentiality and release of information, establishment of an implementation committee, annual reporting, evaluation of the agreement, dispute resolution mechanisms, enforcement, and remedies

Source: Keeping 1998; Kennett 1999; O'Reilly and Eacott 1998; Sosa and Keenan 2001

The third section of an IBA addresses local and Aboriginal economic development and business opportunities (Kennett 1999). The objectives of this section of the IBA are "to ensure that aboriginal people have an opportunity, where possible, to provide goods and services to the mining project on a contract basis and that these contractual arrangements also meet the business needs of the mining company" (Kennett 1999: 65). In the fourth section, positive and negative impacts on social and cultural characteristics of Aboriginal communities are addressed. This section focuses on provisions for ongoing communication and consultation between parties; social and community assistance; traditional cultural and economic activities; and monitoring of social impacts (Kennett 1999). Furthermore, Kennett (1999) noted that this section of the IBA is intended to address "the stresses associated with the entry of aboriginal people into the wage economy and the social and family disruptions that may result from the absences required by the project work rotations" (77).

IBAs may contain a number of financial and equity provisions, depending on the nature of Aboriginal resource ownership and rights. If Aboriginal groups have property rights, IBAs may include royalty and rental payments from project developers (Kennett 1999). Aboriginal groups may also use IBAs to set out specific provisions with respect to fixed and variable cash payments from development companies; compensation as a result of project impacts; equity interests and joint ventures; and reimbursement of expenses related to IBA negotiation and implementation (Kennett 1999).

IBAs may also be used to address a variety of concerns with respect to environmental and cultural resources. While potential environmental and cultural impacts of proposed projects may be addressed through regulatory and approvals processes, some IBAs address these issues specifically (Kennett 1999). Accordingly, the sixth section of an IBA may include provisions for environmental compliance, protection, and monitoring; compensation for disruption of Aboriginal harvesting and for damage to wildlife or wildlife habitat; and protection of cultural resources and significant areas (Kennett 1999). Finally, IBAs may also include other substantive and procedural matters, such as provisions for implementation; dispute resolution mechanisms; evaluation of an agreement, and enforcement (Kennett 1999). The purposes of these IBA sections are to ensure "that the parties' expectations are met and that the agreement serves the needs of all parties over the long term" (97).

4.3.3 Limits of IBAs: Legal and Regulatory Considerations

A number of legal and regulatory issues with respect to IBAs are also important. While IBAs appear to be legally binding contracts between parties, IBAs and standard commercial contracts have different characteristics (Keeping 1998, 1999; Kennett 1999; O'Reilly and Eacott 1998; Sosa and Keenan 2001). First, IBAs often use qualified and ambiguous language that may not be clear or enforceable (Kennett 1999; O'Reilly and Eacott 1998). As Kennett (1999) stated:

> For example, commitments to hire or train local people are often phrased in terms of target numbers or 'best efforts' undertakings. Likewise, provisions regarding contracting to local businesses almost invariably provide that the final decision on individual contracts remains with the mining company. The result of these qualifications is that failure to meet the specified employment or contracting target may not constitute a formal breach of the agreement for which a legal remedy may be obtained" (25).

Therefore, due to ambiguous and qualified language, certain aspects of IBAs may not be enforceable and parties may not be able to ensure compliance through court processes (Kennett 1999; O'Reilly and Eacott 1998).

Second, IBAs are typically used to establish long-term relationships between resource development companies, government, and/or Aboriginal groups. To this end, resorting to court processes to enforce agreements may not be in the best interests of parties involved (Kennett 1999). While legal mechanisms may be useful in certain instances to ensure compliance or to interpret specific provisions of the agreement, Kennett (1999) suggested that "if the parties have reached a point where litigation is the only option, a legal remedy may be of little assistance in reestablishing the cooperative relationship that is necessary for the IBA to achieve its broader objectives" (26).

Finally, IBAs are often labeled as "hybrid agreements" in the sense that they incorporate both contractual provisions and regulatory requirements (Kennett 1999). Even though such agreements may be considered as private contracts between parties, IBAs often contain regulatory and policy requirements based on direction provided by government authorities (Kennett 1999). Indeed, government may use IBAs as a method of establishing regulatory and policy requirements that a resource project must meet to obtain necessary approvals (Kennett 1999). In essence, as Kennett (1999) concluded, "the point is simply that it is probably naïve in most situations to characterize IBAs merely as private contracts, the pure product of an exchange of value between the parties and having few if any implications for broader policy issues" (27).

Other legal and regulatory issues with respect to IBAs that must be considered prior to engaging in negotiation processes, include:

- Requirements for IBAs differ according to location of resource development projects. IBAs are legally required or strongly encouraged by government in certain jurisdictions, but not in others. For example, in areas where comprehensive land claims have been settled, such as in Nunavut and the Northwest Territories, negotiation and implementation of IBAs may be required (Kennett 1999; O'Reilly and Eacott 1998).

- When land claims are outstanding, there are few, if any, legal requirements for IBAs (Keeping 1999; O'Reilly and Eacott 1998; Sosa and Keenan 2001).

- IBA clauses with respect to confidentiality and release of information should be approached with caution. Such clauses limit rights of Aboriginal groups and render IBAs unavailable for public review (Kennett 1999; O'Reilly and Eacott 1998).

- IBA clauses with respect to Aboriginal support for resource development projects must also be considered. Such provisions typically require that Aboriginal groups refrain from objecting to project approvals in exchange for project benefits. Ideally, such clauses should not be included in IBAs (Keeping 1999; O'Reilly and Eacott 1998).

4.3.4 Implementation and Enforcement

Implementation and enforcement of IBAs are key to their success. Keeping (1998) identified conditions for successful implementation of IBAs as follows:

- Agreements must be enforceable to ensure that resource development companies follow through with commitments and to satisfy expectations of local and Aboriginal people;

- Parties involved must build and maintain a constructive relationship;

- Government must support IBA negotiation and implementation processes through legislation and regulations;
- Parties must be clear on purposes and objectives of IBAs;
- IBAs should use clear, simple, and unambiguous language; and
- Agreements should include monitoring and evaluation provisions.

Furthermore, Sosa and Keenan (2001) made a number of recommendations for First Nations with respect to IBA negotiation and implementation. First Nations involved in such processes should:

- Form a good negotiation team and secure funding for IBA processes;
- Develop a good negotiation plan in consultation with Aboriginal people in the community;
- Establish cooperation principles between parties;
- Focus on long-term benefits and interests;
- Ensure that agreements are specific in order to facilitate enforcement;
- Establish conflict resolution measures in the agreement and maintain communication with the company and;
- Not agree to clauses that compromise community sovereignty or its rights to object to a particularly damaging practice (22).

Unfortunately, research on evaluation of IBAs is limited (Kennett 1999; O'Reilly and Eacott 1998; Sosa and Keenan 2001). Sosa and Keenan (2001) argued that "despite several decades of IBA negotiations in Canada, the corresponding literature is fairly recent and includes little analysis regarding the success of these agreements" (18). Therefore, further research concerning evaluation of IBAs is needed to provide resource development companies, government, and First Nations with opportunities to learn from other IBA processes.

4.3.5 Recent Examples of IBAs

While numerous agreements related to mining have been implemented in northern Canada, one of the most comprehensive IBAs with respect to energy development exists in northern Quebec. In response to proposals by the Government of Quebec to develop the James Bay hydroelectric project, the federal and provincial government, three Crown corporations, and First Nations signed the James Bay and Northern Quebec Agreement (JBNQA) in 1975 (Day and Quinn 1992). Day and Quinn (1992) explain the purpose of the JBNQA as follows:

> The agreement was a recognition of aboriginal land rights. The main aim of the settlement was to give the native parties the means of ensuring their cultural vitality and of preserving their traditional way of life while taking advantage of the economic opportunities and benefits arising out of the development of Quebec's northern territories (143).

Under the JBNQA, Cree and Inuit traditional hunting, fishing, and trapping rights were protected and certain parts of the James Bay region was reserved for their use. In addition, the Cree and Inuit secured $225 million in cash compensation for the first phase of the project to be paid over 20 years ending in 1997, as well as a remedial works program to minimize environmental effects (Day and Quinn 1992).

However, the original JBNQA was plagued by numerous implementation problems and failure of governments to fulfil commitments. Therefore, the parties created a new set of agreements and institutions to facilitate completion of the first phase of the project and to initiate construction of the second phase. In 1986, La Grande Agreement was signed to complement the original JBNQA and included various provisions for Aboriginal economic development, community benefits, employment and training, and project mitigation measures. In total, the JBNQA and La Grande Agreement included more than $395 million in direct transfers over 30 years until 2006 for the completion of the first two phases of the project (Day and Quinn 1992).

In 2002, the Government of Quebec and the Cree Nation forged a new relationship with respect to the James Bay Project. The two parties signed the *Agreement Concerning a New Relationship* in February 2002 to further economic, social, and community development in the James Bay region (Gouvernement du Quebec and the Crees of Quebec 2002). The agreement gives the Cree greater responsibility over economic and community development and mandates the provincial government to "promote and facilitate the participation of the James Bay Crees in forestry, hydroelectricity and mining development in the Territory through partnerships, employment and contracts" (Gouvernement du Quebec and the Crees of Quebec 2002: 6). Highlights of the new agreement include:

- $50 million for remedial works associated with the next two phases of the James Bay Project to mitigate environmental impacts;
- $24 million for re-appropriation of Cree fishing resources;
- Provisions securing eligibility of Cree businesses for contracts related to the James Bay Project; and
- Transfer of economic and community development responsibilities in Cree territory to the Cree Nation, including payments of approximately $3.5 billion over 50 years to facilitate the transfer (Gouvernement du Quebec and the Crees of Quebec 2002).

4.4 Benefits and Opportunities Assessment

4.4.1 Overview

This section of the report will assess potential socioeconomic benefits and opportunities for First Nations as a result of project development. In addition, policies and programs for realizing these opportunities will be identified. Benefits and opportunities have been divided into four categories: direct employment; indirect and induced employment; financial; and community investment.

4.4.2 Direct Employment Opportunities

Potential Opportunities: The Gateway Project would generate significant employment opportunities (table 4.2). In 2008, average employment is estimated at 959 person years, largely in pipeline construction and logging to clear the pipeline ROW in Alberta and in B.C. (Enbridge Pipelines Inc. 2005c). In 2009, average project employment is expected to reach its highest level at 1,559 person years, with a significant number of jobs in pumping station construction, pipeline construction in Alberta and B.C., tank construction, and design consulting (Enbridge Pipelines Inc. 2005c). Average project employment is expected to reach 613 person years in 2010 (Enbridge Pipelines Inc. 2003a, 2005c). Most employment opportunities in 2010 will be generated in pipeline construction, pumping station construction, and design consulting. Total project employment will peak in July 2009 at an estimated 2,924 employees. In summary, over the 3-year construction period, the Gateway Project will employ an average of 1,043 workers (Enbridge Pipelines Inc. 2003a, 2005c).

Once project construction is completed and the pipeline becomes operational in late 2010, only a limited number of permanent operational jobs will be available. Such jobs will be generated as a result of pipeline operations in Alberta (30 jobs) and pipeline and marine terminal operations in B.C. (45 jobs) (Enbridge Pipelines Inc. 2003a).

Enbridge has not provided details as to the nature of training programs with respect to the Gateway Project. However, it is clear that Enbridge is committed to providing fair access of Aboriginal people in all aspects of project employment and training. Enbridge's *Indigenous Peoples Policy* states:

> Enbridge's commitment is to forge mutually beneficial relations with indigenous people in proximity to its operations. To achieve this Enbridge will . . . commit to the fair and equal access of indigenous peoples to opportunities in education, training, employment and business development that result from Enbridge's operations, and foster their greater participation in those opportunities (Enbridge Pipelines Inc. 2004c: 1).

Assessment: Opportunities for Aboriginal employment and training in relation to the Gateway Project would be substantial. However, there are several constraints on employment opportunities. First, project-related construction employment is short-term and occurs at different times of the year. Once project construction is completed, there will only be 45 permanent jobs in B.C. (Enbridge Pipelines Inc. 2003a).

Second, while local and Aboriginal people may be able to benefit from construction-related employment, the experience of other large-scale resource projects indicates that the majority of positions are filled by in-migrants (Cocklin and Kelly 1992; Detomasi 1997; Hua 1985; Kennett 1999; Yamaguchi and Kuczek 1984). For example, the recent environmental and socioeconomic impact assessment of the Mackenzie Gas Project in northern Canada concluded that required skills necessary for project employment are not available in the region and that the majority of labor will need to be imported from areas outside the Northwest Territories (Aboriginal Pipeline Group et al. 2004).

Table 4.2: Estimated Average Person Years of Direct Employment for the Gateway Project

Category	2008	2009	2010	3-Year Average
General				
Enbridge Personnel	47	50	46	48
Design Consultants	83	83	70	78
Construction				
Stations	67	173	33	91
Tanks	66	138	17	73
Marine Terminal	42	57	8	36
Pipeline				
Logging (AB)	29	10	-	13
Logging (BC)	62	33	10	35
Site Development (AB)	1	9	5	5
Site Development (BC)	1	1	-	1
Stockpiling (AB)	8	3	-	4
Stockpiling (BC)	5	9	-	5
Construction (AB)	229	208	221	219
Construction (BC)	242	544	113	299
Camps (AB)	5	35	28	23
Camps (BC)	3	75	14	31
Inspections (AB)	15	17	13	15
Inspections (BC)	17	39	7	21
Surveying (AB)	10	10	6	9
Surveying (BC)	10	22	3	12
Nondestructive testing (AB)	5	5	6	5
Nondestructive testing (BC)	5	18	3	9
Reclamation	7	20	10	12
Operation*				
Pipeline (AB)	-	-	30	N/A
Pipeline and Marine Terminal (BC)	-	-	45	N/A
Average Annual Employment**	**959**	**1559**	**613**	**1043**
Peak Month (Total Employment)	**August 1909**	**July 2924**	**February 2458**	N/A

*Permanent operational jobs, which would begin in 2010 and continue for the life of the project, are not included in the average employment calculation for 2010.

**Totals may vary due to rounding.

Source: Enbridge Pipelines Inc. 2003a, 2005c

Finally, it is uncertain as to whether Aboriginal people of the north coast possess necessary skills to obtain employment. In addition, Aboriginal people may be unwilling to seek project-related employment or may prefer to pursue existing economic and cultural opportunities in their communities (Cocklin and Kelly 1992; Detomasi 1997; Hua 1985; Kennett 1999; Yamaguchi and Kuczek 1984).

In summary, while a number of employment and training opportunities may be generated as a result of the Gateway Project, it is unclear whether Aboriginal people will be able to benefit from such opportunities. For Aboriginal people to realize benefits of the Gateway Project, provisions for employment and training would have to be negotiated between Coastal First Nations and Enbridge as part of a comprehensive IBA. For example, the project IBA could include provisions requiring that First Nations receive first priority for pipeline construction and maintenance contracts or provisions securing Aboriginal ownership and operation of the marine terminal.

4.4.3 Indirect and Induced Employment Opportunities

Potential Opportunities: Significant indirect and induced employment opportunities would also be generated as a result of the Enbridge Gateway Project (table 4.3). Indirect and induced construction and operational employment were estimated for the Gateway Project using employment impact ratios from B.C. Stats (2004). Since the pipeline would span across several regions in northern B.C., an average of construction employment impact ratios for seven regions was calculated. The seven regions include: Dawson Creek; Prince George; Vanderhoof; Smithers-Houston; Burns Lake; Kitimat-Terrace; and Prince Rupert (B.C. Stats 2004). Indirect and induced employment related to operational jobs was calculated using multipliers for oil and gas activities in northeastern B.C.

The Gateway Project would generate an average of approximately 354 additional person years of indirect and induced employment over the 3-year construction period (table 4.3). These indirect and induced opportunities may be available to Aboriginal people. The construction of the pipeline, pumping stations, tanks, and the marine terminal will require a significant level of materials and equipment. Aboriginal businesses and contractors may be able to contribute to project development through the supply of materials, services, and equipment for the construction of pumping stations, tanks, and the marine terminal. Furthermore, Aboriginal businesses and contractors may be able to provide materials and equipment in order to facilitate pipeline construction, specifically in the areas of logging, site development, stockpiling of materials, camp construction, inspection and testing, surveying, and reclamation. Operational activities would generate approximately 29 additional indirect and induced employment opportunities starting in 2010.

Table 4.3: Estimated Average Indirect and Induced Person Years of Employment

Type of Employment	Type of Effect	Employment Impact Ratio	2008	2009	2010	3-Year Average
Construction	Direct	-	959	1559	613	**1043**
	Indirect	1.24	230	374	147	**250**
	Induced	1.10	96	156	61	**104**
	Total	**1.34**	**1285**	**2089**	**821**	**1397**
Operations	Direct	-	-	-	75	-
	Indirect	1.26	-	-	20	-
	Induced	1.12	-	-	9	-
	Total	**1.38**	-	-	**104**	-

Source: B.C. Stats 2004; Enbridge Pipelines Inc. 2003a, 2005c

Assessment: Enbridge is committed to fair and equal access of Aboriginal people to business development opportunities in relation to proposed projects, as indicated by the company's *Indigenous Peoples Policy* (Enbridge Pipelines Inc. 2004c). Therefore, it is likely that Aboriginal people will be able to access some of the indirect and induced employment opportunities. Negotiation of IBAs will be crucial to increase opportunities for Aboriginal businesses. IBAs will need to identify business opportunities; preferences for Aboriginal businesses; procedures for securing contract goods and services; monitoring of contracting requirements; and assistance for local business development (Kennett 1999). However, the ability of IBAs to provide opportunities in the indirect and induced sector will be constrained by the fact that Enbridge does not have direct hiring control for many of the indirect and induced activities.

In summary, indirect and induced opportunities have potential to increase local employment as a result of project development, since these opportunities often require fewer skills than direct employment. For example, a recent postproject evaluation of a large-scale mining project in B.C. concluded that while only 15% of direct jobs were taken by local residents, 68% of indirect and induced jobs were filled by local residents (Gunton 2003). However, indirect and induced employment effects are difficult to control. Since resource development companies cannot directly control such employment, IBAs between proponents and First Nations are limited in their ability to address such issues.

4.4.4 Financial Opportunities

Potential Opportunities: Development of large-scale resource projects may include provisions for Aboriginal communities in the vicinity of the project (Aboriginal Pipeline Group et al. 2004; Kennett 1999). Through negotiation of IBAs, Aboriginal organizations may be able to secure direct cash payments and other financial benefits as a result of a project (Kennett 1999). In other instances, Aboriginal groups may be able to secure equity participation in resource projects, as in the case of the Mackenzie Gas Project in the Northwest Territories (Aboriginal Pipeline Group et al. 2004; Kennett 1999).

Potential financial opportunities for Aboriginal communities as a result of project development and operation may include the following:

- Fixed cash payments, which are defined as payments of a predetermined amount that are not related to a project's financial attributes, such as resource prices or profitability (Kennett 1999). Such payments "are intended to provide a guaranteed minimum amount of cash to the Aboriginal beneficiary" (Kennett 1999: 82).

- Variable cash payments, which include payments that are based on a formula that includes variables such as cash flow, profitability, resource prices, and quantities (Kennett 1999). Such payments allow Aboriginal organizations to benefit from successful operation of resource projects and to capture further financial opportunities should there be an increase in resource prices (Kennett 1999).

- Provision of a development or remedial fund to be used by Aboriginal groups to promote traditional activities, mitigate negative project impacts, or facilitate employment and business development (Kennett 1999).

- Financial compensation paid to Aboriginal people who may suffer material or income losses due to project development, such as damage to traditional hunting, trapping, or fishing activities (Kennett 1999).

- Negotiation of equity interests and joint ventures in order to increase direct involvement of Aboriginal organizations in project-related activities (Kennett 1999).

- Reimbursement of negotiation, administration, management, and implementation costs associated with the IBA (Kennett 1999).

To date, Enbridge has not provided specific details with respect to the nature of potential financial opportunities in relation to the Gateway Project.

Assessment: Financial opportunities for First Nations as a result of the Gateway Project could be substantial. While project employment opportunities will largely be short-term in nature, financial opportunities have potential to contribute to long-term sustainability of First Nations communities. Financial opportunities, such as direct cash payments and remedial funding, typically last for the life of a resource project, thereby facilitating a stable flow of funds to Aboriginal organizations. Such financial resources may then be used for community development and programming, employment training, and business development. The primary tool for ensuring that First Nations capture some of the financial benefits as a result of a resource project is the IBA.

4.4.5 Community Investment Opportunities

Potential Opportunities: While Enbridge has not provided specific details on types of community support opportunities, large-scale resource projects typically include a community investment component (Kennett 1999). Such opportunities for First Nations that could be included in an IBA may include:

- Provision of social and community assistance, such as counseling services and public education programs for project employees and families. Programs may address such issues as career development, family and marital dynamics, alcohol and drug use, depression, and child care (Kennett 1999).

- Investment in community projects and physical infrastructure, such as local buildings, housing, schools, health care facilities, and other community infrastructure (Kennett 1999).
- Provisions addressing issues related to Aboriginal cultural and economic activities, such as access of non-Aboriginal employees to Aboriginal land and potential project impacts on traditional harvesting activities (Kennett 1999).

Furthermore, various corporate policies indicate that Enbridge is receptive to investment and support initiatives in communities that may be affected by their projects. For example, Enbridge's *Corporate Social Responsibility Policy* described the company's intentions with respect to community investment as follows:

> Enbridge stresses collaborative, consultative, and partnership approaches in our community investment programs. Enbridge will integrate Community Investment considerations into decision-making and business practices, and will assist in local capacity building to develop mutually beneficial relationships with communities. Enbridge will contribute to our host communities' quality of life by supporting innovative programs in health, education, social services and the environment, as well as cultural and civic projects (Enbridge Pipelines Inc. 2004a: 2).

In addition, Enbridge is committed to promoting First Nations participation in community investment funding programs, as indicated by the company's *Indigenous Peoples Policy* (Enbridge Pipelines Inc. 2004c). The community investment program at Enbridge provides financial and human resources to nonprofit organizations in communities where projects or operations are located. In 2003, the program invested over $3 million in a variety of health care, education, environmental, and cultural projects across Canada and in the U.S. (Enbridge Pipelines Inc. 2005a).

Assessment: Coastal First Nations may be able to benefit from community investment opportunities as a result of the Gateway Project. Community investment initiatives have potential to increase quality of life in First Nations communities. Quality of life in Coastal First Nations communities may be enhanced through Enbridge investments in social services, community projects, facilities, and physical infrastructure. Furthermore, such benefits could potentially contribute to long-term social sustainability of Aboriginal communities, since program and service investments are likely to last for the life of project operations. In addition, if community facilities are developed such as schools and housing, long-term benefits could be significant, since facilities will likely exist in the community long after the project has been terminated. Enbridge is willing to engage in a certain level of community investment and support as indicated by various company policies. However, details as to the nature of community investment by Enbridge need to be negotiated as part of an IBA.

4.4.6 Summary

A variety of opportunities may be available to Coastal First Nations as a result of construction and operation of the Gateway Project. Direct, indirect, and induced employment opportunities are likely to be short-term in nature and may only be available at certain times of the year. While the Gateway Project has potential to create numerous construction-related jobs, only 75 long-term operational jobs are likely to be generated. However, financial and community investment opportunities have potential to contribute to long-term sustainability of Coastal First Nations. Such opportunities include fixed and variable cash payments, financial compensation for project impacts, social services, and community project, facility, and infrastructure investments. Many of these opportunities have potential to create positive effects on Aboriginal communities, both during and after project operations.

However, the nature and extent of potential project opportunities will require further investigation and negotiation. While Enbridge has not provided specific details on potential project benefits and opportunities, such details should be discussed as part of a comprehensive IBA negotiation and implementation process.

4.5 Conclusion

Development and operation of pipeline, port, and tanker projects have potential to generate a variety of socioeconomic impacts on local and regional communities. Large-scale resource projects typically create community impacts through significant short-term increases in employment and population, economic and business development, and inflation effects. Furthermore, pipeline, port, and tanker projects may generate negative impacts on demography, infrastructure, community wellness, traditional Aboriginal use and culture, other economic sectors, and heritage and archaeological resources.

However, several measures are available to resource developers, governments, and First Nations communities to increase socioeconomic benefits and mitigate negative socioeconomic consequences of resource projects. IBAs are the preferred technique for maximizing net project benefits. IBAs are used to establish long-term relationships between resource development companies, local communities, and Aboriginal groups. Furthermore, IBAs help ensure that local and Aboriginal communities capture a portion of short-term and long-term socioeconomic benefits of large-scale resource projects.

CHAPTER 5: INSTITUTIONAL CONSIDERATIONS

5.1 Overview

This chapter focuses on institutional and regulatory considerations for pipelines, port, and tanker projects in B.C. The regulation and approval of such projects involve many parties at the federal, provincial, and First Nations levels of government. The purpose of this chapter is to identify the parties involved and to describe relevant regulatory structures and approval processes related to such projects. Finally, an evaluation of relevant regulatory and approval processes is presented based on international best practices criteria.

5.2 Regulatory Structures and Approval Processes

5.2.1 Federal

A variety of federal departments and agencies are involved in regulation and approval of pipeline, port, and tanker projects. Key parties with authority over such projects include National Energy Board, Fisheries and Oceans Canada, Transport Canada, Natural Resources Canada, and the Canadian Environmental Assessment Agency. Roles and responsibilities of federal departments and agencies are briefly described in this section of the report.

5.2.1.1 National Energy Board

The National Energy Board (NEB) is an independent federal tribunal that has jurisdiction to regulate international and interprovincial aspects of the oil, gas, and electricity industries in Canada (Canada NEB 2003b). The purpose of the NEB is:

> To promote safety, environmental protection and economic efficiency in the Canadian public interest within the mandate set by Parliament in the regulation of pipelines, energy development and trade (Canada NEB 2003b: 1).

Specifically, the NEB has jurisdiction to regulate:

- Construction and operation of international and interprovincial pipelines;
- Traffic, tolls, and tariffs for pipelines under its jurisdiction; and
- Export of light and heavy crude oil (Canada NEB 2002b).

The *National Energy Board Act* (*NEB Act*) sets out the regulatory framework and powers of the NEB as they relate to oil and gas activities (Canadian Institute of Resources Law (CIRL) 2004). In accordance with the *NEB Act*, the NEB reviews applications for international and inter-provincial pipelines and issues "Certificates of Public Convenience and Necessity" for approved projects (CIRL 2004). The NEB is also given powers "to consider the environmental impacts of proposed projects under its jurisdiction and to attach appropriate terms and conditions to project certificates" (CIRL 2004: 93). In addition, the NEB is required to conduct environment assessments (EAs) for projects under its jurisdiction, pursuant to the *Canadian Environmental Assessment Act (CEA Act)* (CIRL 2004). The federal EA process is discussed in greater detail later in this chapter.

The approval process for a Certificate for Public Convenience and Necessity is also described in the *NEB Act*. Proponents of a pipeline must apply for a certificate under section 52 of the *NEB Act*. An application for a certificate will include the following information:

- Purpose of the pipeline;
- Pipeline design;
- Potential environmental and socioeconomic impacts of the project;
- Existing or proposed public consultation programs in relation to the project;
- Need for any land rights;
- Adequacy of supply, demand, and other market factors;
- Economic considerations of the pipeline;
- Proposed corridor route; and

- Any other factors that the board requires to make a decision (Canada NEB 2003b).

The NEB may exempt certain activities from project approval including:

- Pipelines—or branches of or extensions to pipelines—not exceeding forty kilometers in length; and
- Such tanks, reservoirs, storage facilities, pumps, racks, compressors, and loading facilities as the Board considers appropriate (Canada 2004).

The NEB reviews applications for compliance with a variety of legislative and regulatory documents, including, the *NEB Act*, the *CEA Act*, the NEB's *Rules of Practice and Procedure*, and the NEB's *Guidelines for Filing Requirements* (Canada NEB 2003b). In assessing applications, the NEB states that "it is the responsibility of the NEB to consider all aspects of the project in order to determine if the pipeline project is in the public interest" (Canada NEB 2003b: 21). The board defines public interest as follows:

> The public interest is inclusive of all Canadians and refers to a balance of economic, environmental and social interests that changes as society's values and preferences evolve over time (Canada NEB 2003b: 21).

Once an application is submitted, the NEB may conduct public hearings depending on the nature of the proposed pipeline. For pipelines more than 40 kilometers in length, the NEB requires a certificate hearing (Canada NEB 2003b). At certificate hearings, all relevant matters pertaining to pipeline applications are reviewed. However, if potentially affected stakeholders raise valid and sincere objections about a proposed pipeline route or related construction activities, the NEB is obligated to conduct a detailed route hearing (Canada NEB 2003b). The procedures for certificate hearings and detailed route hearings are similar (table 5.1).

One important difference between certificate and detailed route hearings exists in the use of mediation. Prior to detailed route hearings, the NEB may offer to facilitate a mediation process between parties to determine if objections can be resolved without the use of a hearing (Canada NEB 2003b). Mediation processes are voluntary, informal, and confidential, where NEB staff trained in mediation techniques act as facilitators (Canada NEB 2003b).

Table 5.1: Steps in the NEB Hearings Process

Step 1: The board issues a certificate or detailed route hearing order.
Step 2: The Board decides on a written or oral hearing process.
Step 3: The Board publishes a Notice of Public Hearing.
Step 4: Stakeholders apply to be intervenors (participants), or submit their comments via letter.
Step 5: The NEB may or may not hold a public information session before a hearing.
Step 6: The NEB registers all intervenors that have been accepted.
Step 7: Participants file evidence and submit questions regarding the filed evidence of other parties.
Step 8: The hearing begins and participants give opening statements.
Step 9: Witnesses for the applicant are sworn-in, adopt evidence, and may be cross-examined by witnesses.
Step 10: Intervenors are sworn-in, adopt evidence, and may be cross-examined by the applicant.
Step 11: The applicant and intervenors submit final arguments.
Step 12: The NEB adjourns the hearing until a final decision is reached.

Source: Canada NEB 2003b

If the NEB issues a certificate for a pipeline project, the board is involved in the inspection of construction activities and pipeline operations (Canada NEB 2003b). Typically, NEB inspection officers carry out field inspections to ensure that project conditions are adhered to. Certificates for public convenience and necessity may be revoked by the board, in circumstances of repeated violations by proponents (Canada NEB 2003b).

The NEB also has authority with respect to the abandonment of projects within its jurisdiction. Pipeline abandonment is carried out in one of two ways: a pipeline can be physically removed or a pipeline can be abandoned and left on the landscape (called "abandonment in place") (Canada NEB 2003b). The process for abandonment is similar to the pipeline approvals process. If the board grants permissions, and the company takes the required steps as set out at the hearing, the pipeline is formally abandoned and is no longer under NEB jurisdiction (Canada NEB 2003b).

5.2.1.2 Fisheries and Oceans Canada

Fisheries and Oceans Canada's (DFO) mandate includes management and protection of fisheries resources and the marine environment; oceans and aquatic resources research; maintenance of marine safety; and facilitation of maritime trade, commerce, and ocean development (Canada DFO 2004). DFO authority over oceans and inland waters stems from a number of legislative documents including the *Oceans Act*; *Fisheries Act*; *Navigable Waters Protection Act*; and *Canada Marine Act* (Cassidy and Chao 2003). DFO is required to:

- Conserve and protect fisheries resources and habitat pursuant to the *Fisheries Act*;
- Approve development applications in relation to navigable waters pursuant to the *Navigable Waters Protection Act*, and provide marine pollution response services pursuant to the *Oceans Act*, through the Canadian Coast Guard (CCG); and
- Facilitate and coordinate development of plans for integrated management of coastal and marine waters pursuant to the *Oceans Act* (Cassidy and Chao 2003).

5.2.1.3 Transport Canada

Transport Canada is the main federal department with authority to regulate aspects of marine transportation systems, including development and enforcement of marine safety programs (Canada Transport Canada 2003). Through the Marine Safety division, Transport Canada "is responsible for the administration of national and international laws designed to ensure the safe operation, navigation, design and maintenance of ships, protection of life and property and prevention of ship source pollution" (Canada Transport Canada 2001: 1-3). Specific responsibilities with respect to vessel safety and environmental protection include:

- Developing, administering, and enforcing national and international laws;
- Promoting safe practices and procedures;
- Overseeing training programs for officers and crews of commercial vessels;

- Responding to marine occupational safety and health issues;
- Maintaining a Canadian ship registry;
- Licensing small commercial vessels; and
- Overseeing pilotage matters (Canada Transport Canada 2003: 8).

These responsibilities are set out in a variety of legislative documents including the *Canada Shipping Act*; *Navigable Waters Protection Act*; *Transportation of Dangerous Goods Act*; *Oceans Act*; and *Canada Marine Act* (Canada Transport Canada 2001).

5.2.1.4 TERMPOL Review Process

TERMPOL is a joint review process administered by DFO and Transport Canada Marine Safety (TCMS), commonly referred to as the technical review process of marine terminal systems and transhipment sites (TRP) (Canada Transport Canada 2001). TRP is described by Transport Canada as follows:

> The TRP focuses on a dedicated design ship's selected route in waters under Canadian jurisdiction to its berth at a proposed marine terminal or transshipment site and, specifically, to the process of cargo handling between vessels, or off-loading from ship to shore or vice-versa (Canada Transport Canada 2001: 1-1).

The purpose of TRP is to assess environmental, operational, safety, and management issues associated with tanker routes and marine terminal siting, construction, and operation (Canada Transport Canada 2001). The results of TRP help DFO and TCMS to identify potential problem areas and to recommend mitigation measures with respect to proposed marine terminal systems (Canada Transport Canada 2001).

TRP applies to necessary equipment and procedures at proposed oil, chemical, or liquefied natural gas terminals, transshipment facilities associated with these substances, as well as any proposed changes to existing terminals or facilities for these substances (Canada Transport Canada 2001). For the purposes of TRP, a marine terminal system includes "the ship's berth, its approaches from seaward and related port or terminal infrastructures" (Canada Transport Canada 2001: 1-1).

TRP requires that proponents address a number of issues with respect to marine safety, operations, accident hazards, and potential risks. For example, when conducting a TERMPOL review, proponents must demonstrate that:

- Proposed safety measures are in accordance with recognized procedures for the safe management of marine terminal systems;
- Auditing of operational activities related to safety and management systems will be conducted on an on-going basis;
- All major accident hazards have been identified; and
- Risks from identified accident hazards have been evaluated and mitigation measures to reduce potential risks will be implemented (Canada Transport Canada 2001).

To demonstrate that the above-mentioned issues have been addressed, TRP requires that proponents address a range of subject matters in their submission. TRP must consider:

- Potential impacts of new shipping operations on existing regional shipping operations and regional fishing activities;
- Environmental issues associated with transportation of pollutant cargoes;
- Risks to communities along potential routes to the terminal, such as threats to public health and safety;
- Navigational safety issues associated with proposed routes, such as equipment and activities to ensure safe navigation such as fixed and floating aids, vessel traffic services, electronic positioning systems, radio communication and pilotage requirements;
- Ship characteristics, such as maneuvering capabilities, navigational and communication equipment, and containment systems; and
- Pollution prevention measures, contingency plans, and emergency procedures (Canada Transport Canada 2001).

TRP begins when a proponent submits a written request for review to TCMS (table 5.2) (Canada Transport Canada 2001). Following a formal request, the proponent and representatives from relevant federal departments informally meet to discuss submission requirements, such as review process timelines and requirements, data availability, and scope of data requirements (Canada Transport Canada 2001). The next step involves the Director General of TCMS appointing a chairperson for the TERMPOL Review Committee (TRC) (Canada Transport Canada 2001).

The chairperson then forms the TRC by including representatives from federal departments with expertise or responsibilities associated with the project (Canada Transport Canada 2001). Representatives from DFO and TCMS may include staff with expertise in marine communications and traffic services; navigation systems; environmental response systems; sounding and dredging; and marine safety (Canada Transport Canada 2001). The TRC may also include representatives from other federal or provincial departments such as Environment Canada; Public Works Canada; Natural Resources Canada (NRCAN); Indian and Northern Affairs Canada; Canada Ports Corporation; the regional Pilotage Authority; and the provincial Department of the Environment (Canada Transport Canada 2001).

The TRC has a number of responsibilities when carrying out TERMPOL reviews for proposed projects. For example, the TRC must determine if a proponent's submission is complete, identify any information gaps, and submit requests to the proponent if further information is required (Canada Transport Canada 2001). The committee advises the TRC chairperson on various departmental policy matters associated with proposed projects and TRP (Canada Transport Canada 2001). The committee also develops a comprehensive list of reports that the proponent must include in submissions. Other TRC responsibilities include production of interim and final reports and coordination of the TRP with other departments and agencies (Canada Transport Canada 2001).

While TRP is a useful process for addressing a variety of issues with respect to proposed tanker routes and marine terminal systems, it is not a mandatory process. Transport Canada explained the status of TRP in the following manner:

> The TRP is not a regulatory instrument. Its provisions, therefore are not mandatory. The TRP's criteria, however, are used by TCMS in determining the need for making or revising specific regulations, or for implementing special precautionary measures that may affect a ship's

operation within a particular marine terminal system or transshipment site (Canada Transport Canada 2001: 1-2).

Table 5.2: TERMPOL Review Process Stages and Outcomes

TRP Stage	Key Activities
1. Formation of TRC	- Initial review of proposed project outline - Initial discussion of survey and study requirements - Identification of departmental resources available
2. TRC meets with proponents	- Agree on scope of required studies and surveys - Inform proponent of departmental resources available - Agree on format of proponent's submission - Establish administrative lines of communication - Agree on schedule of progress meetings
3. TRC chairperson receives proponent's submission	- Proponent's submission is distributed to the TRC
4. TRC begins the review process	- TRC identifies additional information needs - TRC meets with proponent's representatives - TRC may seek additional expert advice based on information provided in a proponent's submission
5. TRC submits report to director general of TCMS	- Director general approves a TRC report with authorities from other departments - Director general forwards the report to the proponent

Source: Canada Transport Canada 2001

Transport Canada noted that while DFO and TCMS have specific roles with respect to TRP, such responsibilities are separate from the regulatory roles of both departments (Canada Transport Canada 2001). Furthermore, approval of a project through TRP does not mean that a proponent has satisfied all requirements of federal and provincial legislation and regulations pertaining to marine safety and environmental protection (Canada Transport Canada 2001). Proposed projects may also have to meet requirements of various other legislative documents including the *Canada Shipping Act*; *Navigable Waters Protection Act*; *Canadian Environmental Protection Act*; *Canadian Environmental Assessment Act*; *Transportation of Dangerous Goods Act*; *Fisheries Act*; *Oceans Act*; and *Canada Marine Act* (Canada Transport Canada 2001).

5.2.1.5 Natural Resources Canada

Natural Resources Canada (NRCAN) "is a scientific and economic department concerned primarily with Canada's land-mass and with promoting sustainable development and the responsible use of Canada's mineral, energy and forest resources" (Canada DFO 1997: 19). NRCAN has a variety of responsibilities with respect to natural resources including promotion of international competitiveness; development of client industries; enhancement of environmental quality; coordination of natural resource policy; and monitoring of health and safety practices in natural resource industries (Canada DFO 1997; Canada NRCAN 2004).

NRCAN also supports energy research activities through developing research programs, geographical information systems, remote sensing databases, surveys, and maps (Canada DFO 1997; Canada NRCAN 2004). While NRCAN is likely to be involved in regulatory processes with respect to pipeline, port, and tanker projects, the extent of such involvement has yet to be determined.

5.2.1.6 Canadian Environmental Assessment Agency

The Canadian Environmental Assessment Agency (CEAA) is an independent federal organization that administers the federal EA process and promotes environmental policies and practices (Canada CEAA 2003). The *Canadian Environmental Assessment Act* (*CEA Act*) sets out specific objectives, duties, and powers of the agency, which consist of administering the EA process and procedures established by the act or its regulations (Canada CEAA 2003). The *CEA Act* was first passed in 1992, but legislation was updated most recently in 2003 (OOGRG 2004). Boyd (2003 in OOGRG 2004) provided an overview of the *CEA Act*:

> The purposes of the *CEAA* include ensuring that environmental impacts are considered before actions are taken, encouraging actions that promote sustainable development, avoiding duplication, and providing opportunities for public participation (82).

CEAA acts as a coordinator between the federal government and other jurisdictions to negotiate EA harmonization agreements and to promote efficiency in environmental review processes (Canada CEAA 2003). The agency supports a variety of research activities related to EA, such as development of EA techniques and practices, information and training initiatives, and EA quality assurance programs (Canada CEAA 2003). Furthermore, CEAA is required to ensure for timely and appropriate public participation in the EA process. For example, CEAA administers funding programs for public participation in comprehensive studies and review panel assessments (Canada CEAA 2003).

The *CEA Act* can be triggered in four ways: if "the federal government proposes a physical project or activity, provides financial support to a physical project or activity, provides a license or permit to enable a physical project or activity to be carried out, or if a project is proposed on federal land" (Canada CEAA 2003 in OOGRG 2004: 82). The *CEA Act* clearly applies to inter-provincial pipelines, port, and tanker projects because these projects require approvals and permits from the federal government.

Four types of EAs may be carried out in accordance with the federal legislation. Screenings provide a brief analysis of environmental and cumulative effects of a project and are typically used for simple or routine projects (Canada CEAA 2003 in OOGRG 2004). Comprehensive studies are more detailed than screenings, since environmental and cumulative effects are considered in conjunction with project alternatives, monitoring systems, and other project characteristics (Boyd 2003 in OOGRG 2004). Federal EAs may also be carried out through mediation or through a panel review. These two methods are used "if a comprehensive study determines that a project may cause significant adverse environmental effects or if environmental impacts of a project are inconclusive" (Boyd 2003 in OOGRG 2004: 82).

Decision making processes with respect to EA applications are also described in the federal legislation. The *CEA Act* explains that EAs must determine whether or not significant adverse environmental effects will be generated as a result of a project (OOGRG 2004). The responsible federal authority must ensure that all environmental effects of projects are considered, including impacts on the socioeconomic environment, aboriginal people, and cultural heritage (OOGRG 2004). Furthermore, responsible federal authorities may require that a comprehensive study— instead of a screening—be carried out for projects if the federal authority is of the opinion that significant adverse environmental effects are likely to be generated (OOGRG 2004).

The federal legislation also requires assessment of cumulative environmental effects of a project. An assessment of cumulative environmental effects of a proposed project is required for both screenings and comprehensive studies. Comprehensive studies must also consider:

(a) alternative means of carrying out the project that are technically and economically feasible and the environmental effects of these alternatives;
(b) the need for and requirements of a follow-up program in respect of the project;
(c) whether renewable resources that will likely be in heavy demand for the project will be able to meet present and future needs (Rankin 2004 in OOGRG 2004: 82).

However, the federal EA process has several weaknesses. Certain projects proposed by federal organizations and Crown corporations are not required to undertake EAs (Boyd 2003 in OOGRG 2004). Furthermore, many screenings are incomplete and unclear in terms of information requirements and analytical techniques (Boyd 2003 in OOGRG 2004). In addition, the *CEA Act* is discretionary in certain instances. For example, under federal legislation, "a project can be approved by the federal government even when the EA concludes that the project will have significant adverse environmental effects" (OOGRG 2004: 83).

For example, section 37 of the *CEA Act* discusses the power of a responsible authority to permit a project to proceed even if the project will generate significant environmental effects:

> 37. (1) Subject to subsections (1.1) to (1.3), the responsible authority shall take one of the following course of action in respect of a project after taking into consideration the report submitted by a mediator or a review

> panel or, in the case of a project referred back to the responsible authority pursuant to subsection 23(1), the comprehensive study report:
>
> (a) where, taking into account the implementation of any mitigation measures that the responsible authority considers appropriate,
>
> (i) the project is not likely to cause significant adverse environmental effects, or
>
> (ii) the project is likely to cause significant adverse environmental effects that can be justified in the circumstances,
>
> the responsible authority may exercise any power or perform any duty or function that would permit the project to be carried out in whole or in part (Canada 2003: 38).

Therefore, even if a federal EA determines that a project should not be approved, such a project could still be carried out.

Between 1995 and 2000, 99.9% of the approximately 25,000 EAs that were carried out were screenings and a further 99.9% of all EAs submitted were approved (Boyd 2003 in OOGRG 2004). OOGRG (2004) noted that "these results suggest that either virtually all federal projects subject to EA are environmentally appropriate, or the federal process favors development over the environment" (83). The federal EA process also has a number of other deficiencies including a lack of clear decision-making criteria, inappropriate public consultation methods, and inadequate enforcement and monitoring provisions (Boyd 2003 in OOGRG 2004).

5.2.1.7 West Coast Moratorium on Tanker Traffic

Another key aspect of the regulatory regime for oil and gas projects is the current moratorium on tanker traffic and offshore oil and gas development on the west coast of Canada. In 1972, the federal government "imposed a moratorium on crude oil tanker traffic through Dixon Entrance, Hecate Strait, and Queen Charlotte Sound due to concerns over potential environmental impacts" (Royal Society of Canada (RSC) 2004: 1). The decision to prohibit tanker traffic in these areas was based on recommendations from the Commons Special Committee on Environmental Pollution chaired by David Anderson (Strong et al. 2002). The main concern of the committee was risk of oil spills as a result of tanker traffic carrying crude oil from drilling sites in Prudhoe Bay, Alaska to Washington along the west coast of B.C. (Strong et al. 2002).

Shortly after the moratorium on tanker traffic was announced, the Government of Canada extended the prohibition to include all offshore oil and gas activities on the west coast (RSC 2004). In addition, the federal moratorium on offshore oil and gas development was followed by a similar ban by the provincial government in 1981 (RSC 2004; Strong et al. 2002). While both the federal and provincial governments considered lifting the moratoria in the mid-1980s, the *Exxon Valdez* oil spill disaster in Alaska convinced both governments to keep the moratoria in place (RSC 2004). Therefore, since the Gateway Project would include tanker traffic from the north coast of B.C. to California through Hecate Strait and Queen Charlotte Sound, and to Asia through Dixon Entrance, the current moratorium on west coast tanker traffic would require further consideration prior to project approval.

5.2.2 Provincial

The provincial government is also likely to be involved in approval of pipeline, port, and tanker projects. Key provincial departments and agencies involved in such projects include the Ministry of Sustainable Resource Management, the Oil and Gas Commission, Land and Water British Columbia Inc., and the British Columbia Environmental Assessment Office. A general overview of roles and responsibilities of these parties is presented next.

5.2.2.1 Ministry of Sustainable Resource Management

MSRM has a broad mandate to promote B.C.'s economy through sustainable development of provincial natural resources (B.C. MSRM 2004b). The role of MSRM "is unique as most natural resources in British Columbia are owned by the Crown and largely developed by private interests" (B.C. MSRM 2004b: 11). Accordingly, MSRM responsibilities include setting strategic policies and developing land use plans for efficient and equitable use of Crown land and resources in the province (B.C. MSRM 2004b). The ministry has three types of responsibilities with respect to natural resources:

- Development of land-use and resource-sector plans to provide for sustainable development of provincial land and resources;
- Collection, storage, and analysis of resource and geographic information to support business and investment opportunities and to ensure for effective natural resource management; and
- Development of principles, policies, and legislation related to allocation and pricing of natural resources (B.C. MSRM 2004b).

Land use planning in B.C. was significantly changed in the early 1990s to promote collaboration in land and natural resource allocation processes. Due to increasing land and resource use conflicts throughout the last few decades, the provincial government initiated a new strategic land use planning process emphasizing economic, social, and environmental sustainability, as well as public and First Nations participation (B.C. Commission on Resources and Environment (CORE) 1996; B.C. MSRM 2004b). The new process was designed to bring together stakeholders and the province to develop land and resource management plans (LRMPs) through collaboration and consensus building (B.C. CORE 1996; B.C. MSRM 2004b). Frame et al. (2004) described some general principles of the LRMP process:

- Land and resource management plans provide direction for more detailed resource planning by government agencies and the private sector, and provide a context for local government planning;
- All resource values are considered in the LRMP process to ensure that land and resource management decisions are based on a comprehensive assessment of resource values;
- Public participation is required in each LRMP. The public, aboriginal groups and government agencies negotiate an agreement on the objectives and methods of public participation at the outset of each LRMP project;
- The objective is consensus on decisions and recommendations in LRMPs. A definition of consensus is one of the first decisions required in an LRMP process; and
- The goal of the LRMP process is to present to Cabinet ministers, designated by the Cabinet Committee on Sustainable Development, a recommended consensus

> agreement including a description of any scenarios considered. If consensus agreement is not possible, decision makers must be presented with options for land and resource management (63).

According to Frame et al. (2004), land use plans have been completed and approved in nineteen regions throughout the province, covering 73% of the provincial land base. Furthermore, "with the completion of the six LRMPs currently in preparation, new land-use plans will have been prepared for 85% of the B.C. land base" (Frame et al. 2004: 64). Accordingly, approval of pipeline and port projects may involve review of applicable LRMPs with respect to pipeline route selection and marine terminal siting.

5.2.2.2 Oil and Gas Commission

The Oil and Gas Commission (OGC) is the lead provincial agency with respect to oil and gas activities under jurisdiction of the B.C. government (OOGRG 2004). Roles and responsibilities of OGC are set out in the *Oil and Gas Commission Act, Petroleum and Natural Gas Act*, and *Pipeline Act* (OOGRG 2004). OGC has the mandate "to assist oil and gas industry development by streamlining the approval process while ensuring that environmental and social impacts are taken into account" (OOGRG 2004: 78). Section 3 of the *Oil and Gas Commission Act* describes the purposes of the commission. The purposes of OGC are to:

> a) regulate oil and gas activities and pipelines in British Columbia in a manner that
>   (i) provides for the sound development of the oil and gas sector, by fostering a healthy environment, a sound economy and social well being,
>   (ii) conserves oil and gas resources in British Columbia,
>   (iii) ensures safe and efficient practices, and
>   (iv) assists owners of oil and gas resources to participate equitably in the production of shared pools of oil and gas,
>
> b) provide for effective and efficient processes for the review of applications related to oil and gas activities or pipelines, and to ensure that applications that are approved are in the public interest having regard to environmental, economic and social effects,
>
> c) encourage the participation of First Nations and aboriginal peoples in processes affecting them,
>
> d) participate in planning processes, and

e) undertake programs of education and communication in order to advance safe and efficient practices and the other purposes of the commission (OOGRG 2004: 78-79).

The *Oil and Gas Commission Act* also sets out activities that OGC is authorized to regulate. Section 1 of the *Act* explains that, for oil and gas activities under provincial jurisdiction, OGC is permitted to regulate:

a) the search for petroleum, natural gas or both;
b) the exploration and development of petroleum, natural gas or both;
c) the production, gathering, processing and storage of petroleum, natural gas or both;
d) the reclamation of sites disturbed because of an activity described herein; and
e) the monitoring and long-term protection, control and treatment of those sites (OOGRG 2004: 79).

While OGC is charged with regulating oil and gas pipelines within the province, its regulatory and approval processes have limited applicability to activities under NEB jurisdiction (B.C. LWBC 2004b). However, it is unclear as to whether OGC would participate in approvals processes in an advisory capacity for NEB regulated projects.

5.2.2.3 Land and Water British Columbia Inc.

As discussed previously in this report, the NEB has jurisdiction over regulating interprovincial pipelines and the export of crude oil. However, the provincial government does retain jurisdiction over access and management of the Crown land base and is responsible for issuing land tenures and water permits (B.C. LWBC 2004b). Land and Water British Columbia Inc. (LWBC) "remains responsible for the sale of Crown land and issuing and administering all *Land Act* tenures for federally regulated pipelines" (B.C. LWBC 2004b: 1). Principles and goals of LWBC are described as follows:

> As a Crown corporation charged with providing access to Crown land and water resources, LWBC strives to apply sound business principles. The successful management of these assets contributes significantly to the economic, social and cultural well-being of all British Columbians (B.C. LWBC 2004b: 2).

The most likely form of land allocation for the purposes of pipeline development is a "statutory right of way". In the case of large projects, statutory rights of way are usually issued for 30 years, although terms can be longer if required (B.C. LWBC 2004b). LWBC explains this concept in the following manner:

> A statutory right of way is normally used to authorize linear uses of Crown land for transportation, communication, energy production and utility developments. The tenure holder is granted a legal right of passage over the land for a specific purpose. It does not generally confer the right to exclusive use and enjoyment of the area, nor the right to exclude or charge the public for the use of improvements (B.C. LWBC 2004b: 6).

Once an application is submitted, LWBC assesses if applications are complete, followed by an assessment of the application's complexity. For complex applications, LWBC may create a Project Review Team (PRT) (B.C. LWBC 2004a). Establishment of a PRT is a way for LWBC to discuss issues and collect input from other agencies (B.C. LWBC 2004a). The PRT may include federal, provincial, and municipal agencies, as well as First Nations and nongovernmental organizations that have an interest related to projects (B.C. LWBC 2004a). The general process for applications being reviewed by a PRT is as follows:

- Once a PRT has received a complete application, material is distributed to all participants and PRT meetings are arranged;
- The PRT reviews all application information, including any terms of reference for additional studies, and provides comments to LWBC, typically within 30 days;
- If no further studies require completion, LWBC makes a decision on an application based on comments received from the PRT;
- If further study and data collection are required, an applicant is to complete requirements in accordance with terms of reference approved by PRT. Once new information is reviewed by PRT and comments are received by LWBC, a decision can be made on the application (B.C. LWBC 2004a).

LWBC asserts that aboriginal interests and concerns will be considered throughout this process. The agency states its responsibilities with respect to First Nations in the following manner:

> LWBC is responsible for ensuring the province's fiduciary obligations to First Nations are met in the disposition of Crown land. LWBC carries out consultations in accordance with its Aboriginal Interests Consideration Procedures and the consultation guidelines of the Province to identify the potential for aboriginal rights or title over the subject property and to determine whether infringement of either might occur (B.C. LWBC 2004a: 12).

5.2.2.4 British Columbia Environmental Assessment Office

Reporting to the minister of sustainable resource management, the British Columbia Environmental Assessment Office (B.C. EAO) "is a neutral provincial agency that coordinates assessment of the impacts of major development proposals in British Columbia" (B.C. EAO 2004: 1). The intent of the EA process is to identify potential adverse impacts as a result of project development and operations and to determine appropriate measures to minimize or mitigate such impacts (B.C. EAO 2004). Powers and responsibilities of the B.C. EAO are set out in the *British Columbia Environmental Assessment Act* (*B.C. EAA*) (B.C. EAO 2003). The B.C. EAO strives to administer the provincial EA process in an accountable and neutral manner through management of project assessments according to rules established under legislation, regulations, and operating procedures (B.C. EAO 2003).

The *B.C. EAA* was first introduced in 1995, but was significantly changed in 2002. According to some observers, the 2002 changes substantially weakened the EA process (Boyd 2003 in OOGRG 2004). The *B.C. EAA* is based on five main principles:

- Access to information by all interested parties;
- Balanced decision making by government;
- Comprehensive environmental assessments;
- Consultation with all potentially affected parties; and
- Flexibility of assessment methods and procedures (B.C. EAO 2003).

Table 5.3: Steps in the Provincial EA Process

Step 1: Determine if the *B.C. EAA* applies
Step 2: Determine the review path
Step 3: Determine how the assessment will be conducted (scope and procedures)
Step 4: Develop and approve a terms of reference for the application
Step 5: Prepare and submit the application
Step 6: Review the application
Step 7: Prepare the assessment report and refer the application to the ministers responsible for the project
Step 8: Decide whether to issue an environmental assessment certificate

Source: B.C. EAO 2003

The provincial EA process follows an eight-step approval process (table 5.3). A proposed project must be considered "reviewable" before the provincial EA process is initiated. Projects are considered reviewable "if it is listed in the *Reviewable Projects Regulation* promulgated under the 2002 *B.C. EAA*, if the Minister of Sustainable Resource Management determines the project is reviewable, or if the proponent asks B.C. EAO to consider the project as reviewable (B.C. EAO 2003 in OOGRG 2004: 83). However, the executive director of the B.C. EAO may exclude projects from the provincial EA process even if projects are included in the *Reviewable Projects Regulation* (OOGRG 2004). Section 10(1) of the 2002 *B.C. EAA* describes the powers of the executive director:

> 10(1) The executive director by order
> (a) may refer a reviewable project to the minister for a determination under section 14,
> (b) if the executive director considers that a reviewable project will not have a significant adverse environmental, economic, social, heritage or health effect, taking into account practical means of preventing or reducing to an acceptable level any potential adverse effects of the project, may determine that
> (i) an environmental assessment certificate is not required for the project, and

(ii) the proponent may proceed with the project without an assessment (in OOGRG 2004: 83-84).

If the *B.C. EAA* is deemed to apply to proposed projects, the second step in the process considers the review path of an application. In most cases, either the B.C. EAO or the minister of sustainable resource management manages the EA process (OOGRG 2004). However, as discussed previously, the executive director of the B.C. EAO may waive an assessment if the director determines that no adverse effects will be generated as a result of the project (OOGRG 2004). The next step in the process involves developing an EA terms of reference for projects, a document that explains project information requirements, scope, and relevant procedures (OOGRG 2004). The next three stages in the provincial EA process involve submission and review of the application, preparation of an assessment report, and referral of the application to ministers responsible for the project. Finally, "the ministers then have 45 days to decide whether to issue an environmental assessment certificate, which usually contains project-specific conditions such as requirements for ongoing environmental monitoring" (B.C. EAO 2003 in OOGRG 2004: 84). However, decision-making criteria with respect to evaluation of EAs are not outlined (OOGRG 2004).

The provincial EA process has several weaknesses. Hertzog (2003 in OOGRG 2004) stated that the B.C. EAO has never turned down a project. The author suggests "that either all projects to date in B.C. have been environmentally sound or that B.C. EAO has leaned more towards development rather than environmental protection" (Hertzog 2003 in OOGRG 2004: 84).

The *B.C. EAA* also does not adequately address public and First Nations' consultation (Boyd 2003 in OOGRG 2004). Requirements for a "project committee", which include public and First Nations representatives, were eliminated when the *B.C. EAA* was revamped in 2002. The 2002 *B.C. EAA* also eliminated "requirements to assess the cumulative effects of a project, the need for and alternatives to a project, and an introductory section that emphasizes sustainability" (Boyd 2003 in OOGRG 2004: 85).

Furthermore, other provincial statutes have changed the EA process in B.C. In 2003, the *Significant Project Streamlining Act (SPSA)* was passed by the provincial government, which essentially:

> . . . gives the B.C. Cabinet and individual ministers extraordinary powers to overrule provincial or local government laws, regulations or bylaws if they are perceived as being 'constraints' to development projects that the government designates as 'provincially significant' (WCEL 2003 in OOGRG 2004: 85).

In effect, even though the *SPSA* states that the province must meet all requirements of the *B.C. EAA*, provincially significant projects may be exempt from review processes (OOGRG 2004). In summary, the *B.C. EAA* is deficient because:

- Public and First Nations consultation are inadequate;
- An assessment of cumulative project effects is not mandatory; and
- EAs for major projects are not required to be carried out (OOGRG 2004).

5.2.2.5 Environmental Assessment Cooperation

Federal and provincial EA processes are also characterized by jurisdictional overlap. To address this issue, governments have signed cooperation agreements to clarify roles and responsibilities. The two governments signed the *Canada-British Columbia Agreement on Environmental Assessment Cooperation* in 1997 "in order to establish a single EA process, avoid duplication, and carry out EAs in an efficient manner when both EA processes apply" (OOGRG 2004: 85). Federal and provincial governments signed a new version of the agreement in 2004. While the agreement attempted to clarify EA harmonization, the document fell short of doing so because it used ambiguous wording. For example, subsection 12(1) of the new agreement describes processes for determining the lead party when both EA processes overlap:

> (a) Canada will be the Lead Party for proposed projects on federal lands where Canada has an environmental assessment responsibility;
> (b) British Columbia will be the Lead Party for proposed projects on lands within its provincial boundary, not covered under paragraph (a), where British Columbia has an environmental assessment responsibility; and

(c) If a project is located on both federal and provincial lands and both Parties have an environmental assessment responsibility, the Lead Party will be determined by mutual agreement of the Parties (Governments of Canada and British Columbia 2004: 5-6).

The agreement is also unclear in others areas. For example, subsection 15(1) discusses processes for establishing a joint review panel for cooperative EAs:

> For a cooperative environmental assessment, where British Columbia determines, in accordance with the British Columbia *Environmental Assessment Act*, that the assessment should be conducted by a commission or hearing panel, or where Canada determines that the project subject to the cooperative environmental assessment should be referred to a review panel pursuant to the *Canadian Environmental Assessment Act*, the Party making such a determination will immediately notify the other Party of that determination and consult on the possible establishment of a joint review panel for the project (Governments of Canada and British Columbia 2004: 7).

The new *Agreement* also discusses formulation of project work plans, dispute resolution procedures, and First Nations participation (OOGRG 2004).

5.2.2.6 First Nations and Public Consultation in Environmental Assessment

Federal and provincial legislation do not adequately address First Nations and public consultation. Mandatory requirements for project committees and First Nations participation were eliminated from the *B.C. EAA* with the 2002 amendments (Rankin 2004 in OOGRG 2004). Furthermore, the new *Provincial Policy for Consultation with First Nations* lacks clarity, even though the provincial government has stated that it is willing to consult aboriginal people (OOGRG 2004). For example, the provincial policy is ambiguous in terms of consultation requirements and procedures:

- Consultation processes can be carried out in a variety of ways, depending on the circumstances and nature of the proposed activity. Methods for meaningful consultation should be selected in relation to the nature of the proposed activity, the requests of the First Nation in question (where those are reasonable), the soundness of the aboriginal interests that are at issue, and other relevant factors; and

- The consultation process will inform the First Nation(s) in question of the potential effect of a proposed activity. Information should be provided in a manageable and understandable format, with adequate time for review, wherever possible within the context of time limits imposed for the making of statutory decisions (B.C. 2002b: 19-20).

Extent of public consultation in the federal EA process varies with the type of review. For screenings, public participation is at the discretion of the federal government (OOGRG 2004). Comprehensive studies only require that the public be notified of a project and be given opportunity to provide written comments (Boyd 2003 in OOGRG 2004). However, the public is able to participate more directly if a panel review is required. All citizens are allowed to participate in EA scoping meetings to identify issues for the review panel and are permitted to present evidence, concerns, and recommendations to the review panel during proceedings (Canada CEAA 2003). Despite these provisions, Rankin (2004 in OOGRG 2004) stated "the federal legislation makes no greater provision for aboriginal and public participation in the EA process than does the *B.C. EAA*" (86).

5.2.3 First Nations

First Nations may have jurisdiction over aspects of pipeline, port, and tanker projects in B.C. This jurisdiction stems from either self-government rights or Aboriginal rights and title, which include rights to make land use decisions in areas subject to Aboriginal title (OOGRG 2004). Donovan and Griffith (2003) explained that:

> First Nations of British Columbia have unextinguished treaty and aboriginal rights that may include aboriginal title, a right in the land itself. Crown actions such as legislation, regulation, and permitting resource use and development have the potential to infringe treaty and aboriginal rights (1).

Aboriginal rights are defined as "rights to engage in certain activities that are held by aboriginal people as a communal group, pursuant to the integral role these activities play in the culture of the group holding the right" (Donovan and Griffith 2003: 3). Aboriginal title is a specific type of Aboriginal right, in the sense that "Aboriginal title includes the right to exclusive use and occupation of the land, the right to choose the use to which the land is put, and an economic component" (Donovan and Griffith 2003: 5).

5.2.3.1 Aboriginal Rights

Aboriginal and treaty rights receive constitutional protection under Section 35 of the *Constitution Act*, 1982 (Donovan and Griffith 2003; OOGRG 2004). To be considered an Aboriginal right, First Nations activities:

> . . . must be an element of a practice, custom or tradition integral to the distinctive culture of the aboriginal group claiming the right. To be integral, a practice, custom or tradition must be of central significance to the aboriginal society in question – one of the things which made the culture of the society distinctive. The practices or customs and traditions which constitute aboriginal rights are those which have continuity with the practices, customs and traditions that existed prior to contact with European society (*R. v. Van der Peet* [1996] 2 S.C.R. 507 in OOGRG 2004: 74).

Furthermore, in *R. v. Van der Peet*, the Supreme Court of Canada (SCC) concluded that even if activities are interrupted temporarily, they may still be considered continuous (OOGRG 2004). OOGRG (2004) noted "a practice, custom or tradition existing prior to European contact, and resumed after an interval, may still form the basis for an aboriginal right" (74). In addition, Donovan and Griffith (2003) noted that the *R. v. Van der Peet* decision provided guidelines in determining the scope of Aboriginal rights:

> (a) The practice must have been integral to the culture prior to contact with European society.
>
> (b) Incidental or occasional activities do not qualify. Nor do aspects of an Aboriginal society that are true to everyday society.
>
> (c) The scope and content of the Aboriginal right must be determined on a case by case basis (3).

5.2.3.2 Aboriginal Title

OOGRG (2004) explained that "Aboriginal title relates solely to Aboriginal interests in the land itself and confers an exclusive right to use and occupy such lands" (74). Donovan and Griffith (2003) noted that issues surrounding the existence of Aboriginal title were initially brought forth in the case of *Calder vs. British Columbia*, [1973] S.C.R. 313 (S.C.C.). In this case, "three justices of the Supreme Court of Canada decided that Aboriginal title had been extinguished in British Columbia, and three justices decided that Aboriginal title had not been extinguished in British Columbia" (Donovan and Griffith 2003: 5).

In *Delgamuukw v. British Columbia* [1997] 3 S.C.R. 1010, the court concluded that Aboriginal groups must have been exclusive occupants of the territory prior to 1846, the time at which the Crown asserted sovereignty in B.C. (OOGRG 2004). Furthermore, "the group claiming title to the land must have the capacity and intention to retain exclusive control of the land" (Rankin 2004 in OOGRG: 74). It is also important to note "no Aboriginal title claim has been completed in British Columbia since *Delgamuukw*" (Donovan and Griffith 2003: 6).

Currently, a number of Aboriginal title claims exist with respect to land and marine areas in B.C. The provincial treaty process has been partially completed for the Haisla, Heiltsuk, and Tsimshian Nations (B.C. Treaty Commission (B.C. TC) 2004). Haisla Nation treaty negotiations made significant progress over the past year, as parties continued discussions and completed several procedural chapters (B.C. TC 2004). In May 2001, the Heiltsuk Nation temporarily withdrew from treaty negotiations to review its mandate and to reconsider its participation in the process (B.C. TC 2004). B.C. TC (2004) stated that the Heiltsuk "have since extended this to await the outcome of the negotiations currently being conducted at the four Stage 5 tables" (22). The Tsimshian Nation also decided to engage in provincial treaty negotiations processes, but the Nation struggled in 2004 to address internal governance and treaty funding issues (B.C. TC 2004).

However, the Haida Nation rejected provincial treaty processes altogether and claimed "aboriginal title over all of Haida Gwaii [its aboriginal name and known as the

Queen Charlotte Islands] including the seabed resources of over half of Hecate Strait and 320 kilometers out into the Pacific Ocean" (Anonymous 2002 in OOGRG 2004: 74). The Haida Nation filed a lawsuit to address its Aboriginal title claim (B.C. TC 2004). Case law indicated that the Haida Nation may be able to resolve its claim, since "there is reasonable probability that the Haida will be able to establish Aboriginal title to at least some parts of the coastal and inland areas of Haida Gwaii" (*Haida et al. v. Minister of Forests et al.* [2000] B.C.S.C. 1280 in OOGRG 2004: 75).

Therefore, since federal and provincial governments have yet to recognize several Aboriginal title claims on B.C.'s north coast, the only option to assert Aboriginal title to land and marine areas currently appears to be through court processes.

5.2.3.3 Justification of Section 35 Infringements

While Aboriginal rights and title do receive constitutional protection, an infringement of section 35 of the *Constitution Act* is permitted in certain cases. OOGRG (2004) indicated "the government can justify an infringement of s. 35 if it satisfies the test outlined in the Supreme Court of Canada case, *R. v. Sparrow*, [1990] 1 S.C.R. 1075, whereby the infringement would be allowed if it were the result of government pursuing a legitimate objective" (75). For example, infringement of an Aboriginal right or title was considered in *R. v. Gladstone*:

> As distinctive aboriginal societies exist within, and are a part of, a broader social, political and economic community, over which the Crown is sovereign, there are circumstances in which, in order to pursue objectives of compelling and substantial importance to that community as a whole (taking into account the fact that aboriginal societies are a part of that community), some limitation of those rights will be justifiable (in OOGRG 2004: 75).

Justification for infringements was also considered in *Delgamuukw v. British Columbia*:

> In my opinion, the development of agriculture, forestry, mining, and hydroelectric power, the general economic development of the interior of British Columbia, protection of the environment or endangered species, the building of infrastructure and the settlement of foreign populations to support those aims, are the kinds of objectives that are consistent with this

> purpose and, in principle, can justify the infringement of aboriginal title (in OOGRG 2004: 75).

Therefore, infringement of Section 35 may be justified if development projects are likely to generate significant economic development opportunities. However, OOGRG (2004) explained that "if the government proceeds with such development projects, it still has a fiduciary obligation to First Nations, as provided for by *Delgamuukw v. British Columbia* (at para. 203), to pay fair compensation" (75).

5.2.3.4 Duty to Consult and Accommodate

The federal and provincial governments' duty to consult First Nations is summarized by Donovan and Griffith (2003) as follows:

> The duty to consult with respect to Crown activities that infringe on aboriginal title or rights arises from the Crown's common law fiduciary duty to First Nations, and as a result of the 1982 entrenchment of these common law rights in s. 35(1) of the Charter (7).

Justification of Section 35 infringements requires "the province and third parties to undertake meaningful consultation with affected First Nations, conducted in good faith" (OOGRG 2004: 75). To be meaningful, consultation must include collection and analysis of adequate information to determine effects of the proposed project on Aboriginal rights or title (OOGRG 2004).

In *Taku River Tlingit First Nation* (TRTFN) *v. Ringstad et al.* (*Taku River Tlingit First Nation v. Ringstad et al.* [2002] B.C.C.A. 59 in OOGRG 2004), the B.C. Supreme Court concluded that the duty to consult applies even in situations where Aboriginal title has yet to be proven. The province appealed the case, based on the argument that the government did not have a duty to consult the TRTFN, since Aboriginal rights or title had not been proven in court (OOGRG 2004). However, the B.C. Court of Appeal concluded that if the project under consideration were approved, the province would be violating the *Constitution Act* with respect to Aboriginal rights (OOGRG 2004). Furthermore, the effect of this violation would essentially rob "s. 35 (1) of much of its constitutional significance, effectively ending any prospect of meaningful negotiation or settlement of aboriginal land claims" (Dolha 2003 in OOGRG 2004: 76).

In addition, case law dealing with the duty to consult and accommodate Aboriginal people continues to evolve, as demonstrated by two recent decisions by the SCC. The duty to consult and accommodate Aboriginal people was considered in *Taku River Tlinglit First Nation v. British Columbia (Project Assessment Director)* (2004 SCC 74). The TRTFN objected to construction of a road through part of its traditional territory that was needed in order to facilitate reopening of an old mine. The TRTFN had participated extensively in the provincial EA process but still contended that their interests in the project were not accommodated and that provincial consultation was inadequate. While lower courts found that the province had failed to meet its duty to consult and accommodate the TRTFN, the SCC concluded that the Crown's obligation to consult and accommodate was fulfilled in the case:

> The TRTFN's role in the environmental assessment was, however, sufficient to uphold the Province's honour and meet the requirements of its duty. Where consultation is meaningful, there is no ultimate duty to reach agreement. Rather, accommodation requires that Aboriginal concerns be balanced reasonably with the potential impact of the particular decision on those concerns and with competing societal concerns. Compromise is inherent to the reconciliation process. In this case, the Province accommodated TRTFN concerns by adapting the environmental assessment process and the requirements made of Redfern in order to gain project approval (*Taku River Tlinglit First Nation v. British Columbia (Project Assessment Director)* 2004 SCC 74: para. 2).

However, while there is a clear duty to consult and accommodate Aboriginal people prior to making decisions that might negatively impact lands subject to rights and title claims, the SCC concluded that consultation activities are dependent on the context of proposed projects. Indeed, since each EA project is different, the SCC found that "it is impossible, however, to provide a prospective checklist of the level of consultation required" (*Taku River Tlinglit First Nation v. British Columbia (Project Assessment Director)* 2004 SCC 74: 2).

In *Haida Nation v. British Columbia (Ministry of Forests)* (2004 SCC 73), replacement and transfer of a timber forest license on Haida Gwaii were allegedly approved despite repeated objections from the Haida Nation. The SCC concluded that the provincial government has a duty to consult and accommodate Aboriginal people even when asserted Aboriginal rights and title claims have yet to be proven. Furthermore, the SCC found that the duty to consult and accommodate Aboriginal people cannot be transferred to a third party:

> The effect of good faith consultation may be to reveal a duty to accommodate. Where accommodation is required in making decisions that may adversely affect as yet unproven Aboriginal rights and title claims, the Crown must balance Aboriginal concerns reasonably with the potential impact of the decision on the asserted right or title with other societal interests. Third parties cannot be held liable for failing to discharge the Crown's duty to consult and accommodate. The honour of the Crown cannot be delegated, and the legal responsibility for consultation and accommodation rests with the Crown. This does not mean that third parties can never be liable to Aboriginal people (*Haida Nation v. British Columbia (Minister of Forests)* 2004 SCC 73: 2).

To address concerns with respect to First Nations consultation, the provincial government developed a new strategy in 2002. The *Provincial Policy for Consultation with First Nations* "recognizes that consultations with First Nations should occur before government makes any decisions related to land- and resource-use issues" (OOGRG 2004: 76). The consultation process consists of four steps:

1) Initiate consultation;
2) Consider the impact of the decision on aboriginal interests;
3) Consider whether any likely infringement of aboriginal interests could be justified in the event that those interests were proven subsequently to be existing aboriginal rights and/or title; and
4) Look for opportunities to accommodate aboriginal interests and/or negotiate resolution bearing in mind the potential for setting precedents that may impact other Ministries or agencies (B.C. 2002b in OOGRG 2004: 76).

While the *Policy* applies to all provincial bodies and is based on consultation principles developed in case law, it may be changed at any time since it is not entrenched in legislation (OOGRG 2004).

Donovan and Griffith (2003) stated that the *Policy* has experienced a number of problems related to its administration and implementation. Specifically, Donovan and Griffith (2003) observed that:

> Under a heightened awareness of their duty to consult and accommodate, some decision-makers and their staff are keeping detailed logs of any contact or communication they have with a First Nation, to be used as a record of the 'consultation' they have undertaken. The decision-maker might log a simple phone call to try to arrange a meeting as a consultation attempt. The result is a discrepancy between what the province is labeling as 'consultation', and real consultation (16-17).

In addition, Donovan and Griffith (2003) argued that First Nations are not being informed as to which level of consultation within the *Policy* has been attained. This process makes First Nations increasingly frustrated with consultation processes and strains limited resources of such groups to resolve issues (Donovan and Griffith 2003).

The duty to consult with Aboriginal peoples has also received substantial attention at the NEB. The board is of the opinion "that imposing on the Board a fiduciary duty towards Aboriginal peoples as part of its decision making process is inconsistent with its function as an independent quasi-judicial tribunal" (Canada NEB 2002a: 1). However, the NEB does understand that it must ensure that its decisions do not violate the *Constitution Act* (Canada NEB 2002a). The board still must determine if the Crown has engaged in adequate and appropriate consultation prior to issuing decisions that may interfere with aboriginal rights (Canada NEB 2002a).

5.3 Evaluation of Regulatory Structures and Approval Processes

This section evaluates regulatory and approval processes for pipelines, port, and tanker projects. The evaluation framework is based on "best practices" criteria (table 5.4). "Best practices" evaluative criteria are based on a review the following literature: Bardach 2000; Baker and McLelland 2003; B.C. 2002b; Calbick 2003; *Council of the Haida et al. v. Minister of Forests et al.* 2000; Doyle and Sadler 1996; Elliott 1997; Gilpin 1995; Gunton 1991; Innes and Booher 1999; International Association for Impact Assessment (IAIA) 1999; Laswell 1971; Mazmanian and Sabatier 1989; OOGRG 2004; Sadar 1996; *Taku River Tlinglit First Nation v. Ringstad et al.* 2002; Weimer and Vining 1998; and Wood 1995. Each criterion is assessed as fully met, partially met, or not met. The evaluation framework in this report is largely based on criteria developed in OOGRG (2004).

Table 5.4: Regulatory and Approval Processes Evaluation Criteria

Best Practice Principle	Discussion	Assessment
1. ***Roles and Responsibilities:*** should be clearly defined.	Roles and responsibilities of parties are clearly defined in some cases, but not in others.	Partially Met
2. ***Legislative Base:*** the structure of the management regime should be formally structured through legislation or regulation.	The regulatory system is formally structured in legislation, but overlapping federal and provincial legislation leads to confusion.	Partially Met
3. ***Decision-Making Criteria and Methods:*** the decision-making process should be based on clear criteria and methods for assessing options.	Decision-making criteria and evaluation methods are not explicitly outlined and processes do not take into account competing projects.	Not Met
4. ***Efficiency:*** decisions should be reach in a timely manner at a reasonable cost.	Decision-making processes may be costly and lengthy, but recent pipeline projects have been approved in a timely manner.	Partially Met
5. ***Stakeholder Involvement:*** a framework should be in place to ensure that stakeholders are fully engaged in the decision-making process through shared decision making.	Stakeholders are involved in regulatory and approvals processes to some extent, but consultation methods are not based on shared decision making.	Partially Met
6. ***First Nations:*** legal and fiduciary obligations, such as to consult and address First Nations interests, should be fully met.	Case law suggests that governments must consult and accommodate concerns of First Nations, but court processes are costly and lengthy, while outcomes are uncertain.	Partially Met
7. ***Monitoring and Enforcement:*** the regulatory framework should clearly outline monitoring and enforcement processes, infractions, and penalties.	Monitoring and enforcement activities are carried out by regulatory agencies.	Met
8. ***Equity***: the decision-making process should contain a legal obligation to provide compensation to those negatively affected by the project.	Equity and compensation issues are not adequately addressed.	Not Met
9. ***Resources:*** decision-making bodies should have sufficient resources in place to ensure effective and efficient decision-making processes.	Regulatory agencies have been provided with adequate resources.	Met

Best Practice Principle	Discussion	Assessment
10. Appeal Process: the decision-making process should include a mechanism to allow stakeholders to appeal a decision.	Regulatory decisions can be appealed to the courts in certain instances, but such processes are costly and lengthy.	Partially Met
11. Adequate Information: decisions should be based on adequate information.	Information with respect to the Gateway Project will be required as part of approval processes.	Met
12. Democratic Accountability: the management regime should be structured such that impartial decision-makers represent the publics' interests, and are directly, or indirectly, accountable through democratic processes to those affected by the decision.	Democratically elected officials are the ultimate decision makers for projects, but many decisions have been delegated to civil servants who are not accountable to stakeholders.	Partially Met

Source: Based on OOGRG 2004

5.3.1 Roles and Responsibilities

Principle: *Roles and responsibilities should be clearly defined.* Administrative structures and policy should provide clear guidance and clearly outline levels of authority and responsibilities, including those relationships that require multijurisdictional collaboration such as EA processes (OOGRG 2004: 92).

Evaluation: Jurisdiction over certain aspects of pipeline, port, and tanker projects has been clearly defined. The NEB regulates construction and operation of interprovincial pipelines. Approval of proposed marine terminals and tanker routes will likely involve a TERMPOL review under the jurisdiction of DFO and Transport Canada. However, roles and responsibilities of some parties are unclear due to a certain degree of jurisdictional overlap. For example, while OGC is likely to be involved in project approval, extent of such involvement is unclear since the NEB has jurisdiction to regulate interprovincial pipelines. Furthermore, First Nations also have a legal role in decision-making processes, based on Aboriginal rights and title claims, but this role has not been clearly defined.

Roles and responsibilities of parties involved in EA processes are also poorly defined. Pipeline, port, and tanker projects are likely to be subject to both federal and provincial EA processes. However, the *Canada-British Columbia Agreement on Environmental Assessment Cooperation* is ambiguously worded and does not adequately outline the level of EA collaboration between the two governments. The agreement also fails to clearly define circumstances that determine which government assumes the lead agency role when both parties have an EA responsibility. Therefore, since certain roles and responsibilities have been clearly defined while others have not, this criterion is only partially met.

5.3.2 Legislative Base

Principle: *The structure of the management regime should be formally structured through legislation and regulations.* A formal structure gives decision makers the authority to carry out their roles, as well as explicitly outlining their level of authority, role, and responsibilities. This ensures that the responsibilities, timelines, processes, information requirements, and authority are transparent and clear (OOGRG 2004: 92).

Evaluation: Regulatory structures for pipeline, port, and tanker projects have been formally structured in legislation and regulations. However, certain aspects of the regulatory system are not adequately addressed. For example, EA processes do not require assessments to be conducted for all projects and, even if an assessment is undertaken for a proposed project, the content of the assessment and decision-making criteria used are not explicitly defined. In addition, many aspects of decision-making processes are left to the discretion of federal and provincial governments. For example, the NEB is permitted to exempt certain pipeline activities from approval, while the application of EA processes and requirements for EA content are left to the discretion of federal and provincial authorities. Legislative frameworks are also clearly deficient with respect to public and First Nations consultation. Furthermore, federal and provincial legislation are inconsistent and frequently overlap. Accordingly, while a legislative basis exists for approval of pipeline, port, and tanker projects, regulatory and approvals processes are highly discretionary and unclear. Therefore, this criterion is only partially met.

5.3.3 Decision-Making Criteria and Methods

Principle: *The decision-making process should be based on clear criteria and methods for assessing options.* The decision-making process should be transparent using clear decision-making criteria, sound methods of analysis, and rules that clarify how decisions will be made (OOGRG 2004: 94).

Evaluation: OOGRG (2004) stated "many jurisdictions specify the criteria and types of analytical methods such as multiple accounts evaluation or cost-benefit analysis that must be used in assessing options and formulating recommendations" (94). With respect to pipeline, port, and tanker projects, decision-making criteria and evaluation methods used in approvals processes are not explicitly outlined. For example, the NEB simply states "it is the responsibility of the NEB to consider all aspects of the project in order to determine if the pipeline project is in the public interest" (Canada NEB 2003b: 21). Furthermore, TERMPOL review and EA processes are equally vague with respect to decision-making criteria.

Furthermore, effective decision-making processes must take into account alternatives to a proposed project. In addition to the Gateway Project, two other crude oil pipeline projects have been proposed to transport Alberta oil sands production to market. Terasen Pipelines proposed an expansion of its existing Trans Mountain pipeline system, which currently transports crude oil from Edmonton, Alberta to Vancouver, B.C. (Terasen Pipelines 2005). Currently, the company is in the process of assessing two development options. The Northern Option would develop a pipeline from Edmonton to a deep-water port at either Kitimat or Prince Rupert on the B.C. coast, similar to the Gateway Project. The Southern Option would expand the current system by developing a second pipeline adjacent to the existing Trans Mountain pipeline. This option also includes development of an additional berth at the Westridge Marine Terminal in Vancouver and expansion of facilities in Sumas, Washington. Regardless of which option is selected, the proposed pipeline would increase the Trans Mountain system from its current capacity of 225,000 BPD to 850,000 BPD by 2010 (Terasen Pipelines 2005).

TransCanada Pipelines proposed a 3,000-kilometer crude oil pipeline, with approximate capacity of 400,000 BPD, from Hardisty, Alberta to southern Illinois (TransCanada Pipelines Limited 2005). The Keystone Pipeline is expected to begin operations in 2008 or 2009. This project would include:

- Conversion of 1,240 kilometers of an existing natural gas pipeline to crude oil service in Alberta, Saskatchewan, and Manitoba;
- Construction of new pipeline segments from Hardisty, Alberta to Forestburg, Alberta (70 kilometers) and from Winnipeg, Manitoba to the Canada/U.S. border (90 kilometers); and
- Development of a 1,600-kilometer pipeline from the Canada/U.S. border to southern Illinois (TransCanada Pipelines Limited 2005).

Regulatory and approval processes must take into account other competing projects to ensure effective resource management. Accordingly, the Gateway Project should be evaluated in conjunction with the Trans Mountain Expansion Project and the Keystone Pipeline Project to determine the most appropriate means of transporting Alberta crude oil to market. To date, the NEB has not established a comprehensive process to evaluate the three projects concurrently. Therefore, this criterion is not met.

5.3.4 Efficiency

Principle: *Decisions should be reached in a timely manner at a reasonable cost.* The decision-making process should not be constrained by lengthy appeal processes, or delays, due to the lack of a clear decision-making framework or blurred roles and responsibilities. The process should be effective in the sense that outcomes should be consistent with goals and objectives, implementable and in the public interest (OOGRG 2004: 95).

Evaluation: Decision-making processes for pipeline, port, and tanker projects in B.C. may be both lengthy and costly due to overlapping regulatory and approvals processes, inadequate policy frameworks, and uncertainty with respect to Aboriginal rights and title claims. If such issues are not adequately addressed at the outset of decision-making processes, potential projects may be significantly delayed by litigation. However, decisions on many recently completed pipeline projects have been reached in a timely manner, such as the Alliance Pipeline in western Canada, Express Pipeline in Alberta, and Southern Crossing Pipeline in B.C. (B.C. Gas Utility Inc. 1998; Canada NEB 1996, 1998). These results indicate that there is potential for efficient decision-making processes. Therefore, this criterion is partially met.

5.3.5 Stakeholder Involvement

Principle: *A legal framework should be in place to ensure that stakeholders are fully engaged in the decision-making process through shared decision making.* Sound decisions must be based on the values, objectives, and risk assessments of those stakeholders affected by the decision. Therefore, stakeholders need the opportunity to participate effectively in decision making. An effective stakeholder process delegates responsibility for assessing options and developing recommendations to stakeholder tables that engage in consensus-based negotiations to reach agreement. This process, which is termed shared decision making (SDM) by the B.C. government, results in decisions that are more likely to be in the public's best interest by addressing the concerns of all affected parties (OOGRG 2004: 95). In addition, adequate financial support for stakeholders to participate in decision-making processes should be made available (OOGRG 2004: 97).

Evaluation: Many stakeholders are likely to be involved in decision-making processes with respect to pipeline, port, and tanker projects. Decision-making processes will involve federal, provincial, and First Nations governments and agencies, industry and private interests, regional and local communities, nongovernmental organizations, environmental groups, other resource users such as recreational interests, and the public. While regulatory and approvals processes outlined in this report do include a certain degree of stakeholder involvement, in most cases stakeholders are only given opportunities to provide comments on proposed projects. Furthermore, case law indicates that federal and provincial governments are required to engage in meaningful consultation with First Nations and attempt to accommodate Aboriginal interests.

However, consultation methods used in federal and provincial decision-making processes are not necessarily based on principles of SDM and therefore do not provide adequate opportunities for stakeholder engagement. NEB, DFO, Transport Canada, and EA processes do not delegate responsibility for assessing options and developing recommendations to stakeholder tables; do not use consensus-based decision-making rules; do not equitably distribute power among stakeholders; and do not allow stakeholders to collectively define goals and objectives, set ground rules, or agree on procedures.

In addition, regulatory and approvals processes in B.C. with respect to pipeline, port, and tanker projects do not include provisions for stakeholder resources and funding. However, the federal government has developed a participant funding program to ensure stakeholder participation in the EA process. The federal participant funding program was designed " to help concerned citizens and organizations participate in the environmental assessment of projects being assessed by a comprehensive study, mediator or review panel" (Canada CEAA 2003: 28). Despite the development of this program, Boyd (2003 in OOGRG 2004) suggested that funding available to stakeholders through the federal participant funding program is inadequate. In summary, much of the obligation to consult is at the discretion of government and project proponents and considerable improvement is needed to ensure that stakeholders have adequate resources to participate in decision-making processes. Therefore, this criterion is only partially met.

5.3.6 First Nations

Principle: *Legal and fiduciary obligations, such as the duty to consult and address First Nations' interests, should be fully met* (OOGRG 2004: 95).

Evaluation: Case law indicates that First Nations have a legal right to make land use decisions with respect to areas subject to Aboriginal title claims. The Haida, Haisla, Heiltsuk, and Tsimshian Nations have all claimed certain land and marine areas on B.C.'s north coast. While federal and provincial governments have not recognized Aboriginal title claims in these areas, case law suggests that governments must consult and attempt to accommodate concerns of First Nations in decision-making processes. While the B.C. government has formally developed a First Nations consultation policy to address consultation and accommodation issues, the policy has deficiencies (Donovan and Griffith 2003; OOGRG 2004).

The NEB encourages public participation in review processes, but has stated that "imposing on the Board a fiduciary duty towards Aboriginal peoples as part of its decision making process is inconsistent with its function as an independent quasi-judicial tribunal" (Canada NEB 2002a: 1). TRP also has limited opportunities for First Nations consultation and involvement. Federal and provincial EA processes stress the need for consultation with affected parties, but the extent of such consultation is both ambiguous and unclear. While the courts provide a means of enforcing obligations to First Nations, such processes pose significant obstacles in terms of cost and time. Therefore, this criterion is only partially met.

5.3.7 Monitoring and Enforcement

Principle: *The regulatory framework should clearly outline monitoring and enforcement processes, infractions, and penalties.* An effective monitoring and enforcement strategy, based on principles of adaptive management, ensures environmental, economic, and social goals are achieved during all project phases. Compliance monitoring processes and penalties for noncompliance should be clearly outlined and results made available to all interested parties, including the public (OOGRG 2004: 96).

Evaluation: Monitoring and enforcement for pipeline, port, and tanker projects are required by various government agencies. The NEB requires that pipeline companies develop monitoring programs to include provisions for regular patrols and inspections during construction and operations, ongoing communication with stakeholders, emergency procedures, and other safety concerns (Canada NEB 2003b). The NEB also monitors pipeline performance through field inspections and by requesting that companies submit Assurance of Voluntary Compliance (AVC) reports (Canada NEB 2003b). In terms of enforcement, the NEB may revoke or suspend the company's certificate for public convenience and necessity or issue sanctions for noncompliance (Canada NEB 2003b).

Similarly, through TRP, Transport Canada and DFO require that project proponents submit information with respect to proposed monitoring programs, contingency plans, mitigation measures, and emergency procedures (Canada Transport Canada 2001). The mandate for Transport Canada also includes responsibilities with respect to vessel inspection and enforcement of marine safety programs (Canada Transport Canada 2003). Accordingly, this criterion is met.

5.3.8 Equity

Principle: *The decision-making process and outcomes should contain a legal obligation to provide compensation to those negatively affected by the project* (OOGRG 2004: 97).

Evaluation: Regulatory and approvals processes for pipeline, port, and tanker projects do not adequately address issues of equity and compensation. The NEB clearly states that it does not have jurisdiction over compensational matters, since land use compensation is typically negotiated between landowners and pipeline companies (Canada NEB 2003b). Similarly, EA, Transport Canada, DFO, and LWBC processes do not include provisions for compensating stakeholders who are negatively affected as a result of a project. Projects may include negotiation of IBAs between proponents and First Nations to address employment, training, economic development, business opportunities, and community support issues. However, such agreements are not required by regulatory agencies and are at the discretion of project proponents. Therefore, this criterion is not met.

5.3.9 Resources

Principle: *Decision-making bodies should have sufficient resources in place to ensure an effective and efficient decision-making process.* Sufficient resources include adequate financial and human resources to carry out project evaluation and monitoring (OOGRG 2004: 97).

Evaluation: Regulatory agencies have been provided with resources in order to carry out evaluation and monitoring of pipeline, port, and tanker projects. Based on past experience and contemporary examples, such as the Mackenzie Gas Project in northern Canada, adequate resources will be provided to relevant authorities to carry out decision-making responsibilities with respect to the Gateway Project. Accordingly, this criterion is met.

5.3.10 Appeal Process

Principle: *The decision-making process should include a mechanism to allow stakeholders to appeal a decision.* If decisions breach procedural requirements, prescribed guidelines, or goals and objectives, then stakeholders should be afforded the right to challenge such decisions. The appeal process should be efficient and narrowly defined to eliminate delays to the decision-making process. Moreover, the appeal board or tribunal should have sufficient expertise to render such decisions (OOGRG 2004: 97-98).

Evaluation: While regulatory decisions can be appealed to the courts in certain instances, court appeals are costly, lengthy, and based on unclear decision-making criteria. EA processes and TRP do not provide mechanisms enabling stakeholders to appeal tribunal decisions. However, if stakeholders do not agree with a decision made by the NEB, the board permits stakeholders to request a review of the board's decision on the application. Therefore, this criterion is partially met.

5.3.11 Adequate Information

Principle: *Decisions should be based on adequate information to make a decision.* Adequate scientific and technical information regarding potential environmental and socioeconomic impacts of projects must be available. Such information should be subject to rigorous scrutiny by the management regime before a decision is made (OOGRG 2004: 98).

Evaluation: To ensure that pipeline, port, and tanker projects receive necessary regulatory approvals, information must be collected and synthesized with respect to potential environmental and socioeconomic impacts of such projects. While adequate scientific and technical information concerning the Gateway Project does not currently exist, regulatory processes will require provision of such information prior to making a decision on the project. Therefore, this criterion is met.

5.3.12 Democratic Accountability

Principle: *The management regime should be structured such that impartial decision makers represent the publics' interests, and are directly, or indirectly, accountable through the democratic process to those affected by the decision* (OOGRG 2004: 98).

Evaluation: Democratically elected officials are the ultimate decision makers with respect to pipeline, port, and tanker projects. However, delegation of decision making to civil servants is a characteristic of many of regulatory structures discussed in this chapter, including the NEB, Transport Canada, DFO, and federal and provincial EA regimes. Civil servants are not directly accountable to the public or to stakeholders. Furthermore, to ensure democratic accountability, stakeholder participation processes must be based on collaboration and SDM. As previously mentioned in this report, regulatory and approvals processes are clearly deficient in terms of stakeholder involvement. Therefore, this criterion is only partially met.

5.3.13 Evaluation Summary

The evaluation of regulatory and approval processes for pipeline, port, and tanker projects in B.C. reveals some serious deficiencies. Of the twelve best practice criteria used in the evaluation, three criteria have been fully met, seven criteria have been partially met, and two criteria have not been met (table 5.4). Accordingly, regulatory and approvals processes for pipeline, port, and tanker projects must address these deficiencies outlined in this evaluation to ensure for sound project decision making and management.

5.4 Conclusion

Federal, provincial, and First Nations governments will be involved in regulation and approval of pipeline, port, and tanker projects in B.C. At the federal level, key parties will include the National Energy Board, Fisheries and Oceans Canada, Transport Canada, Natural Resources Canada, and the Canadian Environmental Assessment Agency. At the provincial level, the Ministry of Sustainable Resource Management, the Oil and Gas Commission, Land and Water British Columbia Inc., and the B.C.

Environmental Assessment Office will also be involved in various capacities. In addition, case law indicates that First Nations will also have a certain level of jurisdiction over pipeline, port, and tanker projects stemming from Aboriginal rights and title claims. However, an evaluation of regulatory and approval processes indicates that management regimes for such projects are deficient in certain areas. To ensure sound decision-making and management processes, issues related to decision-making criteria, methods, and equity (among others) need to be improved before assessment processes begin to regulate and approve the Gateway Project.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

1. Construction and operation of pipelines may create numerous adverse effects on physiography and soils, surface and groundwater, air quality, noise, vegetation, wildlife, and fish and fish habitat (table 6.1). In addition, pipeline oil spills and accidents have potential to create detrimental effects on terrestrial and riparian environments.

2. Adverse impacts on terrestrial and marine ecosystems may occur as a result of port development and operational activities such as air pollution, water and contaminant discharges, dredged material and contaminated sediment disposal, ship and port solid waste generation, and oil spills (table 6.1).

3. Tanker traffic also has potential to severely damage the coastal marine environment due to air pollution and ballast water discharge.

4. The most significant environmental risk of the project is the risk of oil spills. Experience in other jurisdictions suggests that oil spills will occur and that potential exists for catastrophic oil spill events (table 6.1).

5. While several mitigation measures designed to minimize potential environmental impacts of pipeline, port, and tanker projects have been partially successful, all negative impacts cannot be avoided or eliminated completely. The accumulating evidence is that such changes may have long-term detrimental effects on ecosystems and affected populations.

Table 6.1: Summary of Potential Environmental Impacts

Project Component	Impact Category	Potential Impacts
Pipeline Construction and Operation	Physiography and Soils	• Loss of soil capability • Soil compaction, pulverization, rutting, and reduced percolation rate • Erosion and increased sediment load • Decreased terrain stability • Direct topsoil and subsoil loss
	Surface and Groundwater	• Changes in groundwater recharge and discharge rates and flow obstruction • Decreased water quality and quantity • Contamination from solid, industrial, and liquid wastes
	Air Quality	• Increased emissions due to burning of slash and debris, construction and operation of pump stations, and vehicle use • Increased dust from construction and maintenance vehicles
	Noise	• Negative effects on nearby residents, hunters, recreational users, and indigenous wildlife
	Vegetation	• Direct loss and alteration of vegetation • Changes to physical site conditions due to introduction of nonnative and invasive species • Disturbance of rare plants and traditional collecting sites
	Wildlife	• Direct habitat loss, alteration, or fragmentation leading to species loss • Disturbances on feeding, nesting, denning, or breeding patterns • Alteration of seasonal and daily movements of wildlife • Increased mortality due to greater human access to wildlife areas

Project Component	Impact Category	Potential Impacts
	Fish and Fish Habitat	• Direct species loss due to increased sedimentation, turbidity, flow disruption, trenching, or dredging in watercourses • Indirect species loss due to increased water use and access to fishing areas
	Oil Spills and Accidents	• Detrimental impacts on soils, water, and vegetation • Destruction of bird nests and feather contamination in waterfowl • Direct loss of wildlife due to contaminated food intake, reduced respiratory functions, or ingestion of oily water • Direct loss of water birds, livestock, fish, fish eggs, and larvae
Port Construction and Operation	Air Pollution	• Negative human health effects • Destruction of upper-atmosphere ozone • Generation of acid rain • Increased global warming • Destruction of agricultural resources, forest, and plant communities
	Water and Contaminant Discharges	• Direct and indirect loss of marine biodiversity and fishery resources • Ocean floor contamination and loss of benthic organisms
	Dredged Material and Contaminated Sediment Disposal	• Negative effects on plant and animal communities • Decreased water quality • Contamination of ocean sediments leading to species loss
	Ship and Port Generated Solid Waste	• Direct loss of marine mammals, sea turtles, seabirds, and fish due to entanglement or ingestion of marine debris • Reduced capacity of animals to forage, digest food, and absorb nutrients

Project Component	Impact Category	Potential Impacts
	Oil Spills and Accidents	• Direct loss of vegetation communities, bird and mammal populations, threatened and endangered species, fish populations, and benthic communities
Tanker Operations	Air Pollution	• Detrimental human health effects • Destruction of upper-atmosphere ozone • Increased acid rain • Increased global warming • Destruction of agricultural resources, forest, and plant communities
	Ballast Water Discharge	• Introduction of alien species • Increase mortality in marine birds • Generation of beach tar
	Accidents and Oil Spill Risks	• Direct loss of marine and terrestrial mammals, birds, and other species • Direct loss and/or decreased survival capacity in fish and fish larvae • Decreased water quality by chronic toxicity levels • Contamination of shorelines • Other negative effects due to oil spill clean-up techniques

Source: AAPA 1998, 2000; Aboriginal Pipeline Group et al. 2004; B.C. Gas Utility Ltd. 1998; Canada 1978; Canada NEB 1996, 1998, 2003a; Encana Ekwan Pipeline Inc. 2003; Environment Canada and U.S. EPA 2004; Foothills Pipe Lines (South Yukon) Ltd. 1979; OOGRG 2004; Salmo Consulting Inc. 1999; Taggart and McCracken 2002; Thompson 1978; U.S. DOI 1972, 2002; WCEL 2003; Westwater Research Centre 1977

6. Large-scale resource projects have significant socioeconomic impacts on local and regional communities (table 6.2). The Gateway Project will stimulate economic activity in the region through construction and operation of the pipeline and port. However, the project may also generate socioeconomic problems. Major projects create a boom-bust cycle characterized by a short-term increase in

employment followed by a rapid decline as construction is completed. This short-term stimulus can lead to large-scale in-migration that can stress community infrastructure through significant short-term increases in population and generation of inflation effects.

7. Pipeline, port, and tanker projects may create adverse socioeconomic impacts on regional demography, infrastructure, community wellness, traditional Aboriginal use and culture, other economic sectors, and heritage and archaeological resources (table 6.2).

8. Several measures are available to resource developers, governments, and First Nations communities to mitigate negative socioeconomic consequences of resource projects. Impact and benefits agreements (IBAs) exist as the most sophisticated and comprehensive tool for mitigating such impacts. IBAs are used to establish long-term relationships between resource development companies, local communities, and Aboriginal groups. In addition, such agreements help to ensure that local and Aboriginal communities capture a portion of short-term and long-term benefits of large-scale resource projects.

9. An assessment of potential benefits of the Gateway Project indicates several short-term and long-term opportunities may be available to Coastal First Nations. Direct, indirect, and induced employment opportunities generated by the project are largely short-term and may not contribute to long-term improvements to socioeconomic conditions. For example, the project is expected to create an average of 1,043 direct jobs over the three-year construction period, while only 75 long-term pipeline and marine terminal operational jobs will be generated.

10. Financial and community investment opportunities generated by the Gateway Project may have potential to contribute to long-term socioeconomic stability of Coastal First Nations. However, details on the nature and extent of the above-mentioned opportunities are not available at this time and require further investigation.

Table 6.2: Summary of Potential Socioeconomic Impacts

Impact Category	Potential Impacts
Employment and Economic Development	• Short-term direct employment generation as jobs are largely filled by in-migrants • Limited regional economic multiplier impacts as equipment and materials are produced in other regions • Increase in local business opportunities and regional incomes • Diversification of the local economic base • Generation of taxes and royalties for government • Boom-town phenomenon can lead to inflation, social upheaval, unrealistic expectations for future growth, excess investment in project expansion, and housing shortages • Increased unemployment in some cases because prospective in-migrants may be unsuccessful at finding jobs
Demography	• Population increases as in-migrants seek project employment, which in turn creates adverse effects on community infrastructure and services
Infrastructure	• Increased demands are placed on highways, railways, and air transportation • Population increases may lead to increased demand for water treatment, sewage, and solid waste treatment and disposal, power supplies, and housing • Increased demand for recreation complexes and other facilities
Individual, Family and Community Wellness	• Greater consumption of alcohol and related substance abuse may place increased demands on social, police, and ambulance services • Increased income levels may lead to improved diets, clothing, and housing • Social tension between project workers and local residents • Exposure to contagious diseases and sexually transmitted infections • Adverse effects on education attainment levels

Impact Category	Potential Impacts
Traditional Aboriginal Use and Culture	• Negative impacts on retention of traditional language and identification with traditional culture • Oil spills can negatively affect wildlife and fishery resources • Decreased childhood education in traditional harvesting methods • Increased costs of harvesting
Other Economic Sectors	• Decreased land available for timber harvesting and disruption of existing forest industry practices • Negative effects on commercial fishing due to oil spills and tanker traffic • Negative effects on the tourism industry due to oil spills, environmental degradation, and decreases in the available land base • Labor shortages in other economic sectors
Heritage and Archaeological Resources	• Negative impact on culturally or spiritually sensitive areas, culturally modified tress, historic sites and cabins, heritage trails, and burial sites due to construction disturbances and operational activities in marine and terrestrial environments

Source: Aboriginal Pipeline Group et al. 2003, 2004; B.C. Gas Utility Inc. 1998; Canada 1978; Canada NEB 1996, 1998, 2003a; Cocklin and Kelly 1992; Detomasi 1997; EnCana Ekwan Pipeline Inc. 2003; Hua 1985; MVPI 1977; OOGRG 2004; Salmo Consulting Inc. 1999; Thompson 1978; U.S. DOI 1972, 2002; Yamaguchi and Kuczek 1984; Yukon Department of Energy, Mines and Resources 2002

11. Federal, provincial, and First Nations governments all have a legally mandated role in regulation and approval of the Gateway Project. Case law indicates that First Nations have rights over pipeline, port, and tanker projects stemming from Aboriginal rights and title claims. In many cases, jurisdictional roles and responsibilities are unclear and frequently overlap.

12. An evaluation of current regulatory and approval processes for pipeline, port, and tanker projects reveals serious deficiencies (table 6.3). Only three of the twelve best practices criteria have been fully met.

Table 6.3: Evaluation of Regulatory and Approval Processes

Best Practice Principle	Discussion	Assessment
1. ***Roles and Responsibilities:*** should be clearly defined.	Roles and responsibilities of parties are clearly defined in some cases, but not in others.	Partially Met
2. ***Legislative Base:*** the structure of the management regime should be formally structured through legislation or regulation.	The regulatory system is formally structured in legislation, but overlapping federal and provincial legislation leads to confusion.	Partially Met
3. ***Decision-Making Criteria and Methods:*** the decision-making process should be based on clear criteria and methods for assessing options.	Decision-making criteria and evaluation methods are not explicitly outlined and processes do not take into account competing projects.	Not Met
4. ***Efficiency:*** decisions should be reach in a timely manner at a reasonable cost.	Decision-making processes may be costly and lengthy, but recent pipeline projects have been approved in a timely manner.	Partially Met
5. ***Stakeholder Involvement:*** a framework should be in place to ensure that stakeholders are fully engaged in the decision-making process through shared decision making.	Stakeholders are involved in regulatory and approvals processes to some extent, but consultation methods are not based on shared decision making.	Partially Met
6. ***First Nations:*** legal and fiduciary obligations, such as to consult and address First Nations interests, should be fully met.	Case law suggests that governments must consult and accommodate concerns of First Nations, but court processes are costly and lengthy, while outcomes are uncertain.	Partially Met
7. ***Monitoring and Enforcement:*** the regulatory framework should clearly outline monitoring and enforcement processes, infractions, and penalties.	Monitoring and enforcement activities are carried out by regulatory agencies.	Met
8. ***Equity***: the decision-making process should contain a legal obligation to provide compensation to those negatively affected by the project.	Equity and compensation issues are not adequately addressed.	Not Met
9. ***Resources:*** decision-making bodies should have sufficient resources in place to ensure effective and efficient decision-making processes.	Regulatory agencies have been provided with adequate resources.	Met
10. ***Appeal Process:*** the decision-making process should include a mechanism to allow stakeholders to appeal a decision.	Regulatory decisions can be appealed to the courts in certain instances, but such processes are costly and lengthy.	Partially Met

Best Practice Principle	Discussion	Assessment
*11. **Adequate Information:*** decisions should be based on adequate information.	Information with respect to the Gateway Project will be required as part of approval processes.	Met
*12. **Democratic Accountability:*** the management regime should be structured such that impartial decision-makers represent the publics' interests, and are directly, or indirectly, accountable through democratic processes to those affected by the decision.	Democratically elected officials are the ultimate decision makers for projects, but many decisions have been delegated to civil servants who are not accountable to stakeholders.	Partially Met

Source: Based on OOGRG 2004

6.2 Recommendations

1. **Further research should be undertaken to identify and assess specific environmental impacts, socioeconomic effects, and institutional issues associated with the Gateway Project.** Such research efforts are needed to provide adequate information, an evaluation of project costs and benefits, and clear decision-making criteria to assess the Gateway Project.

2. **Enbridge, Coastal First Nations, and regulatory bodies at the federal and provincial levels of government should establish a collaborative decision-making process in order to review project information and to assess options for the Gateway Project.** Creation of such a process should be based on principles of shared decision-making and would ensure for greater participation of Coastal First Nations in project decisions. To this end, a project review committee comprised of relevant stakeholders and First Nations should be established to review and manage impact assessment and regulatory approvals processes for the Gateway Project.

3. **Enbridge should provide Coastal First Nations with specific details on the nature and extent of benefits and opportunities associated with the Gateway Project.** Such information would include employment opportunities, as well as financial and community investment opportunities. It is expected that this information will be made available once Enbridge engages in formal impact assessment and regulatory approval processes.

4. **Enbridge and Coastal First Nations should engage in a comprehensive IBA negotiation and implementation process once specific information regarding benefits is made available.** The IBA negotiation process should be based on principles of interest-based negotiation. In addition, the process should address a range of issues in order to ensure that Coastal First Nations capture short-term and long-term benefits associated with the Gateway Project.

5. **Enbridge and Coastal First Nations should commit to an ongoing relationship, based on open communication, collaborative decision-making, and trust in order to ensure an effective and efficient review of the Gateway Project.** The nature of this relationship should be characterized through a memorandum of understanding between the two parties. To this end, Enbridge and Coastal First Nations should create a formal working group to review all aspects of development and operation of the Gateway Project. The working group should also be used as the primary body to negotiate the project IBA.

6. **Coastal First Nations must be provided with adequate financial resources to participate in project review and decision-making processes.** To ensure for efficient and effective review of the Gateway Project, Coastal First Nations must have financial resources to participate in all regulatory and approval processes.

REFERENCES

Aboriginal Pipeline Group, Imperial Oil Resources Venture Limited, Conoco Phillips Canada (North) Limited, Shell Canada Limited, and Exxon Mobil Canada Properties. 2001. *Memorandum of Understanding for a Mackenzie Valley Pipeline.* <Online: http://www.aboriginalpipeline.ca/pdfs/MOU.pdf; accessed 22 September 2004.>

Aboriginal Pipeline Group, Imperial Oil Resources Venture Limited, Conoco Phillips Canada (North) Limited, Shell Canada Limited, and Exxon Mobil Canada Properties. 2003. *Mackenzie Gas Project Preliminary Information Package Volume 1: Project Description.* <Online: http://www.mackenziegasproject.com/theProject/regulatoryProcess/pipSubmission/PIPfulldetails/PIPFullDetails.htmlvolume#1; accessed 22 September 2004.>

Aboriginal Pipeline Group, Imperial Oil Resources Venture Limited, Conoco Phillips Canada (North) Limited, Shell Canada Limited, and Exxon Mobil Canada Properties. 2004. *Environmental Impact Statement for the Mackenzie Gas Project, Volume 1: Overview and Impact Assessment Summary.* <Online: http://www.mackenziegasproject.com/theProject/regulatoryProcess/applicationSubmission/Applicationscope/EIS.html; accessed 14 October 2004.>

Alberta Energy and Utilities Board. 1998. *Pipeline Performance in Alberta 1980-1997.* <Online: http://www.eub.gov.ab.ca/bbs/documents/reports/r98g.pdf; accessed 20 October 2004.>

Alyeska Pipeline Service Company. 2003. *Pipeline Facts: Pipeline Construction.* <Online: http://www.alyeska-pipe.com/Pipelinefacts/PipelineConstruction.html; accessed 18 January 2005.>

American Association of Port Authorities (AAPA). 1998. *Environmental Management Handbook.* <Online: http://www.aapa-ports.org/govrelations/env_mgmt_hb.htm; accessed 24 October 2004.>

American Association of Port Authorities (AAPA). 2000. *Green Ports: Environmental Management and Technology at US Ports.* <Online: http://www.aapa-ports.org/govrelations/greenports.htm; accessed 24 October 2004.>

Anderson, D. 1989. *Report to the Premier on Oil Transportation and Oil Spills.* Victoria, BC: Queen's Printer for British Columbia.

Anderson, C.M. and R.P. LaBelle. 2000. Update of Comparative Occurrence Rates for Offshore Oil Spills. *Spill Science & Technology Bulletin.* 6 (5/6): 303-321.

Baker, D.C. and J.N. McLelland. 2003. Evaluating the effectiveness of British Columbia's environmental assessment process for first nations' participation in mining development. *Environmental Impact Assessment Review.* 23: 581-603.

Bardach, E. 2000. *A Practical Guide for Policy Analysis: The Eightfold Path to More Effective Problem Solving.* New York: Chatham House Publishers of Seven Bridges Press, LLC.

B.C. Gas Utility Ltd. (1998). *The Southern Crossing Pipeline Project, B.C. Gas Utility Ltd.: Application for a Project Approval Certificate.* <Online: http://www.eao.gov.bc.ca/epic/output/documents/p47/1036601869141_88b6a5bcf3034c6e9f288b69dad3d2da.pdf; accessed 6 October 2004.>

Boyd, D.R. 2003. *Unnatural Law: Rethinking Canadian Environmental Law and Policy.* Vancouver: UBC Press.

British Columbia. 2002a. *Environmental Assessment Act.* Victoria, B.C.: Queen's Printer for British Columbia. <Online: http://www.qp.gov.bc.ca/statreg/stat/E/02043_01.htm#section10; accessed 27 March 2004.>

British Columbia. 2002b. *Provincial Policy for Consultation with First Nations.* <Online: http://srmwww.gov.bc.ca/clrg/alrb/cabinet/ConsultationPolicyFN.pdf; accessed 25 February 2004.>

British Columbia. B.C. Stats. 2004. *British Columbia's Heartland at the Dawn of the 21st Century, 2001 Economic Dependencies and Impact Ratios for 63 Local Areas.* Victoria, B.C.: Ministry of Management Services.

British Columbia. British Columbia Treaty Commission (B.C. TC). 2004. *Treaty Commission Annual Report 2004.* <Online: http://www.bctreaty.net/files_2/pdf_documents/Annual_Report_04.pdf; accessed: 19 February 2005.>

British Columbia. Commission on Resources and Environment (B.C. CORE). 1996. *Strategic Land Use Planning Source Book.* Victoria, BC: Queen's Printer for British Columbia.

British Columbia. Environmental Assessment Office (B.C. EAO). 2003. *Guide to the British Columbia Environmental Assessment Process.* <Online: http://www.eao.gov.bc.ca/publicat/guide-2003/final-guide1-2003.pdf; accessed 27 March 2004.>

British Columbia. Environmental Assessment Office (B.C. EAO). 2004. *Environmental Assessment Office: Who we are – What we do*. <Online: http://www.eao.gov.bc.ca/new-website/description.htm; accessed 23 November 2004.>

British Columbia. Land and Water British Columbia Inc. (B.C. LWBC). 2004a. *Land Procedure: Allocation Procedures – Applications*. <Online: http://lwbc.bc.ca/01lwbc/policies/procedures/land/ap_applications.pdf; accessed: 4 October 2004.>

British Columbia. Land and Water British Columbia Inc. (B.C. LWBC). 2004b. *Land Use Policy: Oil and Gas*. <Online: http://www.lwbc.bc.ca/01lwbc/policies/policy/land/oil_gas.pdf; accessed 2 October 2004.>

British Columbia. Ministry of Sustainable Resource Management (B.C. MSRM). 2004a. *Introduction to Land Use Planning*. <Online: http://srmwww.gov.bc.ca/rmd/lrmp/data/lup_brochure/index.htm; accessed 20 February 2004.>

British Columbia. Ministry of Sustainable Resource Management (B.C. MSRM). 2004b. *Ministry of Sustainable Resource Management Service Plan 2004/05-2006/07*. <Online: http://www.bcbudget.gov.bc.ca/sp2004/srm/srm.pdf; accessed 23 November 2004.>

Calbick, K.S. 2003. *The Use of Program Theory for Identifying and Evaluating 'Best Practices' for Implementing Land-Use Policies*. Master's of Resource Management, School of Resource and Environmental Management, Simon Fraser University, Burnaby, B.C.

Canada. 1978. *Potential Pacific Coast Oil Ports: A Comparative Environmental Risk Analysis, Volume 1*. Vancouver, BC: Fisheries and Environment Canada Working Group on West Coast Deepwater Oil Ports.

Canada. 2003. *Canadian Environmental Assessment Act*. Ottawa, ON: Queen's Printer for Canada.

Canada. 2004. *National Energy Board Act*. Ottawa, ON: Queen's Printer for Canada. <Online: http://laws.justice.gc.ca/en/N-7/85914.html; accessed 1 February 2004.>

Canada. Canadian Environmental Assessment Agency (Canada CEAA). 2003. *Canadian Environmental Assessment Act: An Overview*. <Online: http://www.ceaa-acee.gc.ca/012/002/CEAA-Overview_e.pdf; accessed 27 March 2004.>

Canada. Fisheries and Oceans Canada (Canada DFO). 1997. *The Role of the Federal Government in the Oceans Sector.* Ottawa, ON: Minister of Public Works and Government Services Canada.

Canada. Fisheries and Oceans Canada (Canada DFO). 2004. *Fisheries and Oceans Canada Mandate.* <Online: http://www.dfo-mpo.gc.ca/dfo-mpo/mandat_e.html; accessed 17 November 2004.>

Canada. National Energy Board (Canada NEB). 1996. *Express Pipeline Project: Report of the Joint Review Panel.* Ottawa, ON: Queen's Printer for Canada.

Canada. National Energy Board (Canada NEB). 1998. *Comprehensive Study Report: Alliance Pipeline Ltd. On behalf of the Alliance Pipeline Limited Partnership, Alliance Pipeline Project.* Ottawa, ON: Queen's Printer for Canada.

Canada. National Energy Board (Canada NEB). 2002a. *Consultation with Aboriginal Peoples.* <Online: http://www.neb.gc.ca/11-eng/livelink.exe/fetch/2000/90463/231144/142849/Memorandum_Of_Guidance_(A0C8Q3.pdf?nodeid=142856&vernum=0; accessed 29 September 2004.>

Canada. National Energy Board (Canada NEB). 2002b. *National Energy Board: Answers to your Questions.* Ottawa, ON: Queen's Printer for Canada. <Online: http://www.neb.gc.ca/AboutUs/NEBQA_e.pdf; accessed 27 August 2004.>

Canada. National Energy Board (Canada NEB). 2003a. *Joint Panel Review: GSX Canada Pipeline Project.* Ottawa, ON: Queen's Printer for Canada.

Canada. National Energy Board (Canada NEB). 2003b. *Pipeline Regulation in Canada: A Guide for Landowners and the Public.* Ottawa, ON: Queen's Printer for Canada. <Online: http://www.neb.gc.ca/safety/PipelineRegulationCanada_e.pdf; accessed 27 August 2004.>

Canada. National Energy Board (Canada NEB). 2004. *Canada's Oil Sands: Opportunities and Challenges to 2015.* Ottawa, ON: Queen's Printer for Canada.

Canada. Natural Resources Canada (Canada NRCAN). 2004. *Who We Are and What We Do.* <Online: http://www.nrcan-rncan.gc.ca/inter/who_what_e.html; accessed 3 December 2004.>

Canada. Transport Canada. 1977. *TERMPOL Assessment of the Kitimat B.C. Marine Oil Terminal Proposal.* Ottawa, ON: Transport Canada, Canadian Coast Guard.

Canada. Transport Canada. 2001. *Termpol Review Process 2001.* <Online: http://www.tc.gc.ca/MarineSafety/TP/Tp743/menu.htm; accessed 17 November 2004.>

Canada. Transport Canada. 2003. *The Next Wave: Marine Safety Strategic Plan 2003-2010*. Ottawa, ON: Queen's Printer for Canada.

Canadian Association of Petroleum Producers (CAPP). 2004. *Planning Horizontal Directional Drilling for Pipeline Construction*. CAPP Publication 2004-0022. Calgary, AB: Canadian Association of Petroleum Producers.

Canadian Institute of Resource Law (CIRL). 2004. *The Legal and Policy Framework for Managing Public Access to Oil and Gas Corridors on Public Lands in Alberta, Saskatchewan, and British Columbia*. Calgary, AB: Canadian Institute of Resource Law and Canadian Association of Petroleum Producers. <Online: http://www.capp.ca/raw.asp?NOSTAT=YES&df=PDF&dn=77025; accessed 2 October 2004.>

Cassidy, P. R. and G. Chao. 2003. *Potential Impacts of Seismic and Other Exploration Activities on Key Species, Habitats and Other Users of the BC Offshore: An Examination of the Applicable Environmental Law Framework*. Vancouver: Blake, Cassels & Graydon LLP.

Coastal First Nations. n.d. *Review of Enbridge Pipeline Project: Proposal to Enbridge Pipelines Inc. from Coastal First Nations – Turning Point Initiative*.

Coastal First Nations and British Columbia. 2001. *General Protocol Agreement on Land Use Planning and Interim Measures*. <Online: http://www.davidsuzuki.org/files/finalprotocol.pdf; accessed 20 January 2005.>

Cocklin, C. and B. Kelly. 1992. Large-scale Energy Projects in New Zealand: Whither Social Impact Assessment? *Geoforum*. 23(1): 41-60.

Council of the Haida et al. v. Minister of Forests et al. [2000] B.C.S.C. 1280.

David Suzuki Foundation. 2001. *Turning Point First Nations Signatories to Protocol with British Columbia, April 4, 2001*. Available from: http:/www.davidsuzuki.org/files/communities.pdf. Accessed: 20 January 2005.

Day, J.C. and F. Quinn. 1992. *Water Diversion and Export: Learning from Canadian Experience*. Department of Geography Publication Series No. 36. Waterloo, ON: University of Waterloo, Department of Geography.

DF Dickins Associates Ltd. 1995. *The Double Hull Issue and Oil Spill Risk on the Pacific West Coast*. Salt Spring Island, BC: DF Dickins Associates Ltd. for the Ministry of Environment, Land and Parks, Enforcement and Environmental Emergencies Branch.

Detomasi, D.D. 1997. Resource Development: Economic Benefits and Settlement Options. In *Disposition of Natural Resources: Options and Issues for Northern*

Lands. Edited by Ross, Monique M. and J. Owen Saunders, pp. 211-224. Calgary, AB: Canadian Institute of Resources Law.

Dixon, M. 1978. *What Happened to Fairbanks? The Effects of the Trans-Alaska Oil Pipeline on the Community of Fairbanks, Alaska*. Boulder, CO: Westview Press Inc.

Donovan, A. and J. Griffith. 2003. *Duty of business to consult with and accommodate First Nations*. The Continuing Legal Education Society of British Columbia. <Online: http://www.cle.bc.ca/Cle/Practice+Desk/Collection/02-app-dutytoconsult; accessed 29 September 2004.>

Doyle, D., and B. Sadler. 1996. *Environmental assessment in Canada: Frameworks, procedures & attributes of effectiveness: A report in support of the International Study of the Effectiveness of Environmental Assessment*. Ottawa: Canadian Environmental Assessment Agency.

Elliott, J. 1997. *Tourism politics and public sector management*. New York, N.Y.: Routledge.

Enbridge Inc. 2004. *Enbridge Liquids Pipelines*. <Online: http://library.enbridge.com/images/maps/liquidsPipelines.jpg; accessed 20 January 2005.>

Enbridge Inc. 2005. *Corporate Overview*. <Online: http://www.enbridge.com/about/corporateOverview/; accessed 20 January 2005.>

Enbridge Pipelines Inc. n.d. *Preliminary Hydraulic Parameters*.

Enbridge Pipelines Inc. 2003a. *Potential Socio-Economic Impacts – British Columbia and Alberta – Project Gateway – Estimates January 2003*.

Enbridge Pipelines Inc. 2004a. *Corporate Social Responsibility Policy*. <Online: http://www.enbridge.com/corporate/pdf/2004-csr-policy.pdf; accessed 14 January 2005.>

Enbridge Pipelines Inc. 2004b. *Gateway Pipeline*.

Enbridge Pipelines Inc. 2004c. *Indigenous Peoples Policy*. <Online: http://www.enbridge.com/pipelines/rightOfWay/pdf/IndigenousPeoplesPolicy.pdf; accessed 11 August 2004.>

Enbridge Pipelines Inc. 2005a. *Community Investment*. <Online: http://www.enbridge.com/corporate/community-investment.php; accessed 14 January 2005.>

Enbridge Pipelines Inc. 2005b. *Schedule for RFP: 2005/04/08.*

Enbridge Pipelines Inc. 2005c. *Workforce for Gateway – 11 April 2005.*

EnCana Ekwan Pipeline Inc. 2003. *Ekwan Pipeline: Application to the National Energy Board Volume I and 2.* <Online: https://www.neb-one.gc.ca/ll-eng/livelink.exe?func=ll&objId=273295&objAction=browse&sort=name; accessed 24 August 2004.>

Environment Canada and the United States Environmental Protection Agency (U.S. EPA). 2004. *Characterization of the Georgia Basin/Puget Sound Airshed.* <Online: http://www.pyr.ec.gc.ca/air/gb_ps_airshed/report_e.pdf; accessed 8 November 2004.>

Foothills Pipe Lines (South Yukon) Ltd. 1979. *Overview Summary of the Environmental Impact Statement for the Alaska Highway Gas Pipeline Project.* Whitehorse, YK: Foothills Pipe Lines (South Yukon) Ltd.

Frame, T. M., T. Gunton and J.C. Day. 2004. The Role of Collaboration in Environmental Management: An Evaluation of Land and Resource Planning in British Columbia. *Journal of Environmental Planning and Management.* 47(1): 59-82.

Gilpin, A. 1995. *Environmental impact assessment: Cutting edge for the twenty-first century.* Cambridge: Cambridge University Press.

Gouvernement du Quebec and the Crees of Quebec. 2002. *Agreement Concerning a New Relationship Between Le Gouvernement du Quebec and the Crees of Quebec.* <Online: http://www.bip-pio.qc.ca/en/docu.asp; accessed 7 March 2005.

Governments of Canada and British Columbia. 2004. *Canada-British Columbia Agreement on Environmental Assessment Cooperation.* <Online: http://www.eao.gov.bc.ca/publicat/canada-bc-agreement/can-bc-agree-mar1104.pdf; accessed 27 March 2004.>

Gunton, T. 1991. Crown-land Planning in British Columbia: Managing for Multiple Use." In *Our Living Legacy: Proceedings of a Symposium on Biological Diversity.* Edited by Fenger, M.A., E.H. Miller, J.A. Johnson, and E.J.R. Williams, pp. 275-293. Victoria, B.C.: Royal British Columbia Museum.

Gunton, T. 2003. Megaprojects and Regional Development: Pathologies in Project Planning. *Regional Studies.* 37(5): 505-519.

Haida Nation v. British Columbia (Minister of Forests). 2004 SCC 73. <Online: http://www.lexum.umontreal.ca/csc-scc/en/rec/texte/2004scc073.wpd.txt; accessed 3 December 2004.>

Hua, C. 1985. Energy-Related Boom Towns: Problems, Causes, Policies, and Modeling. In *Large-Scale Energy Projects: Assessment of Regional Consequences*. Edited by Lakshmanan, T.R. and B. Johansson, pp. 215-232. Amsterdam: Elsevier Science Publishers.

Innes, J.E. and David E. Booher. 1999. Consensus Building and Complex Adaptive Systems. *American Planning Journal.* 65 (4): 412-423.

International Association for Impact Assessment (IAIA). 1999. *Principles of Environmental Impact Assessment Best Practice.* Fargo, ND: International Association for Impact Assessment.

International Petroleum Industry Environmental Conservation Association and International Tanker Owners Pollution Federation (IPIECA and ITOPF). 2004. *Oil Spill Compensation: A Guide to the International Conventions on Liability and Compensation for Oil Pollution Damage.* <Online: http://www.ipieca.org/downloads/oil_spill/oilspill_reports/Compensation.pdf; accessed: 14 November 2004.>

International Tanker Owners Pollution Federation (ITOPF). 2004. *ITOPF Handbook 2004/2005.* <Online: http://www.itopf.com/itopfhandbook2004.pdf; accessed 8 November 2004.>

International Tanker Owners Pollution Federation (ITOPF). 2005. *Oil Tanker Spill Statistics: 2004.* <Online: http://www.itopf.com/stats04.pdf; accessed 25 March 2005.>

Jacques Whitford Environment Limited (JWEL). 2003a. *Oil Sands Market Study: Port Options Analysis.* Report prepared for Enbridge Pipelines Inc. Calgary, AB: Jacques Whitford Environment Limited.

Jacques Whitford Environment Limited (JWEL). 2003b. *Oil Sands Market Study: Route Options Analysis.* Report prepared for Enbridge Pipelines Inc. Calgary, AB: Jacques Whitford Environment Limited.

Jakimchuk, R.D. 1985. Follow-up to Environmental Assessment for Pipeline Projects in Canada: The Missing Link. pp. 32-45. In *Audit and Evaluation in Environmental Assessment and Management: Canadian and International Experience, Volume 1, Commissioned Research.* B. Sadler (ed.). Banff, AB: Environment Canada.

Keeping, J. 1998. *Thinking About Benefits Agreements: An Analytical Framework, Northern Minerals Program Working Paper No. 4.* Yellowknife, NT: Canadian Arctic Resources Committee.

Keeping, J. M. 1999. *Local Benefits from Mineral Development: The Law Applicable in the Northwest Territories*. Calgary, AB: Canadian Institute of Resources Law.

Kennett, S. A. 1999. *A Guide to Impact and Benefits Agreements*. Calgary, AB: Canadian Institute of Resources Law.

Lasswell, H.D. 1971. *A pre-view of policy sciences*. New York: Elsevier.

Mackenzie Valley Pipeline Inquiry (MVPI). 1977. *Northern Frontier, Northern Homeland: The Report of the Mackenzie Valley Pipeline Inquiry: Volume 1*. Ottawa, ON: Ministry of Supply and Services Canada.

Mazmanian, D. A., and P. A. Sabatier. 1989. *Implementation and Public Policy*. Lanham, MD: University Press of America.

Merrick, J. R.W., J. R. van Dorp, T. Mazzuchi, J. R. Harold, J. E. Spahn, and M. Grabowski. 2002. The Prince William Sound Risk Assessment. *Interfaces*. 32(6): 25-40.

National Round Table on the Environment and the Economy (NRTEE). 2001. *State of the Debate: Aboriginal Communities and Non-Renewable Resource Development*. <Online: http://www.nrtee-trnee.ca/publications/PDF/SOD_Aboriginal_E.pdf; accessed 15 December 2004.>

Offshore Oil and Gas Research Group (OOGRG). 2004. *A Review of Offshore Oil and Gas Development in British Columbia*. Burnaby, BC: Simon Fraser University, School of Resource and Environmental Management.

O'Reilly, K. and E. Eacott. 1998. *Aboriginal Peoples and Impact Benefit Agreements: Report of a National Workshop, Northern Minerals Program Working Paper No. 7*. Yellowknife, NT: Canadian Arctic Resources Committee.

Pacific States/British Columbia Oil Spill Task Force. 2002. *West Coast Offshore Vessel Traffic Risk Management Project: Final Project Report and Recommendations*. <Online: http://www.oilspilltaskforce.org/wcovtrm_report.htm; accessed 5 November 2004.>

Royal Society of Canada (RSC). 2004. *Report of the Expert Panel on Science Issues Related to Oil and Gas Activities, Offshore British Columbia*. An Expert Panel Report prepared by the Royal Society of Canada at the request of Natural Resources Canada. Ottawa, ON: Royal Society of Canada.

Sadar, M.H. 1994. *Environmental Impact Assessment*. Ottawa: Carleton University Press for the Impact Assessment Centre.

Sadar, M.H. 1996. *Environmental Impact Assessment. 2nd Edition*. Ottawa: Carleton University Press.

Salmo Consulting Inc. 1999. *Maxhamish Project Application: Application for a Project Approval Certificate*. <Online: http://www.eao.gov.bc.ca/epic/output/documents/p65/1036777297007_07505034ba634131a16a95a13b071ccc.pdf; accessed 6 October 2004.>

Sosa, I. and K. Keenan. 2001. *Impact Benefit Agreements Between Aboriginal Communities and Mining Companies: Their Use in Canada*. Canadian Environmental Law Association. <Online: http://www.cela.ca/publications/cardfile.shtml?x=1021; accessed 15 December 2004.>

Strong, R., P. Gallagher, and D. Muggeridge. 2002. *British Columbia Offshore Hydrocarbon Development: Report of the Scientific Review Panel*. Submitted to the B.C. Minister of Energy and Mines, Hon. Richard Neufeld. 15 January 2002.

Taggart, M. and M.C. McCracken. 2002. *Alaska Highway Pipeline Project and the Environment, Working Paper No. 7.2.8*. Informetrica Limited. <Online: http://www.emr.gov.yk.ca/Pipeline/AHP_Economic_Effects/Environmental_Linkages.pdf; accessed 30 August 2004.>

Taku River Tlingit First Nation v. British Columbia (Project Assessment Director). 2004 SCC 74. <Online: http://www.lexum.umontreal.ca/csc-scc/en/rec/texte/2004scc074.wpd.txt; accessed 3 December 2004.>

Taku River Tlingit First Nation v. Ringstad et al. (Norm Ringstad, in his capacity as the Project Assessment Director for the Tulsequah Chief Mine Project, Sheila Wynn, in her capacity as the Executive Director, Environmental Assessment Office, The Minister of Environment, Lands, and Parks, The Minister of Energy and Mines and Minister Responsible for Northern Development). [2002] B.C.C.A. 59.

Terasen Pipelines. 2004. *TMX West Coast Pipeline Expansion Proposal – Expression of Interest Supplementary Information Package*. <Online: http://pipelines.terasen.com/data/2/rec_docs/300_TMX_EOI.pdf; accessed 26 January 2005.>

Terasen Pipelines. 2005. *System Facts – Trans Mountain*. <Online: http://pipelines.terasen.com/bins/nosidebar_page.asp?cid=38-67-86; accessed 26 January 2005.>

Thompson, A. R. 1978. *West Coast Oil Ports Inquiry: Statement of Proceedings*. Vancouver: West Coast Oil Ports Inquiry.

TransCanada Pipelines Limited. 2005. *The Proposed TransCanada Keystone Pipeline Project.* <Online: http://www.transcanada.com/keystone/KeystoneCanada_factsheet.pdf; accessed 19 February 2005.>

United States. Department of the Interior (U.S. DOI). 1972. *Final Environmental Impact Statement Proposed Trans-Alaska Pipeline, Volumes 1-6.* Springfield, VA: Interagency Task Force for the Federal Task Force on Alaskan Oil Development.

United States. Department of the Interior (U.S. DOI). 2002. *Final Environmental Impact Statement, Renewal of the Federal Grant for the Trans-Alaska Pipeline System Right-of-Way: Volumes 1-7.* <Online: http://tapeis.anl.gov/documents/eis/index.cfm; accessed 14 October 2004.>

Weimer, D. and A. Vining. 1998. *Policy Analysis: Concepts and Practice, 3rd Edition.* Upper Saddle River, NJ: Prentice Hall.

West Coast Environmental Law (WCEL). 2003. *Pump It Out: The Environmental Costs of BC's Upstream Oil and Gas Industry.* <Online: http://www.wcel.org/wcelpub/2003/14028/pdf; accessed 14 October 2004.>

Westwater Research Centre. 1977. *A Digest of Evidence presented to the West Coast Oil Ports Inquiry.* Vancouver: Westwater Research Centre.

Wood, C. 1995. *Environmental impact assessment: A comparative review.* New York: Wiley.

Yamaguchi, S. and E. Kuczek. 1984. The social and economic impact of large-scale energy projects on the local community. *International Labour Review.* 123(2): 149-165.

Yukon. Department of Energy, Mines and Resources. 2002. *The Alaska Highway Pipeline Project: Economic Effects on the Yukon and Canada Final Report.* Informetrica Limited. <Online: http://www.emr.gov.yk.ca/Pipeline/AHP_Economic_Effects/AHP_Economic_Effects_Report.pdf; accessed 18 December 2004.>

Zallen, M., J. McDonald and P. Vonk. 1985. Follow-up Review of Impact Assessments within the Coquihalla Valley, British Columbia. pp. 122-144. In *Audit and Evaluation in Environmental Assessment and Management: Canadian and International Experience, Volume 1, Commissioned Research.* B. Sadler (ed.). Banff, AB: Environment Canada.

Zanasi, L. and M. Taggart. 2002. *Alaska Highway Pipeline Project and First Nations: Linkages, Working Paper No. 7.6*. Informetrica Limited. <Online: http://www.emr.gov.yk.ca/Pipeline/AHP_Economic_Effects/First_Nations_ Linkages.pdf; accessed 30 August 2004.>

APPENDIX 1: PROJECTED GATEWAY PROJECT WORKFORCE

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg	3-Year
	'08	'08	'08	'08	'08	'08	'08	'08	'08	'08	'08	'08	**08**	'09	'09	'09	'09	'09	'09	'09	'09	'09	'09	'09	'09	**09**	'10	'10	'10	'10	'10	'10	'10	'10	'10	'10	'10	'10	**10**	**Avg**
Enbridge Personnel	40	40	40	40	50	50	50	50	50	50	50	50	**47**	50	50	50	50	50	50	50	50	50	50	50	50	**50**	50	50	50	50	50	50	50	50	50	40	30	30	**46**	**48**
Consultants	75	75	85	85	85	85	85	85	85	85	85	85	**83**	75	75	85	85	85	85	85	85	85	85	85	75	**83**	75	85	85	85	100	85	75	65	50	50	40	40	**70**	**78**
Construction																																								
Stations						100	125	125	125	125	100	100	**67**	50	50	50	100	125	200	350	350	350	200	150	100	**173**	100	100	100	50	50								**33**	**91**
Tanks					50	100	130	130	130	130	100	25	**66**	25	25	50	200	200	200	200	200	200	200	100	50	**138**	50	50	50	50									**17**	**73**
Marine Terminal					50	75	75	75	75	75	50	30	**42**	30	30	50	50	75	75	75	75	75	50	50	50	**57**	25	25	25	25									**8**	**36**
Pipeline																																								
Logging Alberta	50	50	50								100	100	**29**	120												**10**													**0**	**13**
Logging B.C.	60	60	60							160	200	200	**62**	200										100	100	**33**	120												**10**	**35**
Site Develop AB				5				10					**1**								10			50	50	**9**	60												**5**	**5**
Site Develop BC				10				5					**1**				15									**1**													**0**	**1**
Stockpiling AB						20	20		20	20	10		**8**									20	20			**3**													**0**	**4**
Stockpiling BC						20	15		20	10			**5**					20	40	20		10	20			**9**													**0**	**5**
Construction AB					50	150	450	600	500	350	350	300	**229**	300	1100	600	50							200	250	**208**	700	1200	700	50									**221**	**219**
Construction BC					100	300	550	700	550	300	250	150	**242**	350	550	300	25	450	1100	1800	1100	450	150	100	150	**544**	350	600	350	50									**113**	**299**
Camp AB												60	**5**	100	100	100								60	60	**35**	100	100	100	40									**28**	**23**
Camp BC												35	**3**	50	50	50		75	120	150	150	120	100		30	**75**	50	50	50	20									**14**	**31**
Inspection AB	4	6	8		6	16	36	30	20	15	20	16	**15**	34	72	48	6							20	24	**17**	24	68	48	16									**13**	**15**
Inspection BC	4	6	8	4	10	18	38	35	24	24	24	14	**17**	18	36	24	12	36	70	96	68	38	30	24	16	**39**	20	34	24	8									**7**	**21**
Survey AB					8	12	16	16	14	24	16	16	**10**	16	32	20	8						12	16	16	**10**	16	32	16	12									**6**	**9**
Survey BC					8	12	16	16	14	24	16	16	**10**	12	16		18	24	38	48	38	30	24	12		**22**	8	16	8	6									**3**	**12**
NDT AB						6	6	16	14	8	6		**5**	12	32	20										**5**	12	32	24										**6**	**5**
NDT BC						6	6	16	14	8	6		**5**	6	16	12			12	50	40	36	30	16		**18**	6	16	12										**3**	**9**
Reclamation									40	40			**7**			60	60					60	60			**20**			60	60									**10**	**12**
Total	**233**	**237**	**251**	**144**	**417**	**970**	**1618**	**1909**	**1695**	**1448**	**1383**	**1197**	**959**	**1448**	**2234**	**1519**	**679**	**1140**	**1990**	**2924**	**2166**	**1524**	**1031**	**1033**	**1021**	**1559**	**1766**	**2458**	**1702**	**522**	**200**	**135**	**125**	**115**	**100**	**90**	**70**	**70**	**613**	**1043**

Source: Enbridge Pipelines Inc. 2005c