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Application for Approval of the  
Mackenzie Valley Pipeline

**Volume 3:  
Engineering Design**

Submitted to:  
National Energy Board

Submitted by:  
Imperial Oil Resources Ventures Limited

IPRCC.PR.2004.05

August 2004





## PREFACE

**APPLICATION TO THE  
NATIONAL ENERGY BOARD FOR APPROVAL  
OF THE MACKENZIE VALLEY PIPELINE  
VOLUME 3: ENGINEERING DESIGN****EXECUTIVE SUMMARY**

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**P.1.1 PROPONENTS**

The proposed Mackenzie Valley pipeline will extend about 1,220 km from Inuvik in the Mackenzie Delta to northwestern Alberta.

The pipeline proponents are:

- Imperial Oil Resources Ventures Limited
- Mackenzie Valley Aboriginal Pipeline Group (APG)
- ConocoPhillips Canada (North) Limited (ConocoPhillips)
- ExxonMobil Canada Properties (ExxonMobil)
- Shell Canada Limited (Shell)

The proponents are required to consider arctic and subarctic environmental and topographic factors, and to choose the most suitable route, when evaluating, engineering, designing, constructing and operating the Mackenzie Valley pipeline.

In developing the engineering design plans, the proponents considered engineering, environmental, safety and cost factors. In addition, the views, concerns and suggestions of the affected stakeholders along the proposed route were regularly sought and considered. In some cases, the route was altered to accommodate these concerns.

**P.1.2 ARCTIC ENGINEERING**

The Mackenzie Valley pipeline will be built in an arctic and subarctic environment. It will be buried for most of its length and will encounter areas of both continuous and discontinuous permafrost over its entire length. Heat transfer, geotechnical and structural engineering factors were considered in evaluating construction options and materials.

Before developing engineering, design and route options for the pipeline, material needs, stresses and tolerances were analyzed and evaluated. Data on climate, ground temperatures, topography and specific terrain conditions were gathered. The information collected was used for pipeline, facilities, construction and operations planning.

### P.1.3 SYSTEM DESIGN

Sweet natural gas from the anchor fields at Niglintgak, Taglu and Parsons Lake will be transported through gathering pipelines to the Inuvik area facility. The gas pipeline has been designed to deliver about 34 Mm<sup>3</sup>/d of natural gas from the Inuvik area facility to Alberta during the summer and about 39 Mm<sup>3</sup>/d during the winter. In addition, gas from other sources may be transported in the pipeline.

Pipeline design alternatives were evaluated using a variety of simulation programs and models that analyzed the materials and designs according to geotechnical, process and hydraulic characteristics.

### P.1.4 DESIGN BASIS

The design and construction of the gas pipeline involves meeting the requirements of shippers and understanding the characteristics of the specific types of terrain, including watercourse crossings, and ambient conditions that will be encountered along the pipeline route. In addition, associated facilities, including compressor stations, block valves, meters and a heating station, were evaluated and designed.

The specific characteristics of the pipeline and associated facilities, including the materials, design parameters, manufacture, special operating or performance features, and installation and construction needs were examined. Various construction techniques for watercourse crossings were evaluated and the methods for watercourse crossings that might require special attention were evaluated in detail.

### P.1.5 ROUTE AND SITE SELECTION

The pipeline will generally be routed within a 1-km-wide corridor. The objectives of the route and facilities site selection process included avoiding sensitive environmental and cultural areas, reducing disturbances to communities and the landscape, satisfying engineering and construction requirements, and minimizing costs.

The route selection process for the pipeline began in 2001. The preliminary routes selected have since been reassessed as a result of field investigations and considerations of community input. In evaluating the suitability of many of the route segments, the proponents studied alternatives to the original proposed route that were suggested by local inhabitants, and the route was altered in some cases. Criteria were developed and used to select each route segment. The original route was adjusted in response to community concerns and input. Additional refinements to the route might be made before construction starts, depending on the results of continuing community input.

Criteria were also developed and applied to selecting the sites for the pipeline facilities, including compressor station, heater and block valve sites.

## CONTENTS

### APPLICATION TO THE NATIONAL ENERGY BOARD FOR APPROVAL OF THE MACKENZIE VALLEY PIPELINE VOLUME 3: ENGINEERING DESIGN

#### TABLE OF CONTENTS

---

<b>Preface</b>	
Executive Summary .....	P-i
<b>Contents</b>	
Table of Contents .....	iii
List of Illustrations .....	ix
<b>1. Arctic Engineering</b>	
1. Introduction .....	1-1
1.1.1 Background .....	1-1
1.1.1.1 Arctic Pipelining .....	1-1
1.1.1.2 Unique Pipelining Considerations .....	1-1
1.1.2 Permafrost Distribution .....	1-2
1.1.3 Climate Data .....	1-3
1.1.3.1 Data Sources .....	1-3
1.1.3.2 Ground Temperatures .....	1-3
1.1.4 Topography .....	1-3
1.1.5 Engineering Terrain Analysis .....	1-3
2. Geotechnical Considerations .....	1-5
1.2.1 Geotechnical Loads .....	1-5
1.2.1.1 Frost Heave .....	1-5
1.2.1.2 Thaw Settlement .....	1-5
3. Design Approach .....	1-9
1.3.1 Design Objective .....	1-9
1.3.1.1 Design Options .....	1-9
1.3.1.2 Maintenance Options .....	1-9
1.3.2 Design Process .....	1-10
1.3.2.1 Temperature Guidelines .....	1-11
1.3.2.2 Construction Surface Disturbance .....	1-11
1.3.2.3 Pipeline Loading .....	1-12
1.3.2.4 Strain Capacity .....	1-12
1.3.2.5 Deformation Monitoring and Maintenance .....	1-13
1.3.3 Climate Change .....	1-13
4. Geotechnical Models .....	1-15
1.4.1 Frost Heave .....	1-15
1.4.2 Thaw Settlement .....	1-16
1.4.3 Operating Temperatures .....	1-16
5. Materials Considerations .....	1-19
1.5.1 Materials Selection .....	1-19
1.5.2 Design Considerations .....	1-19

	1.5.2.1	Fracture Initiation.....	1-19
	1.5.2.2	Propagating Ductile Fracture .....	1-20
	1.5.2.3	Brittle Fracture .....	1-20
	1.5.2.4	Local Buckling – Compressive Strain Limit State.....	1-20
	1.5.2.5	Girth Weld Tensile Fracture – Tensile Strain Limit State .....	1-21
6.		Structural Analysis.....	1-23
	1.6.1	Scope .....	1-23
	1.6.2	Structural Modelling.....	1-23
	1.6.3	Frost Heave.....	1-23
	1.6.4	Thaw Settlement.....	1-24
7.		Right-of-Way Considerations .....	1-27
	1.7.1	Permafrost Considerations .....	1-27
	1.7.2	Right-Of-Way Settlement.....	1-27
	1.7.3	Ditch Backfill Design.....	1-28
	1.7.4	Slope Stability Design .....	1-28
<b>2.</b>		<b>System Design</b>	
	1.	Introduction.....	2-1
	2.1.1	Proposed Design.....	2-1
	2.1.1.1	Design Volumes.....	2-1
	2.1.1.2	System Availability.....	2-2
	2.1.1.3	Expansion.....	2-2
	2.1.2	Gas Pipeline Configuration .....	2-3
	2.1.3	Summer Flow Capability.....	2-3
	2.1.4	Winter Flow Capability .....	2-4
	2.	Design Alternatives.....	2-7
	2.2.1	Pipeline Alternatives .....	2-7
	2.2.1.1	Alternatives Considered.....	2-7
	2.2.1.2	Evaluation Criteria .....	2-7
	2.2.1.3	Dense-Phase Design.....	2-7
	2.2.1.4	Two-Phase Design .....	2-8
	2.2.1.5	Single-Phase Design .....	2-8
	2.2.1.6	Selected Concept.....	2-8
	2.2.1.7	Rationale for Rejected Concepts.....	2-9
	2.2.2	Design Alternatives .....	2-9
	2.2.2.1	Design Considerations .....	2-9
	2.2.2.2	Alternatives Considered.....	2-9
	2.2.2.3	Attributes of Selected Design.....	2-9
	3.	Pipeline Hydraulics .....	2-11
	2.3.1	Hydraulic Model.....	2-11
	2.3.2	Hydraulic Parameters .....	2-11
	2.3.2.1	Model Inputs .....	2-11
	2.3.2.2	Temperature Profile .....	2-11
	4.	Simulation Models .....	2-15
	2.4.1	Models Used.....	2-15
	2.4.2	Geotechnical Simulation Models .....	2-15
	2.4.3	Process and Hydraulic Simulation Models.....	2-15
	5.	Regulations, Codes and Standards .....	2-17
	2.5.1	Applicable Regulations .....	2-17
	2.5.2	Applicable Codes and Standards.....	2-17

<b>3.</b>	<b>Design Basis</b>	
1.	Introduction	3-1
3.1.1	Purpose	3-1
3.1.2	Location Description	3-1
3.1.2.1	Gas Pipeline	3-1
3.1.2.2	Facility Locations	3-1
3.1.3	Community Access to Gas	3-2
2.	Materials and Pipeline Design	3-5
3.2.1	Quality Assurance Program	3-5
3.2.2	Pipeline	3-5
3.2.2.1	Line Pipe Selection, Manufacture and Supply	3-5
3.2.2.2	Welding	3-6
3.2.2.3	Coating	3-6
3.2.2.4	Valves and Fittings	3-6
3.2.2.5	Internal Corrosion	3-6
3.2.2.6	External Corrosion	3-6
3.2.2.7	Fracture Design	3-8
3.2.3	Design Parameters	3-8
3.2.4	Block Valves and Pigging Facilities	3-10
3.2.5	Compressor Stations, Heater Station and Meter Stations	3-12
3.2.5.1	Material Selection	3-12
3.2.5.2	Welding	3-12
3.2.5.3	Internal Corrosion	3-12
3.2.5.4	External Corrosion	3-12
3.	Pipeline Crossing Design	3-13
3.3.1	Water Crossings	3-13
3.3.1.1	Design Criteria	3-13
3.3.1.2	Water Crossing Classifications	3-13
3.3.1.3	Construction Techniques	3-14
3.3.1.4	Horizontal Directional Drilling	3-15
3.3.2	Highway, Road and Pipeline Crossings	3-20
4.	Compressor Stations	3-27
3.4.1	Purpose	3-27
3.4.2	Facility Description	3-27
3.4.2.1	Requirements	3-27
3.4.2.2	Compression	3-28
3.4.2.3	Cooling	3-28
3.4.2.4	Utilities	3-30
3.4.3	Safety and Control Systems	3-30
3.4.4	Compressor Station Schematics	3-30
5.	Heater Station	3-41
3.5.1	Purpose	3-41
3.5.2	Facility Description	3-41
3.5.3	Safety And Control Systems	3-42
6.	Other Facilities	3-47
3.6.1	Inuvik Gas Meter Station	3-47
3.6.1.1	Purpose	3-47
3.6.1.2	Facility Description	3-47
3.6.1.3	Safety and Control Systems	3-47
3.6.2	NGTL Interconnect Facility	3-48

7.	Environmental Design Considerations.....	3-53
3.7.1	Scope .....	3-53
3.7.2	Right-Of-Way Design .....	3-53
3.7.2.1	Right-of-Way Construction Modes.....	3-53
3.7.2.2	Buoyancy Control .....	3-54
3.7.3	Site Development .....	3-54
3.7.4	Air Emissions .....	3-55
3.7.5	Noise Levels.....	3-55
3.7.6	Waste Management .....	3-56
<b>4.</b>	<b>Route and Site Selection</b>	
1.	Introduction.....	4-1
4.1.1	Objectives.....	4-1
4.1.2	Selection Process.....	4-1
4.1.3	Route Selection.....	4-1
4.1.4	Route Evaluation and Selection.....	4-2
2.	Route Description .....	4-5
4.2.1	Proposed Route.....	4-5
4.2.2	Inuvik to Norman Wells .....	4-5
4.2.2.1	Route .....	4-5
4.2.2.2	Topography .....	4-6
4.2.2.3	Ecoregion .....	4-6
4.2.3	Norman Wells To Willowlake River.....	4-6
4.2.3.1	Route .....	4-6
4.2.3.2	Topography .....	4-6
4.2.3.3	Ecoregion .....	4-8
4.2.4	Willowlake River to Northwestern Alberta.....	4-8
4.2.4.1	Route .....	4-8
4.2.4.2	Topography .....	4-8
4.2.4.3	Ecoregion .....	4-8
3.	Route Alternatives.....	4-11
4.3.1	Routes Evaluated in 2002.....	4-11
4.3.2	Routes Evaluated in 2003 .....	4-11
4.3.3	Route Refinements .....	4-15
4.3.4	Ochre River Crossing Route.....	4-15
4.3.5	Trainor Lake Reroute .....	4-16
4.	Travaillant Lake Route Alternatives .....	4-17
4.4.1	Route Considerations .....	4-17
4.4.2	Alternative Routes Considered.....	4-17
4.4.3	Preliminary Route.....	4-18
4.4.4	Adjusted Preliminary Route .....	4-18
4.4.5	Travaillant Lake Route 1 .....	4-18
4.4.6	Travaillant Lake Route 2 .....	4-20
4.4.7	Mackenzie Highway Alternative.....	4-20
4.4.8	Dempster Highway Alternative.....	4-20
4.4.9	Polar Gas East Alternative.....	4-20
4.4.10	Tsiigehtchic Alternative .....	4-21
5.	Bear Rock to Great Bear River Route Alternatives .....	4-23
4.5.1	Alternative Routes Considered.....	4-23
4.5.2	Preliminary Route.....	4-23

---

4.5.3	Low Pass Alternative.....	4-23
6.	Wrigley Route Alternatives.....	4-25
4.6.1	Alternative Routes Considered.....	4-25
4.6.2	Preliminary Route.....	4-25
4.6.3	Eastern Alternative.....	4-25
4.6.4	Western Alternative.....	4-25
7.	Willowlake River Route Alternatives.....	4-27
4.7.1	2002 Alternative Routes Considered.....	4-27
4.7.1.1	Preliminary Route.....	4-27
4.7.1.2	Western Alternative.....	4-27
4.7.2	2003 Alternative Routes Considered.....	4-28
4.7.2.1	Western Alternative with a Central River Crossing.....	4-28
4.7.2.2	Western Alternative with an Eastern River Crossing.....	4-28
4.7.2.3	Eastern Alternative.....	4-30
8.	Ebbutt Hills Route Alternatives.....	4-31
4.8.1	Alternative Routes Considered.....	4-31
4.8.2	Preliminary Route.....	4-31
4.8.3	Eastern Alternative.....	4-31
9.	Mackenzie River Crossing Route Alternatives.....	4-33
4.9.1	Alternative Routes Considered.....	4-33
4.9.2	Preliminary Route.....	4-33
4.9.3	Central Alternative.....	4-33
4.9.4	Eastern Alternative.....	4-33
10.	Alberta Boundary Route Alternatives.....	4-37
4.10.1	Alternative Routes Considered.....	4-37
4.10.2	Preliminary Route.....	4-37
4.10.3	Eastern Alternative.....	4-37
4.10.4	Western Alternative.....	4-38
11.	Facilities Site Selection and Route Refinements.....	4-41
4.11.1	Scope.....	4-41
4.11.2	Site Selection Process.....	4-41
4.11.3	Site Locations and Alternatives.....	4-42

**Glossary**



## CONTENTS

### APPLICATION TO THE NATIONAL ENERGY BOARD FOR APPROVAL OF THE MACKENZIE VALLEY PIPELINE VOLUME 3: ENGINEERING DESIGN

#### LIST OF ILLUSTRATIONS

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#### LIST OF FIGURES

Figure 1-1	Regional Permafrost Distribution.....	1-2
Figure 1-2	Frost Heave .....	1-6
Figure 1-3	Thaw Settlement.....	1-7
Figure 2-1	Gas Pipeline Configuration .....	2-1
Figure 2-2	Gas Pipeline and Facility Locations.....	2-3
Figure 2-3	Gas Pipeline Route Elevation Profile.....	2-12
Figure 2-4	Gas Pipeline Operating Temperature Profiles.....	2-13
Figure 2-5	Compressor Station Monthly Discharge Temperature.....	2-14
Figure 3-1	Gas Pipeline Schematic.....	3-3
Figure 3-2	Typical Cathodic Protection Installation Site Plan.....	3-9
Figure 3-3	Typical Block Valve Site Plan .....	3-11
Figure 3-4	Water Crossing Technique Decision Process.....	3-14
Figure 3-5	Conventional Open Cut Watercourse Crossing.....	3-16
Figure 3-6	Open Cut Watercourse Crossing with Fluming .....	3-16
Figure 3-7	Open Cut Watercourse Crossing with Dam and Pump .....	3-17
Figure 3-8	Horizontal Directionally Drilled Watercourse Crossing.....	3-17
Figure 3-9	Hare Indian (Rabbitskin) River Water Crossing.....	3-19
Figure 3-10	Great Bear River Water Crossing.....	3-21
Figure 3-11	Saline River Water Crossing.....	3-22
Figure 3-12	Blackwater River Water Crossing.....	3-23
Figure 3-13	Ochre River Water Crossing .....	3-24
Figure 3-14	Willowlake River Water Crossing .....	3-25
Figure 3-15	Mackenzie River Water Crossing .....	3-26
Figure 3-16	Typical Compressor Station Plot Plan .....	3-29
Figure 3-17	Typical Compressor Station Conceptual Flow Schematic.....	3-31
Figure 3-18	Little Chicago Compressor Station Material Balance – Summer .....	3-32
Figure 3-19	Little Chicago Compressor Station Material Balance – Winter.....	3-33
Figure 3-20	Norman Wells Compressor Station Material Balance – Summer.....	3-34
Figure 3-21	Norman Wells Compressor Station Material Balance – Winter .....	3-35
Figure 3-22	Blackwater River Compressor Station Material Balance – Summer .....	3-36
Figure 3-23	Blackwater River Compressor Station Material Balance – Winter.....	3-37
Figure 3-24	Trail River Compressor Station Material Balance – Summer.....	3-38
Figure 3-25	Trail River Compressor Station Material Balance – Winter .....	3-39
Figure 3-26	Trout River Heater Station Plot Plan.....	3-43
Figure 3-27	Trout River Heater Station Process Flow.....	3-44
Figure 3-28	Trout River Heater Station Material Balance – Summer .....	3-45
Figure 3-29	Trout River Heater Station Material Balance – Winter.....	3-46
Figure 3-30	Inuvik Gas Meter Station Conceptual Flow Schematic .....	3-49
Figure 3-31	Inuvik Gas Meter Station Material Balance – Summer .....	3-50

Figure 3-32	Inuvik Gas Meter Station Material Balance – Winter .....	3-51
Figure 3-33	Typical Right-of-Way Configuration for NPS 30 and 10 Pipe .....	3-53
Figure 3-34	Typical Right-of-Way Configuration for NPS 30 Pipe .....	3-54
Figure 4-1	Route Development Process .....	4-2
Figure 4-2	Inuvik to Norman Wells Route Map .....	4-7
Figure 4-3	Norman Wells to Willowlake River Route Map .....	4-9
Figure 4-4	Willowlake River to Northwestern Alberta Route Map .....	4-10
Figure 4-5	Travaillant Lake Route Alternatives .....	4-19
Figure 4-6	Bear Rock to Great Bear River Route Alternatives .....	4-24
Figure 4-7	Wrigley Route Alternatives .....	4-26
Figure 4-8	Willowlake River Route Alternatives .....	4-29
Figure 4-9	Ebbutt Hills Route Alternatives .....	4-32
Figure 4-10	Mackenzie River Crossing Route Alternatives .....	4-35
Figure 4-11	Alberta Boundary Route Alternatives .....	4-39
Figure 4-12	Facility Site Selection Schematic .....	4-42

**LIST OF TABLES**

Table 1-1	Terrain Classes .....	1-4
Table 2-1	Gas Pipeline Capability .....	2-2
Table 2-2	Gas Pipeline Specifications .....	2-2
Table 2-3	Gas Pipeline Performance – Summer Design .....	2-4
Table 2-4	Gas Pipeline Performance – Winter Design .....	2-5
Table 2-5	Gas Pipeline Simulation Models .....	2-16
Table 2-6	Gas Pipeline Applicable Codes and Standards .....	2-18
Table 3-1	Gas Pipeline Facility Locations .....	3-2
Table 3-2	Cathodic Protection Anode Ground Bed Sites .....	3-7
Table 3-3	Gas Line Pipe Design Parameters .....	3-8
Table 3-4	Minimum Depth of Cover Requirements .....	3-10
Table 3-5	Intermediate Gas Block Valve Sites .....	3-10
Table 3-6	Watercourse Crossing Classifications by Region .....	3-14
Table 3-7	Primary Watercourse Crossing Techniques by Region .....	3-15
Table 3-8	Proposed Horizontal Directionally Drilled Watercourse Crossings .....	3-18
Table 3-9	Pipeline Inlet Temperatures .....	3-29
Table 3-10	Estimated Facility Air Emissions .....	3-55
Table 4-1	Pipeline Route Evaluation Criteria .....	4-3
Table 4-2	Gas Pipeline Lengths by Region .....	4-5
Table 4-3	Route Refinement by Route Segment – 2002 .....	4-12
Table 4-4	Route Refinements to Connect Project Facilities .....	4-16
Table 4-5	Proposed Sites for the Gas Pipeline Facilities .....	4-43
Table 4-6	Proposed Gas Block Valve Sites .....	4-44