



National Energy Board

Reasons for Decision

**Intercoastal Pipe Line Inc. and Interprovincial
Pipe Line Inc.**

GH-4-93

April 1994

Facilities, Tariff & Toll Methodology

National Energy Board

Reasons for Decision

In the Matter of

**Intercoastal Pipe Line Inc. and Interprovincial
Pipe Line Inc.**

Application dated 29 June 1993, as amended
29 October 1993, for New and Converted
Facilities in southwestern Ontario

GH-4-93

April 1994

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Services Canada 1994

Cat. No. NE22-1/1994-4E
ISBN 0-662-22208-3

This report is published separately in both
official languages.

Copies are available on request from:

Regulatory Support Office
National Energy Board
311 Sixth Avenue S.W.
Calgary, Alberta
T2P 3H2
(403) 292-4800

For pick-up at the NEB office:

Library
Ground Floor

Printed in Canada

© Ministre des Travaux publics et des Services
gouvernementaux Canada 1994

N° de cat. NE22-1/1994-4E
ISBN 0-662-22208-3

Ce rapport est publié séparément dans les deux
langues officielles.

**Exemplaires disponibles sur demande auprès
du:**

Bureau du soutien à la réglementation
Office national de l'énergie
311, sixième avenue s.-o.
Calgary (Alberta)
T2P 3H2
(403) 292-4800

En personne, au bureau de l'Office:

Bibliothèque
Rez-de-chaussée

Imprimé au Canada

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Abbreviations

| | |
|----------------|--|
| Acres | Acres International Ltd. |
| Act | the <i>National Energy Board Act</i> |
| AISI | American Iron and Steel Institute |
| ANR | ANR Pipeline Company |
| ANSI | Area of Natural and Scientific Interest |
| ATA | Alternate Transportation Agreement |
| Battelle | Battelle Memorial Institute |
| Bcf | billion cubic feet |
| Board | National Energy Board |
| British Gas | British Gas plc |
| C | Celsius |
| CCA | Capital Cost Allowance |
| CCME | Canadian Council of Ministers of the Environment |
| CSA | Canadian Standards Association |
| CSA | Z184 CAN/CSA Z184-M92 Gas Pipeline Systems Code |
| CFER | Centre for Frontier Engineering Research |
| Consumers' Gas | (The) Consumers' Gas Company Ltd. |
| COSEWIC | Committee on the Status of Endangered Wildlife in Canada |
| COV | coefficient of variation (standard deviation divided by mean value) |
| dB(A) | decibels (A-weighted) |
| DFO | Department of Fisheries and Oceans |
| EACC | Environmental Assessment Coordinating Committee of Environment Canada - Ontario Region |
| EGPC | Environmental Standards and Guidelines for Pipeline and Facility Construction |
| EIL | Environmental Issues List |
| ESA | Environmentally Sensitive Area |
| ESP | Ecological Services for Planning Ltd. |
| FS | Firm Service |
| Great Lakes | Great Lakes Gas Transmission Limited Partnership |
| Guidelines | Fuel Safety Branch Guidelines of the Ontario Ministry of Consumer and Commercial Relations |

| | |
|-----------------|--|
| HRCA | Halton Regional Conservation Authority |
| ICP | InterCoastal Pipe Line Inc. |
| Interprovincial | Interprovincial Pipe Line System Inc. |
| IPL | Interprovincial Pipe Line Inc. |
| IS | Interruptible Service |
| J | Joules |
| KP | kilometre post |
| kPa | kilopascals |
| Maxey model | the model described in a paper entitled "Brittle Fracture Arrest in Gas Pipelines", by W.A. Maxey, in a Report to the NG-18 Line Pipe Research Supervisory Committee of the American Gas Association, dated July 25, 1975, revised April 4, 1983 |
| MGS | magnetic guidance system |
| MichCon | Michigan Consolidated Gas Company |
| mm | millimetres |
| MMcfd | million cubic feet per day |
| Moore Township | Corporation of the Township of Moore |
| MOP | Maximum Operating, Pressure |
| MSL | Mississauga Southern Link |
| MPa | MegaPascals |
| NEB | National Energy Board |
| NEC | Niagara Escarpment Commission |
| North Canadian | North Canadian Marketing Inc. |
| NPS | Nominal Pipe Size |
| OD | Outside Diameter |
| OMCTR | Ontario Ministry of Culture, Tourism and Recreation |
| OMEE | Ontario Ministry of Environment and Energy |
| OMNR | Ontario Ministry of Natural Resources |
| Ontario | Minister of Environment and Energy of Ontario |
| OPLA | Ontario Pipeline Landowners Association |
| OPCC | Ontario Pipeline Coordination Committee |
| psig | pounds per square inch (gauge) |
| Regulations | the <i>Onshore Pipeline Regulations</i> |
| RG&E | Rochester Gas and Electric Corporation |

| | |
|-----------------------------------|---|
| RH-2-91 | NEB Reasons for Decision RH-2-91 in respect of Interprovincial Pipe Line's 1992 Tolls |
| RH-3-92 | NEB Reasons for Decision RH-3-92 in respect of Westcoast Energy Inc.'s 1993 Tolls |
| ROW | right-of-way |
| RSYD | Reverse Sum of the Years Digits (depreciation method) |
| SCC | Stress Corrosion Cracking |
| SMYS | Specified Minimum Yield Strength |
| TGS | Tecumseh Gas Storage |
| TransCanada | TransCanada PipeLines Limited |
| UCC | undepreciated capital cost |
| Union | Union Gas Limited |
| WIFN | Walpole Island First Nation |
| 10 ³ m ³ /d | thousand cubic metres/day |

Recital and Appearances

IN THE MATTER OF the *National Energy Board Act* ("the Act") and the Regulations made thereunder;

AND IN THE MATTER of applications by InterCoastal Pipe Line Inc. for a Certificate of Public Convenience and Necessity and an Order under Part III of the Act authorizing the construction of additional facilities, and for an Order authorizing the transfer of certain Certificates of Public Convenience and Necessity and Orders respecting crude oil pipeline facilities owned and operated by Interprovincial Pipe Line Inc., and for variation of the Certificates and Orders to authorize the operation of the existing oil pipeline facilities as a natural gas line;

AND IN THE MATTER of an application by InterCoastal Pipe Line Inc. for an Order under Part V of the Act for leave to purchase certain crude oil pipeline facilities from Interprovincial Pipe Line Inc.

AND IN THE MATTER of an application by InterCoastal Pipe Line Inc. for Orders under Part IV of the Act respecting the toll design, cost allocation methodologies and interim tolls for the facilities;

AND IN THE MATTER of applications by Interprovincial Pipe Line Inc. for Orders under Part V of the Act for leave to abandon and to sell certain crude oil pipeline facilities;

AND IN THE MATTER of the National Energy Board Hearing Order GH-4-93.

HEARD in London, Ontario on 10, 11, 12, 13, 14, 17, 18, 19, 20, 21, 24, 25, 26, 27, 28 and 31 January 1994 and 1, 3 and 4 February 1994.

BEFORE:

| | |
|-----------------|------------------|
| C. Bélanger | Presiding Member |
| A. Côté-Verhaaf | Member |
| K.W. Vollman | Member |

APPEARANCES:

| | |
|-------------------|---------------------------------|
| H.T. Soudek | Intercoastal Pipe Line Inc. and |
| J.H. Farrell | Interprovincial Pipe Line Inc. |
| K. Seymour | |
| J.B. Ballem, Q.C. | |

| | |
|----------------|------------------------------|
| M. Sanderson | The Chippewas of Sarnia Band |
| R.E. Rowcliffe | |

| | |
|--------------|----------------------------------|
| B.A. Carroll | Industrial Gas Users Association |
|--------------|----------------------------------|

| | |
|------------|--|
| P.G. Vogel | Ontario Pipeline Landowners Association; |
| N. Hassan | Walpole Island First Nation |

| | |
|--|--|
| T.G. Kane | ANR Pipeline Company |
| R.B. Brander | Centra Gas Ontario Inc. |
| J.H. Farrell P.Y. Atkinson | (The) Consumers' Gas Company Ltd. |
| J.S. Bulger | Gaz Métropolitain, inc. |
| M.F. Campbell | Imperial Oil Limited |
| N. Kozowyk | Alex Kozowyk |
| P.J. McLeod J.F. Foreman, Q.C. R. Bohm | Lambton County Board of Education |
| A.F. Bannister | The Corporation of the Township of London |
| P. McClemens R.J. McClemens | On their own behalf |
| T.E. McLaughlin | On his own behalf |
| A. Mudryj | The Corporation of the Township of Moore; Laidlaw Environmental Services Ltd.; Ron and Margaret Bird; Taisto and Sylvia Puurunen; R. Ben and Donna Rae Leatherdale; Charles Celnar; Harold and Gail Taylor; Margaret Ruth and Richard J. Wellington; 540933 Ontario Ltd.; Craig Featherstone; F. McCullough; Robert Bruce and Lorna Joan Marshall |
| L.G. Keouch | North Canadian Marketing Inc. |
| L.E. Smith | Alberta Northeast Gas, Limited Boundary Gas, Inc.; Ocean State Power / Ocean State Power 11; MASSPOWER; Selkirk Cogen Partners, L.P. and Selkirk Cogen Partners 11, L.P. |
| S.R. Miller | Petro-Canada |
| J. MacDermott J.C. Tweed | Panhandle Eastern Pipe Line Company |

M.S. Forster
J.W.S. McOuatt, Q.C.

TransCanada Pipelines Limited

G. Cameron

Union Gas Limited

J.T. Horte

Wascana Energy Marketing Inc.

H.E. Wellington
J.W. Wellington
P.E. Wellington

On their own behalf

W.M. Moreland

Alberta Petroleum Marketing Commission

J.C. Turchin

Minister of Environment and Energy of Ontario

N.J. Schultz
G. Nettleton

Board Counsel

Chapter 1

Introduction

1.1 The Applications

By applications dated 29 June 1993, InterCoastal Pipe Line Inc. ("ICP") applied to the National Energy Board ("the Board") for an order of the Board granting ICP leave to purchase certain crude oil pipeline facilities owned and operated by Interprovincial Pipe Line Inc. ("IPL"); an order authorizing the transfer of certain Certificates of Public Convenience and Necessity and related orders in respect of the said facilities; and a variation of the Certificates of Public Convenience and Necessity and related orders to authorize the operation of the facilities as a natural gas pipeline. ICP also applied for a Certificate of Public Convenience and Necessity pursuant to section 52 of the *National Energy Board Act* ("the Act") and for an order pursuant to section 58 of the Act, in respect of certain new facilities proposed to be constructed and operated by ICP. ICP further requested orders under Part IV of the Act respecting ICP's tariff for transportation service, toll design and cost allocation methodologies and for interim tolls.

Additionally, on 29 June 1993, Interprovincial Pipe Line Inc. applied for an order of the Board pursuant to paragraph 74(1)(d) of the Act for leave to abandon the operation of the facilities proposed to be transferred to ICP, and further for an order pursuant to paragraph 74(1)(a) granting leave to IPL to sell the said facilities to ICP.

The applications, if approved, would permit ICP to own and operate a natural gas pipeline in southern Ontario capable of transporting up to $4\,955\,10^3\text{m}^3/\text{d}$ (175 MMcfd) from a point of interconnection with the facilities on ANR Pipeline Company ("ANR") at the international border near Sarnia to a point of interconnection with the facilities of the Consumers' Gas Company Ltd. ("Consumers' Gas") near Toronto. Consumers' Gas has contracted virtually all of the initial capacity for a 15-year period. The total cost of the project is estimated to be \$46.6 million, including \$4.3 million for the purchase of the existing facilities from IPL and \$8.4 million for the conversion of the existing crude oil facilities to natural gas service.

ICP will be owned by IPL (80 percent) and ANR directly or through an affiliate (20 percent). The InterCoastal pipeline in Ontario would be part of a larger international pipeline system ("the InterCoastal Project") that also comprises natural gas facilities in the United States that will be owned and operated by ANR.

Having considered the applications, the Board decided to convene a public hearing on 18 October 1993, in Sarnia, Ontario to consider matters within the Board's mandate under the Act and under the *Environmental Assessment and Review Process Guidelines Order*. Following the issuance of the hearing order, the Board heard a motion by the Ontario Pipeline Landowners Association ("OPLA") for a change to the hearing date and venue. The Board considered the submissions of the OPLA, ICP and IPL ("the Applicants") and other Interested Parties, and on 23 September 1993 decided to delay the commencement of the public hearing until 10 January 1994 and to hold the hearing in London, Ontario.

ICP filed a general revision to its application on 29 October 1993, reflecting changes to the operating pressures and the minimum design temperature of its proposed facilities.

1.2 Jurisdictional Matters

During the course of the hearing, which was held between 10 January and 4 February 1994, the Board's jurisdiction was questioned by the Chippewas of Sarnia Band. The objection related to the rights the Band has claimed in relation to certain areas in the vicinity of Sarnia.

Views of the Board

The applications which are before the Board are in respect of a pipeline as defined by the *National Energy Board Act*. The definition of "pipeline" in the Act is grounded on sections 91(29) and 92(10)(a) of the *Constitution Act, 1867*. The Board, therefore, has no doubt as to its jurisdiction in this matter.

In exercising its jurisdiction, the Board took into account affected interests of all parties including those of aboriginal peoples. In that regard, the Chippewas of Sarnia Band intervened in the proceeding and submitted written argument. The Walpole Island First Nation also intervened and participated actively in the hearing through cross-examination, the presentation of evidence, and the submission of oral argument. The Board has considered the representations made to it by these, and all other, interested parties in making its decisions.

1.3 Environmental Review

As an initiating department under the Environmental Assessment and Review Process Guidelines Order ("EARP Guidelines Order"), the Board is required to screen all proposals having the potential to create any adverse environmental effects. In this hearing, the applications filed pursuant to Hearing Order GH-4-93 constituted the proposal to be screened.

Chapter 2

Facilities

2.1 Specific Facilities

The facilities applied for by ICP consist of

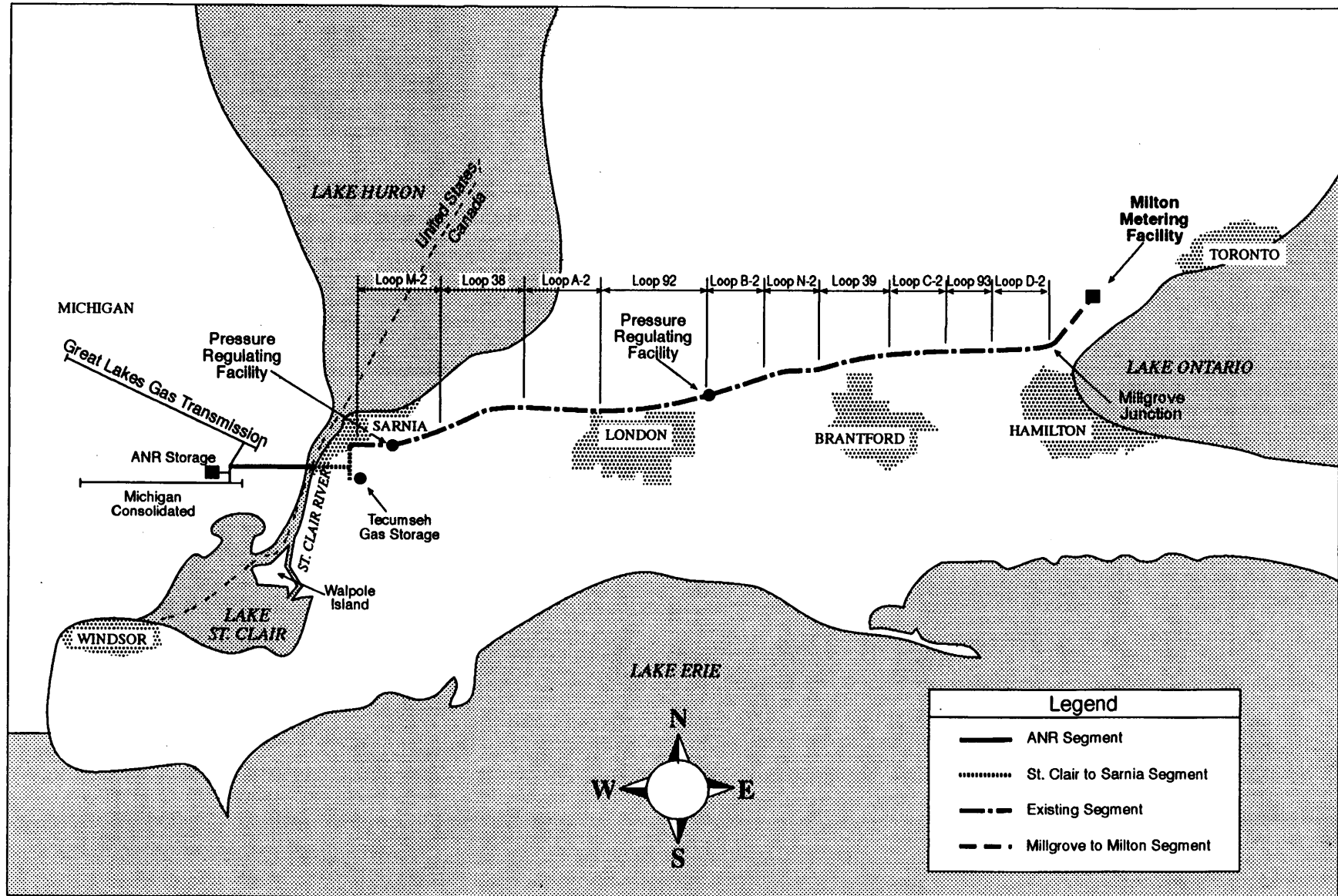
- the construction of 19.7 km (12.2 miles) of 610 mm (24 inch) diameter line pipe from a point of interconnection with ANR at the international border under the St. Clair River in Ontario to IPL's Sarnia Terminal, including a 1.9 km (1.2 mile) lateral to the Tecumseh Gas Storage Facilities (the "St. Clair to Sarnia Segment");
- the construction of 22.4 km (13.9 miles) of 508 mm (20 inch) diameter line pipe from Millgrove Junction to a point of connection with the natural gas distribution system of Consumers' Gas near Milton, Ontario (the "Millgrove to Milton Segment");
- the conversion of 209.7 km (130.3 miles) of IPL's existing 508 mm (20 inch) Line 8 from Sarnia to Millgrove Junction from crude oil to natural gas service (the "Existing Segment");
- pressure regulating facilities located 11.8 km (7.3 miles) and 81.7 km (50.8 miles) east of the Sarnia Terminal on the Existing Segment; and
- a custody transfer metering facility located at the Milton interconnection with Consumers' Gas.

The initial capacity of the InterCoastal pipeline would be 3 766 10³m³/d (133 MMcfd) from the projected in-service date of 1 November 1994 until 31 October 1996, and 4 955 10³m³/d (175 MMcfd) thereafter due to increases in the gas pressure made available from the United States.

The proposed pressure regulating facilities would have the effect of dividing the facilities into three distinct pressure zones. From the international border to the first pressure regulating facility located at kilometre post ("KP") 2816, the pipeline would have a Maximum Operating Pressure ("MOP") of 6895 kilopascals ("kPa") (1000 psig), while downstream of the first pressure regulating facility, the MOP would be 6343 kPa (920 psig). Downstream of the second pressure regulating facility, located at KP 2886, the MOP would be limited to 5620 kPa (815 psig). ICP specified these pressure limits in order to enhance the fracture control capabilities of the Existing Segment of the proposed pipeline. A map illustrating the proposed facilities is included as Figure 2-1.

As a result of its engineering assessment, ICP determined that two of the pipeline loops on the Existing Segment would not have sufficient material toughness to ensure positive fracture control at the maximum operating pressure and minimum temperature conditions specified in the pipeline design. ICP proposed the installation of mechanical crack arrestor devices on these loops as the primary means of fracture control at design conditions.

**Figure 2-1
InterCoastal Pipe Line Inc. – Applied for Facilities**



2.2 Method of Assessment of Conversion of the Existing Segment

The engineering requirements for the conversion of an existing crude oil pipeline to natural gas service are not addressed in the *National Energy Board Act* or the *Onshore Pipeline Regulations* (the "Regulations"), nor are they addressed in the Canadian Standards Association ("CSA") codes. To date, there has been one conversion from crude oil to natural gas service of a federally-regulated pipeline in Canada, which occurred in 1987, and two conversions of provincially-regulated pipelines in the early 1970s. As the conversion of the federally-regulated facilities of Montreal Pipe Line Limited was at a significantly lower operating stress level than ICP's applied-for conversion, this precedent is not applicable to the conversion of the Existing Segment as proposed by ICP.

During the hearing, ICP noted that various provisions of the *Onshore Pipeline Regulations* provide for a level of safety "at least equivalent to the level of safety generally provided for by CSA standards". ICP submitted that this requirement for equivalency was the standard by which it was guided in preparing its application, and that this was the standard which should guide the Board in its assessment of ICP's application.

In its application, ICP proposed changing the service of an existing segment of pipeline and constructing two new sections of pipeline. ICP stated that the CSA design standards are intended to apply to new pipelines and new purchases, but that it is not intended that these design requirements apply to existing pipelines.

In support of this position, ICP referred to clauses 1.4 and 1.5 of the CAN/CSA Z184-M92 Gas Pipeline Systems code ("CSA Z184"). Specifically, these clauses 1.4 and 1.5 state that:

“(1.4) This Standard is intended to establish essential requirements and minimum standards for the design, installation and operation of gas pipeline systems. It is not a design handbook and the need for exercising competent engineering judgement is a necessary requirement to be employed concurrently with its use.

(1.5) The requirements of this standard shall be applicable to the operation, maintenance, and upgrading of existing installations; however, it is not intended that such requirements be applied retroactively to existing installations insofar as design, construction, and established operating pressures are concerned, and established operating pressures are concerned.”

ICP maintained that certain code requirements, such as those for pipeline depth of cover, are intended to be design and installation requirements, but are not intended to be operational requirements. As such, these requirements should not be applied retroactively to an existing pipeline. ICP also suggested that if existing gas lines had to requalify to the current CSA codes every five years, there would be many gas lines that would not be allowed to operate at pressures that have been historically shown to be suitable and safe.

Notwithstanding its position, ICP agreed that certain aspects of CSA Z184, such as fracture toughness properties, are relevant to a conversion of an oil line to gas service, and therefore should not be covered by a retroactivity clause. ICP referred to a combined oil and gas code which is being developed by the CSA, and suggested that this future code will deal with changing pipeline service by stipulating that "an engineering assessment shall be conducted to determine the suitability of the pipeline system for the new service". ICP suggested that the intent of this new provision would be to

address the significant design and construction elements of a change in service through an engineering assessment. ICP noted that although the term "engineering assessment" is used frequently in CSA Z184 and will be used in future combined codes, it was not a defined term. ICP submitted that an engineering assessment implied a detailed technical evaluation that required sound engineering judgement in order to determine the extent to which the applicable clauses of CSA Z184 were being met, and where the clauses were not being met, to determine the significance of not meeting those clauses.

ICP also noted that, as the considerations brought to bear in a pipeline conversion could vary from case to case, it would be difficult to eliminate judgement from almost any aspect of a conversion by stipulating minimum code requirements.

With respect to CSA Z184, A. Kozowyk argued that it was inappropriate for ICP to make statements about its intent in a public hearing. Mr. Kozowyk was concerned that this would be equivalent to rewriting a code during the hearing process, which was inappropriate since most of the code development committee was not present. Mr. Kozowyk reminded the Board that ICP stated in its application that "the design, construction, and operation of InterCoastal will meet or exceed the requirements of CSA standard CAN/CSA Z184-M92 and the Regulations". Mr. Kozowyk also submitted that since ICP's application was based on the current code, and not on the historical use of similar pipe by other pipeline companies, the application should be considered solely on the basis of meeting the current code, and not on ICP's argument that pipe of similar vintage might be in gas service elsewhere. His rationale for this recommendation was that ICP had provided no evidence to establish that the design and operating circumstances of other similar pipe, enabling it to function without incident, were comparable to the conditions proposed for this conversion.

The Minister of Environment and Energy of Ontario ("Ontario") argued that, in examining this application, the Board should require ICP to meet, at a minimum, existing CSA standards and any applicable regulatory Guidelines. Ontario also submitted that where departure from current standards or guidelines was requested, the onus would be on ICP to demonstrate that the degree of safety provided by the current standards and guidelines have been met or exceeded by some other method. With respect to other pipelines in Canada that have undergone an oil to gas service conversion, Ontario suggested that it would have been useful to have received a far more detailed assessment of the operating characteristics and operational histories of these conversions, as a means of bringing additional practical experience related to similar conversions in the past to the assessment of this application.

The Corporation of the Township of Moore ("Moore Township") also argued that a new pipeline system should be required to meet the strict code requirements.

Views of the Board

The Board is of the view that while the current CSA Z184 code does not specifically provide for the conversion of a crude oil to a natural gas pipeline, it can be used as a guide in determining the suitability and safety of the proposed pipeline conversion based on the facts of this particular case. In addition, the Board notes that ICP has accepted the CSA Z184 code as an appropriate standard, and has based its application on meeting the essential requirements and minimum standards of CSA Z184 and the *Onshore Pipeline Regulations*.

The Board is cognizant of the number of judgements and engineering assessments that ICP had to make in determining the safety and suitability of the conversion of the Existing Segment from oil to gas service. ICP initially had to obtain pipe samples and to test them. ICP was then required to decide what benchmarks it would use to evaluate the test results, and subsequently from which to infer the suitability and safety of the Existing Segment for a change in service. In some situations, ICP has used its interpretation of the "intent" of the CSA Z184 code as a suitable benchmark, while in other situations, ICP drew upon available technical literature. The Board's views on the nature of the judgements and engineering assessments made by ICP relative to proposed conversion are provided in detail in each of the following sections of this chapter.

2.3 Fracture Control Design

Section 4.1.4 of CSA Z184-M92 specifies the notch toughness requirements for gas pipeline systems.

Clause 4.1.4.2 states that:

“For steel pipe 60.3 mm OD or larger with nominal wall thicknesses exceeding 5.0 mm ... notch toughness properties shall be specified in accordance with the requirements of Table 4.2 and Clause 4.1.4.3 ... and, where applicable, shall be proven at or below the applicable minimum design temperature.”

Table 4.2 states that the use of Category I¹ pipe is permissible at a design operating stress of 225 MegaPascals ("MPa") or less and a minimum design temperature of -30°C or higher. At operating stresses greater than 225 MPa, the use of Category II² pipe is mandatory. Table 4.2 is generally considered to address the notch toughness requirements of line pipe for the control of *fracture initiation*.

Clause 4.1.4.3 states that:

“Where the design Operating stress ... exceed(s) the applicable pipe threshold stress value given in Table 4.3, Category II pipe shall be required and supplementary design measures that may be necessary to provide positive control of fracture length shall be considered. Such measures may include the use of Category II pipe with higher values of absorbed energy or the use of specially designed fracture arrest devices.”

Table 4.3 indicates that the use of Category I pipe is permissible for 508 mm Outside Diameter ("OD") pipe with a threshold stress value of 180 MPa. At a threshold stress value between 180 and 290 MPa, the use of Category II pipe displaying a minimum absorbed energy (based on full-size Charpy V-notch impact test specimens) of 40 Joules ("J") is mandatory. Table 4.3 is generally considered to address the notch toughness requirements of line pipe for the control of *fracture propagation*.

¹ Pipe without requirements for proven body notch toughness.

² Pipe with requirements for proven body notch toughness in the form of energy absorption and fracture appearance.

ICP developed a fracture control design for the Existing Segment based on a minimum design temperature of 0 °C and maximum operating pressures of 6343 kPa (920 psi) between KP 2816 and 2886, and 5620 kPa (815 psi) between KP 2886 and the terminus of the pipeline at Milton, Ontario.

2.3.1 Minimum Design Temperature

At the time of the initial application dated 29 June 1993, ICP had determined that the minimum design temperature for the converted pipeline should be 5 °C based on a review of eight years of operating information from Line 8 in oil service; the fact that the pipeline had significant depth of cover; the energy imparted into the gas flow through compression; and the Joule-Thompson effect.¹ Subsequent to the initial application, ICP reviewed the operating temperatures of other gas pipeline companies and identified operating temperatures which were below ICP's minimum design temperature. As a result, ICP undertook an analysis of ground temperatures as well as further analysis of the impact of the Joule-Thompson effect on a flowing gas pipeline. ICP relied upon ground temperature measurements extending over periods of up to 30 years from certain climate stations in southwestern Ontario. ICP was of the view that this data base permitted it to establish an appropriate minimum design temperature for the pipeline without a more site-specific analysis involving the effects of the many variables which can affect soil temperature. As a result of these analyses, ICP concluded that 0°C was a more appropriate minimum design temperature. As a consequence of this change in design temperature, loops 38 and A-2 of the Existing Segment were determined to contain 95 percent non-arresting pipe. In a revised application dated 29 October 1993, ICP added a pressure regulating station 81.7 km east of Sarnia Terminal and crack arrestors to loops 38 and A-2 of the Existing Segment. During the hearing a number of parties took issue with the validity of the minimum design temperature selected by ICP and presented arguments supporting a minimum design temperature of -5 °C.

2.3.1.1 Parameters Affecting Ground Temperatures

ICP based its minimum design temperature on an examination of actual soil temperature data available from five climate stations within 100 kilometres of the pipeline; a parametric review conducted by Consumers' Gas of the relationships between pipe wall temperature, soil temperature, gas flow rate and pipe diameter; and a review of flowing gas temperatures in existing gas pipelines operating in the same geographic region in southwestern Ontario.

It was noted that four of the five referenced climate stations were located within 50 kilometres of the Existing Segment and that of those four, the Guelph, Elora and Toronto climate stations were located north of the Existing Segment. ICP indicated that these particular stations would experience a winter climate which would be as cold as, or colder than, the climate along the pipeline route. ICP stated that data from these stations included average and minimum monthly soil temperatures at depths of 100 centimetres and 150 centimetres. ICP indicated that since the average depth of cover of the Existing Segment was 160 centimetres, greater emphasis should be placed on the soil temperature readings at the 150 centimetre depth. It was noted by ICP that the coldest validated ground temperature at a depth of 150 cm depth was 0.6 °C at the Harrow climate station. ICP also pointed to the average of the

¹ The Joule Thompson effect is the phenomenon wherein a fluid temperature changes in a constant enthalpy process. In the situation of a gas pipeline, the flowing gas temperature will decrease when the pressure is reduced.

minimum daily ground temperatures at the five climate stations in March, generally the coldest month for ground temperatures, which ranged from 3 °C to 3.5 °C.

In addition, ICP discussed the results of its parametric review, which indicated that where the pipeline had less than 160 centimetres of cover, there would be a negligible effect from the lower ground temperatures on the pipe temperature. ICP noted that if a ground temperature of -9 °C at the pipe depth was assumed, a continuous length of 500 metres would be required to decrease the pipe temperature by 1 °C. ICP pointed to its recent depth of cover survey which indicated that the longest continuous length of pipe with less than 100 centimetres of cover was about 200 metres in length. ICP stated that if a ground temperature of 1.7 °C at a depth of cover of 100 centimetres was assumed, the pipe temperature would remain essentially unchanged in 200 metres.

ICP also provided flowing gas temperatures from ten metering facilities of pipelines operating in southwestern Ontario, including, Union Gas Limited ("Union"), which were recorded from the years 1988 to 1993. These records indicated that the lowest observed temperature at these locations, which were not affected by a pressure control valve, was 2.2 °C. To support the use of the observed data from the Union system ICP provided, as part of its parametric analysis, a comparison of a 508 mm OD (NPS 20) pipeline representing the Existing Segment with a 1067 mm OD (NPS 42) pipeline which was deemed to be representative of Union's Trafalgar system. The results of this comparison indicated that by assuming an initial ground temperature of 1.67 °C, the NPS 20 pipeline would stabilize over a distance of approximately 78 kilometres at a temperature of 1.22 °C, while the NPS 42 pipeline would converge to a temperature of 0.29 °C at the same distance, regardless of whether the initial gas temperature used in the comparison was +5 °C or -1 °C.

The OPLA argued that ICP had failed to demonstrate the validity of its design temperature because of the absence of a route-specific analysis of the relevant factors affecting soil temperature. It provided evidence illustrating the depth of frost penetration and approximate temperature profiles for two London area winters assuming 1000 degree days Fahrenheit and 1500 degree days Fahrenheit seasons. The OPLA's evidence assumed a range of soil characteristics and used Sanger's charts to calculate the frost penetration. The OPLA indicated that Sanger's charts were developed for the U.S. Army Corps of Engineers and had been verified by field observation by the Corps of Engineers. It indicated that under severe weather conditions, including an absence of snow cover, sandy soil with a low water content could freeze to a depth of 2.1 metres. The OPLA was of the view that a cold pipeline could accelerate the rate of frost penetration down to the pipe depth, but that the pipeline would resist further cooling unless the gas was chilled by passing through frozen soil. The OPLA compared its degree day assumptions with the design freezing index issued by the Ontario Ministry of Environment and Energy, and noted that there was an 85 percent probability that the actual degree days in the London area in a given year would be equal to or less than 1368 degree days Fahrenheit. The evidence was characterized by the OPLA as a worst case scenario for determining minimum pipeline temperatures and, as such, was not intended to be used as a good "average" value.

ICP reviewed the assumptions used by the OPLA in calculating the maximum frost depths for typical soils in the London area. ICP was of the view that the bulk densities and moisture contents of the soil assumed in the OPLA analysis were not characteristic of the agricultural soils in the area. ICP also pointed to meteorological records at the London airport which indicated that the average 75 day freezing period was 827 degree days and that the average snow fall in the months of December and January was 106 centimetres. ICP proposed a revised worst case scenario using 1371 degree days

Fahrenheit, 30 centimetres of snow and different soil condition assumptions. Using these values, ICP estimated a frost penetration depth of 0.9 metres.

In further support of its case, ICP provided the results of some modelling it had undertaken of winter soil temperatures at pipeline depth along the pipeline route. The model used by ICP was developed by C.E. Ouellet of Agriculture Canada using multiple regressions and provides monthly estimates of ground temperature under short grass turf in soils of sandy loam or clayey loam texture using macroclimatic data. Using data from five climate stations along the pipeline route, the results obtained by the model indicated that the minimum average soil temperature in the coldest month on record would be 0.6 °C at a depth of 100 centimetres and 1.6 °C at a depth of 150 centimetres. ICP provided a comparison of the model results with observed data from the Simcoe climate station, which indicated that the model results were within 0.8 °C of the observed ground temperatures.

The OPLA challenged ICP's analysis by pointing to the fact that the Ouellet model used an average of soil types from across Canada in lieu of the actual soil properties obtained by soil testing. The OPLA also noted the lack of specific information as to the extent of snow cover assumed by the model. It indicated that the model provided a margin of error of 2 °C which, by ICP's own data, would put the soil temperature very close to 0 °C at some of the locations used. The OPLA was of the view that the major difference between its calculations and those of ICP was the assumption made with respect to snow cover. It submitted that ICP's assumption of snow cover for a worst case scenario was unrealistic and inappropriate, particularly if the main consideration was safety. Photographic evidence was provided by the OPLA illustrating thin snow cover in the fields over the pipeline. This was used as evidence supporting its view that the assumptions of 1500 degree days Fahrenheit and no snow cover were the most appropriate parameters to use.

2.3.1.2 Practices of Other Companies

During the course of the hearing, evidence was adduced on the design temperature of other gas pipeline companies operating in the same geographic area. It was established that when Union, Consumers' Gas or TransCanada PipeLines Limited ("TransCanada") ordered new Category 11 pipe, the notch toughness was specified at a minimum design temperature of -5 °C. ICP noted that gas pipelines across Canada have used standardized notch toughness test temperatures of 25 °F (-4°C) or -5 °C, rather than attempt to stipulate the lowest expected metal temperature in the various geographic regions in which their lines operate. ICP inferred that since pipeline companies were ordering Category II pipe at this temperature, the actual metal temperatures would be higher than -3 °C for most buried pipelines in Canada.

In response to an information request from the Board, Union indicated that it had specified 25 °F (-4 °C) as a minimum design temperature for buried Category II pipe from the early 1970s until 1979. This temperature was considered reasonable by Union as it was below its historical operating temperatures and was a standard pipe manufacturing test temperature during that period. In 1979, Union revised its standard test temperature downward in keeping with the new CSA Z184-M1979 requirements. Union further indicated in its response that building to the slightly reduced design temperature was consistent with its position on prudent construction principles for its system given its location and operational characteristics. Union also added that it had recorded average daily temperatures of -0.8 °C downstream of a pressure control valve over several days in March 1993.

In response to the information provided by Union respecting its recording of average day temperatures of $-0.8\text{ }^{\circ}\text{C}$, ICP contacted Union to confirm that the pressure control valve may have been activated at the time of the readings, and that this could have resulted in an abnormally low reading due to the Joule-Thompson effect. In a letter to Consumers' Gas dated 31 January 1994, Union confirmed that the valve in question controls the flow of gas from TransCanada into the Union system at Dawn and that the associated pressure drop would be high. Union also noted that the piping configuration upstream of the Union temperature point had several sections which were above ground and, therefore, would be exposed to ambient air temperatures. As a result, both Consumers' Gas and ICP were of the view that these low temperatures were not relevant to the InterCoastal pipeline.

The OPLA and Ontario argued that ICP should use the $-5\text{ }^{\circ}\text{C}$ minimum design temperature to be consistent with the Union, Consumers' Gas and TransCanada pipeline systems.

2.3.1.3 Effect of Pressure Regulators

Because of its impact on the design temperature, the possibility of the prolonged use of the proposed pressure regulators on the InterCoastal pipeline caused by the inadvertent or intentional packing of the pipeline was reviewed with ICP during the course of the hearing. The actual operating pressure of the line is limited by the inlet pressure provided by ANR. ICP indicated that if the pipeline were shut in at the Milton end of the system and the pressure were allowed to build due to continuing compression from ANR, operation of the second pressure regulator could cause a maximum pressure drop of 724 kPa. ICP observed that this would result in a $4\text{ }^{\circ}\text{C}$ drop in gas temperature due to the Joule-Thompson effect, which would immediately begin to decrease as line pack upstream of the regulator was eliminated. ICP estimated that this temperature drop would occur over about 16 minutes before normal operating temperatures would be re-established.

The second scenario discussed was the possibility that, notwithstanding ICP's intention to operate its pipeline in a steady-state manner, the line pack could be increased in order to allow Consumers' Gas to deal with hourly or daily fluctuations in its demand. This could result in the pressure regulators being used on a regular basis during the course of the day. ICP indicated that Consumers' Gas would be able to accommodate its demand fluctuations by using other systems such as TransCanada and Union and that it had not investigated the potential operation of its pipeline in this manner.

Views of the Board

The Board has considered a substantial body of evidence respecting minimum design temperature, as well as evidence concerning brittle fracture propagation and arrest. The Board notes the sensitivity of ICP's design to relatively small changes in minimum design temperature, given that the predicted available arrest energy approaches ICP's calculated required arrest energy for some of the loops of the Existing Segment. For this reason, the Board is of the view that the minimum design temperature used for engineering calculations respecting fracture initiation and propagation for this pipeline should be determined using conservative assumptions. The Board is of the view that since ICP decided to use a minimum design temperature which was higher than the normally conservative value of $5\text{ }^{\circ}\text{C}$ used by the industry, the onus was on ICP to demonstrate that its choice was adequate.

The Board is of the view that any analysis of soil temperature should take into account ambient air temperatures over time and snow cover, as well as the thermal conductivity and latent heat of the soil which is dependent on the soil's density and water content. The Board notes that the Ouellet model used by ICP employs macroclimatic information to provide estimates of monthly soil temperatures under short grass turf in soils of sandy loam or clayey loam texture. The Board also notes that ICP did not provide adequate information respecting the model's uncertainty or the snow cover assumed by the model. The Board is of the view that the usefulness of the Ouellet model is limited, since the snow cover assumed by the model is unknown; the model does not consider the specific soil parameters existing along the route; and the model's potential accuracy has not been established.

Of the two methods used by parties during the hearing, the Board is of the view that Sanger's charts incorporate more of the factors that the Board considers relevant in the determination of soil temperature. However, this method was developed for works such as airports and roadways. Accordingly, the Board finds that its applicability in this case may be too narrow due to its limited ability to consider varying depths of snow cover as well as the thermal characteristics of the top layer of agricultural soils, which may be ploughed and contain various amounts of organic material.

With respect to the actual soil temperature data obtained by ICP from climate stations in southwestern Ontario, the Board found the information interesting but of limited value since ICP did not establish whether the soil conditions and the climate at these stations were similar enough to the climate and soils along the pipeline route to be used as a proxy. With the exception of the Harrow climate station, the Board found that the length of time over which the data was collected was insufficient. In addition, the Board found that the Harrow station was too distant from the pipeline and that its climate could be affected by its latitude and proximity to Lake Erie.

The Board was not persuaded by the evidence regarding observed gas temperatures on other pipeline systems, since the possible impact of compression on the operating temperatures of these systems was not addressed. Despite a parametric analysis conducted by Consumers' Gas suggesting that gas temperatures on the Union system could be comparable to the temperatures on the InterCoastal pipeline, the Board is of the view that Union's Bright and Trafalgar compressor stations could have affected the gas temperatures observed at the Parkway and Lisgar metering stations.

Despite assurances by ICP that it intends to operate its pipeline in a steady-state manner, the Board notes that a pipeline company may operate its line within the pressure limits approved by the Board and, therefore, the possibility exists that the pipeline's line pack could be significantly increased to provide a cushion against fluctuations in demand from the Consumers' Gas system. This could result in the use of the pressure regulating stations on a more regular basis, with the effect of chilling the gas downstream of these stations. The Board is of the view that since this potential method of operation is possible, it should have been considered in ICP's design.

Based on the foregoing discussion, the Board is of the view that ICP has not adequately established the appropriateness of its minimum design temperature. While the Board would accept the -5°C minimum design temperature advocated by parties such as the OPLA and Ontario, the Board notes that ICP's evidence suggests that a higher design temperature may also be appropriate, but ICP has failed to persuade the Board that this higher design temperature should be as high as 0°C .

2.3.2 Fracture Initiation

In its application, ICP stated that the pipe in the Existing Segment was manufactured between 1967 and 1973, prior to the implementation of notch toughness requirements. Therefore, all of the pipe in the Existing Segment would be classified as Category I pipe. As previously noted, CSA Z184 specifies that the use of Category I pipe is acceptable with respect to fracture initiation control if the design operating stress of the pipeline does not exceed 225 MPa and the minimum design temperature is greater than -30°C . ICP stated that it had set the design operating stress of the Existing Segment at 225 MPa to ensure that the CSA requirement for fracture initiation control was satisfied.

At the request of TransCanada, ICP provided additional engineering evidence to support its statement that "the CSA Z184 requirements for fracture initiation are satisfied by the material's inherent properties". ICP submitted that it used a formula developed by the Battelle Memorial Institute¹ to quantify the critical defect length that could extend through the pipe wall and be detected as a leak but not a rupture. The results of these calculations were presented in the form of a graph illustrating the critical crack length as a function of upper shelf Charpy V-notch energy. ICP stated that it was common industry practice to specify notch toughness that would result in a critical crack length of 90 percent of that obtainable using "infinite" notch toughness. From the results of its calculations, ICP determined that this criterion would result in a critical crack length of 110 mm with a corresponding, required upper shelf energy of 22 J. ICP noted that a study performed by the Centre for Frontier Engineering Research ("CFER") indicated that the mean upper shelf energy of the brittle loops of the Existing Segment (pro-rated to full-size) was 53.4 J, with a standard deviation of 11.4 J. By assuming that upper shelf, or "plateau", energies were log-normally distributed, ICP calculated that the probability of achieving the 22 J initiation energy target value was greater than 99.99 percent. It also noted that for the Battelle fracture initiation equation to be valid, it was necessary that initiation occur in a ductile mode. ICP stated that the basis for using the upper shelf energy in its calculations was that fracture initiation is assumed to be a static, rather than a dynamic, process. It suggested that while the Charpy tests conducted on the Existing Segment were carried out to give a sense of the dynamic toughness of the material for arresting a propagating fracture, in the case of the initiation of a propagating fracture the static toughness could be a more indicative parameter. Therefore, ICP submitted that its assumption of ductile fracture initiation behaviour and the use of upper shelf energies in the initiation calculation were justified.

ICP stated that it recognized that the prevention of fracture initiation is the single most important aspect of the fracture control plan for a gas pipeline. To support its objective of preventing fracture initiation, ICP submitted that IPL's established pipeline surveillance and public awareness programs would minimize fracture initiation due to third party damage; that its depth of cover survey indicated

¹ Maxey, W.A., Fracture Initiation, Propagation and Arrest, 5th Symposium on Line Pipe Research, American Gas Association, 1974.

that the average depth of cover along the Existing Segment was 160 cm, which would mitigate against fracture initiation due to external loading or mechanical damage; that the Existing Segment had been inspected for geometrical defects and for metal loss by corrosion as recently as 1991; that hydrostatic testing of the pipeline during the conversion process would be effective in detecting possible failures attributable to Stress Corrosion Cracking ("SCC"), metal loss, or other defects associated with the pipe body and longitudinal and circumferential welds; and that future integrity monitoring would be enhanced by conducting a high resolution internal inspection for metal loss and geometry within one year of the pipeline conversion.

It was noted that only approximately 15 percent of the circumferential welds on the 1967 and 1970 pipeline loops (loops A-2, B-2, C-2, D-2, 38 and 39) had been radiographically examined during construction. ICP has not conducted additional examinations of the Existing Segment pipe to determine whether existing weld defects had propagated since construction or to determine the possibility that previously unexamined pipe welds may contain weld defects that are larger than those currently considered acceptable by CSA welding workmanship standards. ICP was of the opinion that any defects in the Existing Segment that would be prone to propagation would have become evident by this time. ICP also stated that its calculations indicated that any circumferential weld imperfections that were acceptable under the original workmanship standards would not grow by fatigue.

ICP also stated that it had not conducted specific pipeline excavations and examinations in SCC-prone locations to investigate for this condition. With respect to the 19 locations where ICP's depth of cover survey had indicated cover less than the CSA minimum standard of 60 cm, ICP stated that it was still assessing the types of remedial measures it would use in these locations and that it would provide the Board with its proposal for remedial measures to be undertaken at each of these locations within one month of receiving a Certificate of Public Convenience and Necessity approving the InterCoastal project.

Views of the Board

The Board is satisfied with ICP's fracture control plan with respect to fracture initiation with three exceptions. Although ICP non-destructively examined 15 percent of the welds along the brittle pipeline loops of the Existing Segment during the original construction, the Board is of the view that ICP should conduct additional investigations in order to determine the possibility of fracture initiation associated with the propagation of previously undetected weld defects. By way of comparison, the Board notes that section 22 of the Onshore Pipeline Regulations currently requires 100 percent nondestructive examination of each field joint for new pipeline construction. In the event the Board were to approve this application, the Board would direct ICP to examine the Existing Segment for weld defects at all locations where the pipe would be excavated for the replacement of pipe sections, the installation or removal of valves, and the installation of crack arrestor devices.

Additionally, the Board is of the view that ICP's proposed plan for SCC detection is not sufficiently proactive in light of the growing body of knowledge respecting this phenomenon and the potential consequences of the initiation of a fracture on the Existing Segment. The Board's specific views with respect to ICP's proposed plan are addressed in section 2.4.1 of these Reasons.

With respect to the depth of cover of the Existing Segment, the Board would have preferred the inclusion of specific mitigation plans for areas of insufficient cover in ICP's application. The issue of depth of cover is addressed more completely in section 2.4.4 of these Reasons.

2.3.3 Fracture Propagation

As noted above, the CSA Z184 code specifies that new 508 mm OD pipe having an operating stress greater than 180 MPa shall be made of Category II pipe with a minimum absorbed energy of 40 Joules. In its application, ICP noted that the pipe in the Existing Segment could not be classified as Category II pipe since it did not have proven material notch toughness in accordance with the CSA requirements. ICP therefore decided to perform an engineering evaluation to determine the inherent material notch toughness of this pipe in order to establish whether it could meet the "intent" of the CSA code with respect to fracture propagation control. According to ICP's interpretation of the code's intent regarding the term "Category II pipe", no more than 50 percent of the pipe installed may be brittle, and approximately 50 percent of the material installed must have sufficient energy to arrest a propagating fracture. This view stemmed from ICP's reading of the non-mandatory guidance notes to CSA Z184 clause 4.1.4.3, which suggest that the solution of its non-mandatory arrest toughness equation "is commonly used as a specified minimum all-heat average value for the pipe from each individual manufacturing process and source". ICP suggested that this note implies that line pipe having a mean toughness value that meets this arrest energy target would satisfy the code intent for fracture propagation, even though approximately 50 percent of the pipe's toughness test results would fall below the specified target value.

To determine the inherent material notch toughness of the Existing Segment, Charpy V-notch impact tests were performed by the Welding Institute of Canada on a total of 32 sets of samples (consisting of 3 samples per set) cut from 22 locations on the Existing Segment. These samples were intended to be representative of the various construction loops in the pipeline. Twelve sets of samples were initially tested during March and June of 1993. In August 1993, subsequent to ICP's decision to reduce its minimum design temperature from 5 °C to 0 °C, a total of 20 additional sets of samples were taken from one joint of loop A-2 and one joint of loop 38 and tested, in an effort to reduce the statistical uncertainties associated with a small sample size and to acquire Charpy transition curve data for line pipe material from the 1967 and 1970 construction years.

Statistical analyses of the Charpy test results were performed by CFER to determine whether the material notch toughness of the pipe would provide positive control of fracture length under the design conditions. CFER's analyses were filed with the Board in two separate reports, entitled "Analysis of Line Pipe Fracture Toughness Data for Proposed Gas Conversion Project" ("the CFER Report") dated August 1993 and "Supplementary Analysis of Line Pipe Fracture Toughness Data for Proposed Gas Conversion Project" ("the Supplementary CFER Report") dated October 1993. The analyses conducted by CFER are discussed in greater detail in section 2.3.3.1.

The CFER Report stated that the sample data from the Existing Segment suggested that there were distinct sections of the pipeline that would exhibit either ductile or brittle fracture propagation behaviour at the design temperature.

With respect to loops M-2, N-2, 92 and 93 of the Existing Segment, ICP submitted that its notch toughness tests indicated that the pipe material in these loops would exhibit ductile fracture

propagation characteristics at ICP's minimum design temperature of 0°C. Therefore, ICP evaluated the fracture arrest capability of these loops using a ductile fracture arrest equation developed by the American Iron and Steel Institute ("AISI") which was included in the non-mandatory notes of clause 4.1.3.4 of CSA Z184. ICP submitted that statistical analysis of the data by CFER suggested that greater than 99 percent of the pipe joints in these loops would arrest a propagating fracture at the maximum operating pressure and minimum design temperature. Since ICP has assumed that the CSA Z184 code intent for fracture propagation control would be clearly met if the proportion of arrest pipe is greater than 50 percent, ICP submitted that these pipe loops provided adequate control of fracture length.

For loops 39, B-2, C-2 and D-2, ICP stated that notch toughness tests carried out on samples cut from these loops indicated that the pipe material would exhibit brittle fracture propagation characteristics at the minimum design temperature. Therefore, the arrest capability of these loops was evaluated by CFER using brittle fracture arrest criteria developed by the Battelle Memorial Institute ("the Maxey model")¹. ICP stated that statistical analysis of the sample data indicated that slightly more than 50 percent of the pipe joints in these loops would arrest a propagating fracture under the design conditions, when the effects of the Maxey model's uncertainty were included in the analysis. ICP argued that since the calculated proportion of arrest pipe in these loops exceeded 50 percent, these loops were also assumed to provide an adequate control of fracture length.

Notch toughness tests conducted on samples cut from loops 38 and A-2 suggested that these loops would also exhibit brittle fracture propagation characteristics similar to loops 39, B-2, C-2 and D-2. However, ICP stated that its evaluation indicated that approximately 95 percent of the pipe joints in these loops would not arrest a propagating fracture under design conditions, since these loops would be exposed to a higher maximum operating pressure than the other brittle loops. In order to provide positive control of fracture length for these loops, ICP proposed the installation of fracture arrest devices at nominal intervals along the length of these two loops. A review of ICP's crack arrestor proposal is included in section 2.3.4.

2.3.3.1 CFER Studies

ICP commissioned CFER to perform statistical analyses of the Charpy sample test results to determine the probability that the fracture toughness of the line pipe in the Existing Segment was sufficient to satisfy the intent of the crack arrest provisions of CSA Z184.

Using the ductile arrest equation developed by the AISI, as noted above, CFER calculated that the required energy for crack arrest in the ductile pipe loops at 5 °C would be 27 J. When ICP's minimum design temperature was revised to 0 °C, the ductile energy requirement was subsequently recalculated to be 27.5 J for the loops operating at 6343 kPa, and 22.9 J for the loops operating at 5613 kPa (downstream of pressure regulator R2, which was included in ICP's revised application). When CFER converted the Charpy impact results obtained from the 1/2 size Charpy samples at 5 °C to equivalent full-size Charpy results at 0 °C, the mean available arrest energy for the loops constructed in 1971 (loops M-2, N-2 and O-2) was 78.9 J, while the mean available arrest energy for the loops constricted

¹ Maxey, W.A., Brittle Fracture Arrest in Gas Pipelines, Report to NG-18 Line Pipe Research Supervisory Committee of the American Gas Association, dated July 25, 1975, revised April 4, 1983.

in 1973 (loops 92 and 93) was 46.3 J. Thus, CFER was persuaded that the ductile loops of the Existing Segment would meet the intent of the CSA code with respect to fracture propagation.

For the brittle pipeline loops, Charpy test results from 1/2 size samples measured at 5 °C were first transformed to equivalent results at 0 °C using the Charpy energy versus shear area model developed by Maxey and the Charpy shear area versus temperature relationship developed by CFER using the additional sets of samples taken from the two brittle pipeline Joints in August 1993. CFER then converted the 1/2 size sample results at 0 °C to equivalent full size results by multiplying the upper shelf energies corresponding to the 1/2 size results by a factor of 2, and then retransforming the upper shelf full size values to full size values at 0 °C.

The available arrest energy for each brittle sample was finally determined using the full-scale shear area adjustment developed by Maxey to compensate for the difference between the measured shear area fraction of a sub-size specimen and the shear area fraction which would develop in the fracture surface of a full-scale line pipe under similar conditions. ICP submitted that the mean available arrest energy for the brittle pipe was 13.3 J, with a statistical coefficient of variation of 0.101. ICP further submitted that its use of the "point estimate method" adequately accounted for the uncertainty associated with the use of a small sample size.

ICP submitted that an empirical equation developed by Maxey for the prediction of the toughness required to arrest a propagating brittle fracture indicated that a Charpy energy of 15.7 J would arrest a brittle fracture in the portions of the Existing Segment operating at 6343 kPa (loops A-2 and 38), while a Charpy energy of 12.3 J would be sufficient to arrest a brittle fracture in the portions of the Existing Segment operating at 5613 kPa (loops B-2, C-2, D-2 and 39). However, CFER admitted that the data used by Maxey in the development of his model was subject to a large degree of scatter, which could significantly affect the uncertainty of the calculated available arrest energies in the brittle pipeline loops. When both the small sample uncertainty and the Maxey model's uncertainty were considered, the proportion of non-arrest pipe in the brittle loops B-2, C-2, D-2 and 39 increased from 23.4 percent to 45.4 percent. Nonetheless, ICP claimed that this increased proportion of non-arrest pipe was still acceptable since it fell below the 50 percent threshold level that ICP considered clearly met the intent of the CSA Z184 code for fracture propagation control.

When questioned about the effect of a change in the minimum design temperature on the fracture resistance of the Existing Segment pipe, ICP noted that as the design temperature was reduced, the fracture arrest capability of the material would be reduced as well. ICP suggested that the effect of a reduction in the minimum design temperature from 0 °C to -5 °C would be comparable to the change from 5 °C to 0 °C for brittle pipe.

The OPLA was of the view that supplementary design measures, such as the reduction of operating pressure or the use of crack arrestors, were intended to be additional to the CSA requirement for Category 11 pipe. The OPLA argued that the CSA code contemplates the use of Category 11 pipe, and that ICP employed a "somewhat convoluted interpretation of the code" in order to infer that 50 percent non-arrest pipe would be acceptable under CSA Z184. The OPLA also suggested that if the uncertainty associated with the Maxey model was considered, all of the brittle loops would be close enough to ICP's 50 percent non-arrest threshold to warrant consideration of additional mitigation measures. It recommended that the Board adopt an acceptance criterion of 15 to 20 percent non-arrest pipe, in order to limit the potential fracture propagation length to 2 to 3 pipe joints.

Mr. Kozowyk, the Lambton County Board of Education ("Lambton") and Ontario questioned the validity of the sample size used by CFER for its analyses. Lambton suggested that the sampling was too limited to instill confidence in CFER's results, while Ontario noted that the sample size was much smaller than that required for new pipe under existing CSA standards.

Views of the Board

The Board has several concerns with respect to the methods employed by ICP to calculate the required arrest energies and available arrest energies for the ductile and brittle loops of the Existing Segment.

With respect to the ductile arrest energy requirement calculated by ICP using the AISI equation, the Board notes that this equation is included only in the non-mandatory guidance notes of the CSA Z184 standard. The Board is of the view that the AISI equation is provided in the CSA notes so that a designer can evaluate the need for pipe exceeding the 40 J requirement. The Board understands the code to expressly provide that 508 mm diameter pipe will only qualify as Category II pipe if it has a minimum pipe body absorbed energy of 40 J. In that regard, clause 8.4.4.2 of CAN/CSA Z245.1 for Steel Line Pipe specifies that Category II pipe greater than 457 mm O.D. shall exhibit a minimum pipe body absorbed energy of 40 J, and this is reflected in Table 4.3 of CSA Z184. The Board is of the view that the notes in the text of the CSA Z184 code cannot be used to derogate from the code's stated minimum requirements. However, since the conversion of an existing oil pipeline is not provided for in the code and must be evaluated on a case specific basis, the Board finds it acceptable to use the AISI equation to evaluate the actual energy value required for ductile fracture propagation control. The Board notes that ICP has determined that the mean available arrest energy of the ductile loops will be above 40 J. Therefore, the Board is not concerned about the ability of the ductile loops to arrest a propagating fracture.

With respect to the brittle pipeline loops, the Board notes that the CSA code does not contemplate the use of brittle pipe for natural gas pipelines. However, the Board is inclined to accept the use of the Maxey model, which suggests that brittle pipe can demonstrate adequate fracture control properties. Nevertheless, the Board has several concerns with respect to ICP's use of the Maxey model in the present case.

The Board is of the view that the small coefficient of variation ("COV") exhibited by the brittle samples is questionable, given that one would expect a much larger COV even in pipe of the same heat. Although the sample size used by CFER may be acceptable, the Board is of the view that CFER should have been more sceptical of the small COV, and suggests that additional brittle samples should have been tested to confirm the small COV. The Board notes that while the first CFER Report utilized the COV from a historical data base, the subsequent abandonment of the historical data in favour of the reduced COV obtained from testing the second group of brittle samples provided CFER with more favourable non-arrest percentage results. Thus, the Board is of the view that the use of the smaller COV was not adequately supported.

Although the Board is satisfied that CFER has properly determined the available energy for brittle fracture arrest using the Maxey model, the Board is of the view that

model uncertainty must be considered, and that the maximum uncertainty should be incorporated in CFER's analyses in order to provide an appropriate "safety factor" with respect to the determination of the available arrest energies and percentage of non-arrest pipe.

Additionally, the Board is not persuaded by ICP's argument that the intent of the CSA code can be clearly met through the use of 50 percent non-arrest pipe. The Board notes that ICP has based its rationale for this argument on the "minimum all-heat average" phrase found in the non-mandatory guidance notes to CSA Z184 clause 4.1.4.3. In its examination, the Board established that line pipe having only a 50 percent arrest capability would not be acceptable to pipe purchasers in the industry, and that if new Category 11 pipe were ordered, one would reasonably expect that virtually 100 percent of the pipe would have the ability to arrest a propagating crack. However, the Board notes that this view does not preclude it from accepting an arrest percentage that it considers would provide an equivalent level of safety to that provided by CSA standards.

2.3.4 Fracture Propagation Mitigation

2.3.4.1 Design of Crack Arrestors

Under a minimum design temperature of 0°C, ICP determined that loops 38 and A-2 of the Existing Segment would not have adequate inherent toughness to arrest a propagating fracture. As a result, ICP considered a number of alternatives for ensuring positive fracture control which included a reduction in operating stress; total or limited pipe replacement; increasing, the operating temperature; the installation of ductile pipe joints; and the installation of crack arrest devices. ICP concluded that the most viable of these options were the installation of crack arrestor devices and the installation of ductile pipe joints. Of these two options, ICP found that the installation of crack arrestor devices was the more economical alternative.

ICP explained that low toughness brittle fractures propagate with very little displacement of the fracture surfaces in the vicinity of the crack tip since brittle fracture is essentially elastic and stress driven. As a result, brittle fracture can only be arrested by devices that substantially reduce the hoop stress in the pipe. Brittle fracture arrest has been accomplished experimentally by using pretensioned bands or by wrapping the pipe with a high strength banding material which is pretensioned by pressurizing the wrapped pipe to beyond its actual yield, thereby leaving a residual elastic compressive stress in the pipe and a residual tensile stress in the banding. ICP stated that these techniques have been demonstrated by the Battelle Memorial Institute ("Battelle") in research undertaken in the U.S. and that brittle fracture arrest usually occurs within a few inches from entry under the arrestor.

ICP's design of the proposed crack arrestor device is similar to a split sleeve repair method that has been used on the IPL system for a number of years. ICP stated that two half coupling sleeves 620 mm (24 inches) in length would be installed using a roller chain and hydraulic cylinder arrangement to compress the pipe while it was depressurized in order obtain a nominal hoop stress under the sleeve of 75 MPa. ICP verified that it would be able to install this type of device, and develop the jack pressures that would be required to reduce the stress in the pipe, by undertaking a full scale test of the proposed crack arrestor. ICP also provided a finite element analysis of the crack arrestor device confirming, that the devices could safely reduce the stress in the pipe. ICP was of the view that the

resulting stress level obtained by the installation of the crack arrestor would be substantially lower than the hoop stress required to ensure a high probability of arrest.

The OPLA argued that the crack arrestor devices should be constructed with material of the same toughness as Category II pipe. The OPLA's view was that these arrestors could be subject to third-party damage and that if an arrestor was damaged and then in the same impact, or subsequent impact, the pipe was damaged, the potential crack length would be twice as long as that projected in ICP's crack arrestor plan.

Views of the Board

Although the CSA Z184 code relies on the inherent material notch toughness of the pipe material as the primary method of fracture propagation control, there are provisions in the code for the use of fracture arrest devices as supplementary design 'de positive control of fracture length. The Board is of the view that measures to prove crack arrestors may be an acceptable design technique in rural areas to supplement inherent material toughness since they can be used to reduce the hazard associated with propagating fractures in certain areas. However, the use and location of crack arrestor devices must be evaluated based on the specifics of each case.

The Board has noted the testimony of ICP's expert witnesses with respect to the resistance of the proposed crack arrestors to third party damage and that the A516 Grade 70 material specified by ICP is used in welded pressure vessel applications where improved notch toughness is important. The Board also notes ICP's statement that this material would likely exhibit a notch toughness of 40 Joules. Therefore, the Board accepts the expert opinion of ICP's witnesses with respect to the proposed mechanical design and installation of ICP's crack arrestor devices in the context of this application.

2.3.4.2 Proposed Spacing of Crack Arrestors

Since the CSA Z184 code does not provide any guidance with respect to the spacing of crack arrestors, ICP decided to use a comparative hazard assessment to determine the appropriate spacing requirements for the brittle loops of pipeline on the Existing Segment where the use of crack arrestors was being proposed. This comparative hazard assessment was based on a review of some of the literature available on hazard assessments conducted by other pipeline operators, such as British Gas plc in the United Kingdom.

ICP indicated that the principal hazard associated with a gas pipeline rupture was fire. ICP observed that a fire from a short pipeline rupture would be sustained by fuel from both ends of the ruptured line, while a moderate to long rupture would have two smaller fires fed by single-ended gas releases. In its analysis, ICP referred to a "thermal hazard zone", which is the area surrounding the pipeline rupture fire bounded by a "threshold heat intensity". ICP stated that individuals outside the thermal hazard zone would not be at significant risk. ICP also noted that the area of the thermal hazard zone from a single-ended gas release fire would be roughly half the thermal hazard zone area enclosed by a double-ended gas release fire. ICP observed that studies carried out by British Gas and Battelle have shown that the level of hazard presented by flying debris is much lower than the hazard level represented by the fire itself, and that the hazard level presented by a single-ended gas release fire was

much lower than the hazard level of a double-ended gas release fire. As a result, ICP was of the view that the comparative hazard assessment it had undertaken, which was based on a comparison of the linear extent of the respective hazard zones, would significantly overestimate the hazard associated with long ruptures because the hazard assessment assumes that the level of hazard presented by flying debris is equal to the level of hazard from a fire. Figure 2-2 illustrates the thermal hazard zones and debris field hazard zones resulting from short and long ruptures.

ICP's crack arrestor spacing was determined firstly, by equating the distance of the boundary of the thermal hazard zone from a double-ended gas release fire with the 200 metre distance used to determine class locations in the CSA Z184 code; secondly by establishing a "reference interaction length", which is the length of a rectangle whose width is equal to the width of the fire hazard zone of a single-ended gas release fire and whose surface area is equal to the area bounded by the double-ended gas release fire's thermal hazard zone; and thirdly by equating the "reference interaction length" to the crack arrestor spacing. ICP further supported the 200 metre distance by reference to thermal hazard information from a literature survey. Based on the use of the 200 metre thermal hazard zone radius, ICP's assessment indicated that a nominal crack arrestor spacing of approximately 350 metres would be appropriate. ICP indicated that locations within 150 metres of the pipeline, but further than 150 metres from the crack arrestor devices, would not be subject to any incremental hazard due to long propagating fractures, and that it would locate zones of likely public presence or increased public access within these "protected areas". ICP also observed that "unprotected areas", such as locations within 150 metres of the pipeline and crack arrestors, would be exposed to a higher level of hazard unless the crack arrestor spacing was further reduced to limit the length of pipeline which affect these locations in the event of a pipeline rupture. As a result, ICP elected to reduce the spacing of crack arrestors to 175 metres in locations where the pipeline is within 150 metres of a road running parallel to the pipeline. Where homes are located within 150 metres of the pipeline and within "unprotected areas", ICP proposed to reduce the crack arrestor spacing to 100 metres. Figure 2-3 illustrates the interaction lengths and protected and unprotected areas associated with the location of crack arrestors.

During the course of the hearing, it was suggested that the appropriate spacing of crack arrestors could be inferred from the CSA code if one accepted the premise that pipe joints from different heats would be randomly distributed and that it was the intent of the CSA code to require that a minimum of 50 percent of the pipe joints in a pipeline would be capable of arresting a propagating fracture. TransCanada suggested in an information request that this translated into a spacing of 27 metres, while ICP provided evidence suggesting that the spacing of the crack arrestors would be dependent on the percent probability of fracture arrest one decided would be acceptable. ICP's evidence in this regard indicated that there was a greater than 99.99 percent probability of crack arrest within 17 joints of pipe (207 metres). The OPLA's alternative was to calculate the maximum number of joints of pipe which would be required to arrest a fracture by assuming roughly the same percentage of non-arrest pipe which would be included on the other brittle loops of the Existing Segment that did not require crack arrestors. Based on having about 80 percent of the pipe capable of arresting a propagating fracture, the OPLA was of the view that a crack arrestor spacing of 150 metres would be appropriate.

Views of the Board

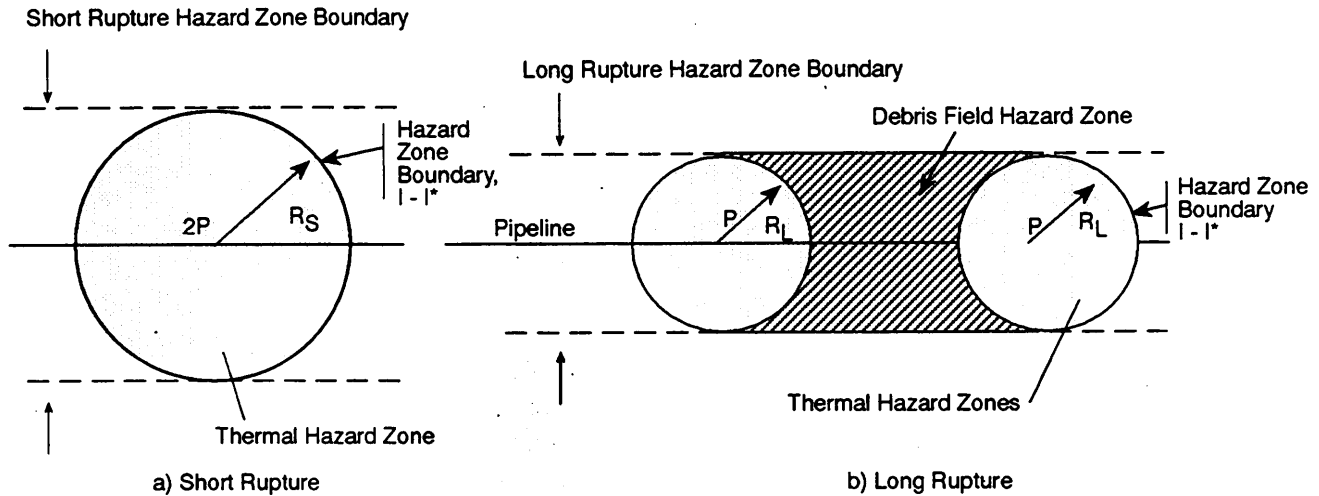
The Board notes that loops 38 and A-2 have virtually no pipe joints capable of arresting a propagating fracture at the minimum design temperature. Thus, it can be assumed that if fractures are initiated under these conditions, they would arrest at crack

arrestor devices. Under these circumstances, the Board is of the view that the use of a detailed hazard evaluation for determining crack arrestor spacing is appropriate. However, the Board notes that ICP undertook its hazard assessment based on a literature search and that it did not provide an expert in the field of hazard assessments to assist the Board in its consideration of the issue. The Board is not prepared to accept the proposed spacing methodology in the absence of expert evidence as to the hazards associated with various crack arrestor spacings.

The Board was also not persuaded by ICP that the CSA Z184 code provides guidance with respect to acceptable thermal hazard levels. As a result, the Board is of the view that ICP cannot meaningfully equate the limit of the thermal hazard zone used in its analysis with the 200 metre class location threshold distance used in the CSA Z184 code. The Board bases its view on the fact that the size of a thermal hazard zone is dependent on a number of factors, including both the size of the pipe and the operating pressure at the time of rupture. It therefore follows that a defined 200 metre hazard zone in a code would be arbitrary. The Board is of the view that thermal hazard zones should more properly be defined by a consistent thermal radiation value which could permit individuals nearby to escape with relatively minor injuries. The Board has noted ICP's observation that its threshold heat intensity for the double-ended gas release is similar to the 4 kW/m² recommended value for the "limiting safe heat flux" described in a paper by G.D. Fearnough of British Gas plc¹ in reference to the findings of the United Kingdom Health and Safety Executive.

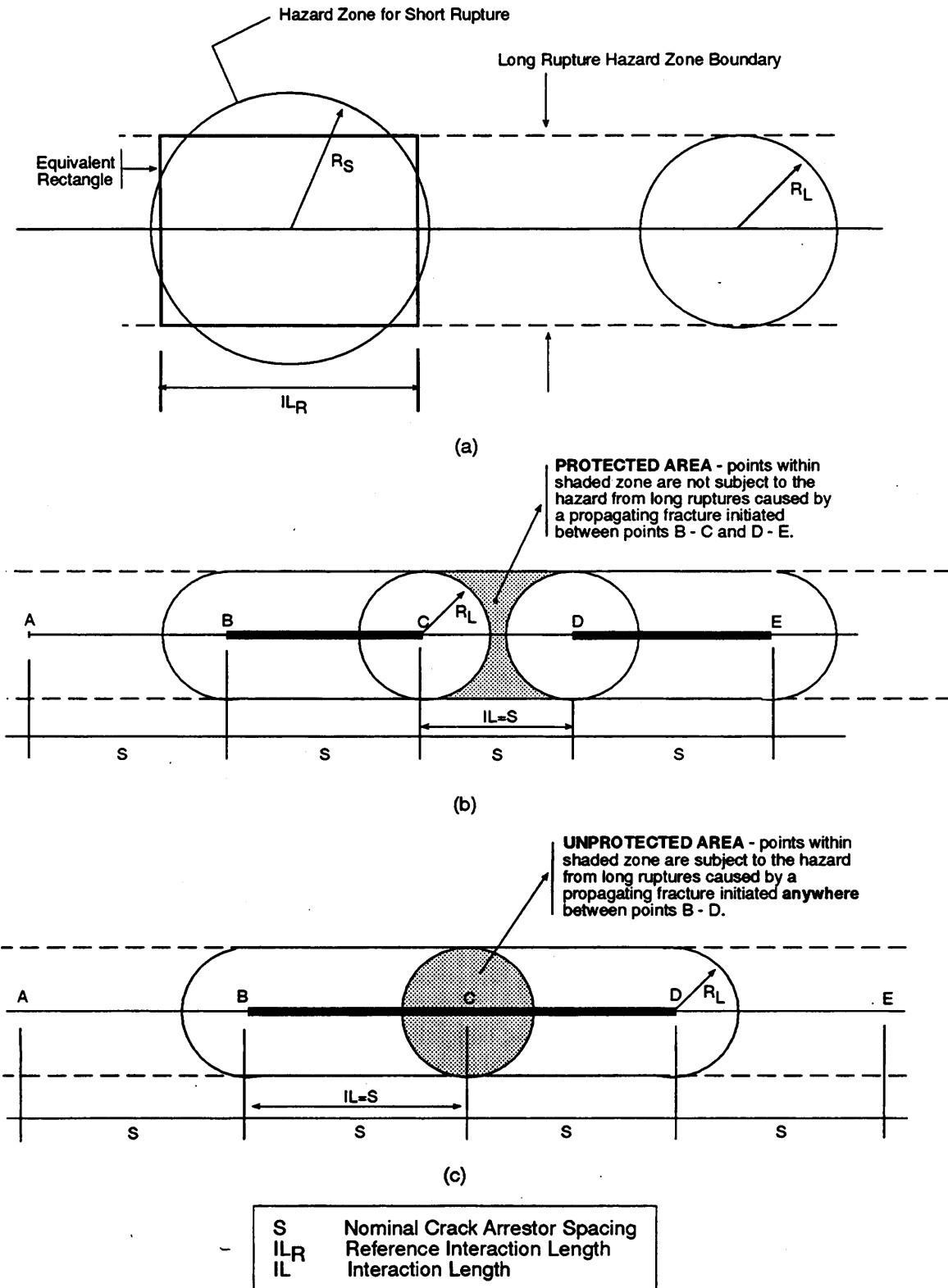
¹ Fearnough, G.D., The Control of Risk in Gas Transmission Pipelines, Institute of Chemical Engineers, Symposium No. 93, 1985.

Figure 2-2
Hazard zones associated with gas pipeline ruptures



| |
|--|
| $ l ^*$ Threshold Heat Intensity $R_L = .71R_S$ |
|--|

Figure 2-3
Interaction lengths for pipelines with crack arrestors



2.4 Other Technical Issues

2.4.1 Stress Corrosion Cracking

Stress corrosion cracking is a failure mechanism characterized by the formation of colonies of small cracks on the pipe surface that are generally longitudinal and localized in nature. These small cracks link together to form long flaws that can lead to ruptures. In pipelines, stress corrosion cracks are initiated at locations where the coating is separated from the pipe and bare metal contacts a corrosive electrolyte. The non-classical form of SCC, which has been found on Canadian systems such as those of TransCanada and NOVA Corporation of Alberta, occurs at locations with low PH electrolytes. Current research indicates that the main contributing factors which may influence the initiation and growth of the non-classical type of SCC are stress, stress fluctuations, corrosive environment, electrochemical potential, coating type and condition, and the condition of the pipe surface. There is currently no consensus regarding the relative importance of each of these contributing factors.

TransCanada experienced five ruptures and one leak as a result of SCC between 1985 and 1992. In 1986, TransCanada addressed the problem by implementing a Pipeline Maintenance Program to ensure the integrity of its pipeline system, to determine the extent to which its pipeline system was affected by SCC, and to define environmental and other conditions under which SCC is known to exist. By using its knowledge of the key factors which contribute to SCC, and findings from investigative excavations, inspections, and hydrostatic retests, TransCanada has been able to develop a model which attempts to predict SCC-susceptible sites. The TransCanada SCC model rates pipeline sections in terms of their SCC susceptibility. Contributing factors such as soil conditions, topography and drainage patterns, along with the type and condition of pipe coating are the essential elements included in the model. It has been noted that tape coated pipelines in areas having poor drainage, such as edges of waterways, have been found to exhibit a higher occurrence of SCC colonies.

As part of its application, ICP provided an evaluation of the susceptibility of the Existing Segment to SCC. In light of the evaluation, ICP was of the view that the presence of significant SCC on the Existing Segment was not likely, given the good historical SCC performance of product and crude oil pipelines, and the proposed operating stress levels of the pipeline. In order to minimize the potential for unexpected SCC failures, ICP indicated that during the conversion process, inspections would be carried out at locations where crack arrestors and valves would be installed and at those sites requiring remediation due to a lack of cover. In addition, ICP indicated that it would hydrostatically test the Existing Segment as part of the conversion process to eliminate the possibility of failure from any pre-existing critical cracks. Once the conversion was completed, ICP would undertake an internal inspection of the Existing Segment using a high resolution magnetic flux tool and include a SCC assessment protocol in future maintenance excavations.

TransCanada was of the view that ICP provided insufficient evidence as to the present state of SCC on the Existing Segment, and that an investigation of the integrity of the line should have been undertaken prior to this application. TransCanada argued that ICP's proposed SCC program of excavations at crack arrestor sites was insufficient on the basis that suitable locations for crack arrestors would not necessarily be suitable locations for SCC investigation. For example, ICP indicated that in locating crack arrestors it would avoid steep embankments or side slopes, very wet or submerged areas and locations with difficult access for installation equipment. TransCanada also noted that hydrostatic testing could only assist in locating SCC in its critical stages, and that current internal inspection technology cannot detect SCC at any growth stage, TransCanada submitted that a proper

and complete engineering assessment of the Existing Segment before conversion would provide the data required to develop a model to predict SCC and SCC growth.

Ontario requested that ICP undertake a similar analysis to that in use by TransCanada for determining potential areas where SCC could develop, and that results of this analysis be submitted to the Board prior to the granting of leave to open. Mr. Kozowyk noted that SCC is recognized as an external phenomenon, and therefore he did not agree with ICP's argument that since the pipe was in oil service, the presence of significant SCC on the Existing Segment was not likely.

In its reply argument, ICP submitted that it would be inappropriate to apply TransCanada's model to predict SCC and SCC growth to the Existing Segment, given that the Existing Segment has significant differences from pipe on TransCanada's system. ICP pointed to the fact that the Existing Segment does not have a confirmed presence of SCC initiation or growth; the pipe coating has performed well and did not exhibit continuous disbanding from the pipe; the Existing Segment has typically experienced lower maximum operating stresses and stress fluctuation regimes while in crude service; and the Existing Segment would be operating at stress levels consistent with pipe designed to a Class 2¹ location factor.

ICP also indicated that it would note the environmental conditions during its excavations and inspections undertaken during the conversion process. ICP advised that the data could be utilized in the eventual development of an SCC severity rating model if SCC is found on the Existing Segment.

ICP undertook to advise the Board if SCC is found on the Existing Segment and to expand its inspection program in accordance with the level of indications found.

Views of the Board

The Board is of the view that, although ICP was of the opinion that significant SCC was not likely on its pipeline, it should have based an engineering assessment on factors which have been associated with SCC on other pipelines. Therefore, the Board would have expected ICP to have made an engineering assessment based on TransCanada's model to determine the potential presence of SCC. The Board shares TransCanada's view that locations suitable for crack arrestor installation are not necessarily locations that would be environmentally prone to SCC growth, and is of the view that any investigative program should focus on areas prone to SCC.

2.4.2 Station and Terminal Piping

As part of its engineering assessment, ICP concluded that its pump stations and the Sarnia Terminal do not qualify as Class 3 locations according to the CSA Z184 requirements. As part of the conversion of the Existing Segment, ICP proposed the installation of pipe designed to a Class 3 location factor through IPL's Sarnia Terminal and pipe designed to a Class 2 location factor at pump stations traversed by the Existing Segment, ICP indicated that it had decided to design the piping in the Sarnia Terminal to a Class 3 location factor based on the economics of consolidating pipe orders and in

¹ Class 2 refers to a geographic area classification system, based on population density and other characteristics, which is used in CSA Z1 84 when prescribing the design and testing of pipelines to be located in the area. A higher class designation implies that the design will be more conservative.

consideration of the potential for mechanical damage occurring due to the frequency of construction activity at the Sarnia Terminal.

Views of the Board

The Board is of the view that the intent of CSA Z184 is to ensure the safety of company employees as well as the public. Although clause 5.3.4.7 of CSA Z184 does not specifically identify pump stations as being a Class 3 location, the Board is of the view that the portions of the Existing Segment traversing IPL's pump stations should be designed to a Class 3 location factor in order to enhance the safety of the employees working in close proximity to the gas pipeline at those sites.

2.4.3 Confederation Public School

A portion of the Existing Segment crosses the property of Confederation School located in Lambton County approximately 27 metres behind the school building. Approximately 350 students attend classes at Confederation School. A school has existed on this property since before the turn of the century. In the 1960s, additional property adjacent to the school was acquired by the Lambton County Board of Education which had certain pipeline easements, restricted solely to the transportation of oil products. The current school was built in 1962 and expanded in 1965 and 1969. Lambton stated that it would never have built the school at this location if there had been any contemplation of a pipeline carrying natural gas in such close proximity to the school.

CSA Z184 designates locations such as schools as Class 2 locations for the purpose of gas pipeline design. This has the effect of limiting the allowable operating stress level of the pipe to 72 percent of its Specified Minimum Yield Strength ("SMYS"). In its application and during the hearing, ICP maintained that the pipe was adequate for the service requirements and that it intended to leave the pipe in place. ICP stated that the maximum and normal operating stresses of the Existing Segment would be below the allowable operating stress level for a Class 2 location, that the pipe exhibited ductile properties for fracture control, and that the depth of cover across the property was in excess of the CSA Z184 requirements. ICP also noted that IPL's cathodic protection records and internal inspection logs did not indicate any corrosion or metal loss in this location.

Lambton questioned the appropriateness of operating a high pressure gas pipeline in close proximity to a school and the prudence of designing a pipeline near a school property to a Class 2 location design standard rather than to a higher one. Lambton also addressed the risk increase associated with the change in service of the Existing Segment, given the change in operating pressures and the flammability of the product carried.

Ontario was of the view that the Confederation School was a special case, and that strict code standards should apply with the installation of new Category 11 pipe. During final argument, ICP advised the Board that it had reached an agreement with Lambton to relocate its pipeline off the school property. However, ICP did not provide any details on the proposed relocation.

Views of the Board

The Board does not find ICP's proposal to maintain a gas pipeline designed to a Class 2 location factor in close proximity to the Confederation Public School to be acceptable. The Board notes that ICP provided a table indicating that there were many instances in Ontario where a pipeline had been built in proximity to schools. However, the Board also notes that ICP's table revealed that most of these pipelines operate at low stress levels. The Board agrees with the arguments put forward by Lambton with respect to the proximity of the pipeline to the school and the pipeline's effect on limiting the potential for future expansion of the school.

The Board is of the view that strict adherence to the requirements of the CSA code as initially proposed by ICP was not a sufficiently prudent course of action in these circumstances. Absent ICP's decision to re-route its pipeline so that it avoids the school property, the Board would have itself made this determination.

2.4.4 Depth of Cover

ICP conducted a survey which identified 19 localized sites where the depth of cover of the Existing Segment was less than the CSA Z184 design minimum. ICP stated that it would evaluate each of the locations on a site-specific basis in order to determine suitable remediation to provide thermal protection to the exposed piping and to protect the pipe from external loading and mechanical damage. ICP indicated that detailed design drawings of mechanical and, if applicable, thermal insulation installations for each location along the Existing Segment would be filed with the Board for its approval upon receipt of a Certificate of Public Convenience and Necessity approving the InterCoastal pipeline.

Ontario and Mr. Kozowyk were each of the view that the Existing Segment should meet the cover C, requirements for a new pipeline construction. In reply, ICP argued that CSA Z184 permits a reduction in cover if the pipeline is provided with additional protection to withstand anticipated external loads.

Views of the Board

The Board would have preferred the inclusion of specific mitigation plans for areas of insufficient cover in ICP's application in order to permit it to assess whether any interference with agricultural operations could occur from the specific mitigation being proposed. In areas such as creeks and drains and where shallow pipe or pipe cover affect the use of agricultural lands, the Board would require that the pipe be lowered to an appropriate depth in the event the application was approved.

2.4.5 Provincial Setback Guidelines

The Fuel Safety Branch Guidelines of the Ontario Ministry of Consumer and Commercial Relations ("the Guidelines") provide for a minimum setback of 20 metres for dwellings in the vicinity of a pipeline operating at a stress level above 45 percent of the Specified Minimum Yield Strength. Where the setback distance of 20 metres cannot be met, the Guidelines provide alternatives to the minimum distance. There are currently eight locations along the Existing Segment where buildings intended for human occupancy are within 20 metres of the centre line of the pipeline. ICP indicated that it did not

intend to replace the pipe at these locations. ICP argued that the intent of the Guidelines was to prevent fracture initiation, and submitted that the pipe at the eight locations has a resistance to fracture initiation that is comparable to new Category II pipe.

Ontario argued that it was not satisfied that the eight structures would be as safe by disregarding the Guidelines as they could be if the Guidelines were followed. Ontario was of the view that ICP should replace the existing pipe at the eight locations with Category II pipe and that ICP should provide a minimum cover of at least 1.5 metres or provide other mechanical protection.

Views of the Board

The Board is of the view that ICP should ensure that all locations along the Existing Segment comply with the Guidelines such that where a minimum setback of 20 metres cannot be met, ICP should replace the Existing pipe with new Category II pipe and provide a minimum cover of at least 1.5 metres or provide other mechanical protection for the pipe.

Chapter 3

Public Consultation

The Board's *Memorandum of Guidance Concerning Public Notification of Proposed Facilities Applications* requires that prior to filing a facilities application, a proponent implement a public information program which explains potential environmental and social effects of a project, allows opportunity and time for public comment, and responds to relevant concerns. The expectation is that public input at the project design and development stage would be incorporated into the proposed project.

ICP submitted that it had carried out a comprehensive early public notification process. In January, 1993 IPL announced plans for the InterCoastal pipeline project. IPL engaged Ecological Services for Planning Ltd. ("ESP") and Acres International Ltd. ("Acres") to conduct the necessary environmental and socioeconomic studies. Public notification began on 8 March 1993 with the wide distribution of a newsletter discussing the proposed pipeline and related facilities and continued with the establishment of a toll-free inquiry line, the holding of five information open houses, the issuance of additional information and the holding of meetings with interested parties, and the inclusion of publicly supported revisions to the route and site selection process.

ICP maintained that public input on the selection of the St. Clair to Sarnia route had a significant effect on the study process and conclusions. ICP noted that:

- public input resulted in numerous changes to the alignment of the preliminary alternative routes. In most cases, those changes consisted of small movements of the preliminary alignments to avoid tile drainage systems or to follow linear features (e.g. a change in the routing of the tie-in to Tecumseh Gas Compressor Station). Also, an additional alternative route following a utility corridor along Moore Road 8 was identified;
- consultations with the Moore Township and citizens were instrumental in selecting between river crossings III and IV, and in selecting the preferred route from the St. Clair River to the IPL Sarnia Terminal; and
- the proposed preferred river crossing and alignment of the pipeline were generally consistent with preferences expressed by the public and Moore Township, the municipality most affected by the proposal.

A number of intervenors raised concerns about consultation practices. The OPLA and its members characterized the public consultation process as inadequate in that it did not address or resolve landowners' concerns at the planning stage. The OPLA members stated that during the public notification process they had been misled and harassed. The OPLA members also expressed dissatisfaction with the notification process and format of public meetings. They stated that a notice in a newspaper was insufficient notification for landowners since not everyone subscribes to a newspaper, and that a registered letter to landowners would be preferable. The open house format was criticized because it was a single meeting and did not permit landowners to discuss and share concerns among themselves. Finally, the OPLA was concerned that not all landowners were notified of ICP's proposals at the same time, putting some at a disadvantage. The OPLA was of the view that ICP should have

involved landowners much earlier in the planning process and in a much more meaningful way. To this end, the OPLA proposed a "Landowner Relations Program", including a joint dispute resolution and liaison committee, for both the pre-construction and construction phases of the proposed project.

The Walpole Island First Nation ("WIFN") maintained that ICP's consultation process failed to recognize and address its concerns. In the WIFN's view, ICP was aware of its special interests but did not adequately consult with the WIFN in the early stages of project planning and did not initiate any direct contact with it. The WIFN maintained that other project proponents had been much more responsive to its concerns when dealing with potential projects in the traditional areas claimed by the WIFN. The WIFN asked the Board to condition any approval of ICP's application to ensure better communication and participation with WIFN with respect to ICP projects impacting on its interests.

Moore Township maintained that ICP's early public notification and consultation practices were severely deficient. It argued that ICP was preoccupied from the beginning with acquiring options and easement amending agreements rather than discussing alternatives with the public. Moore Township was also of the view that there was inadequate consultation with landowners and the public after a new preferred route through the Township was selected.

In addition to early public notification, ICP committed to an ongoing consultation process, consisting of a "Landowner Relations Program" which includes a "Complaints Resolution Procedure". ICP submitted that this program would ensure that all reasonable landowner concerns are identified and addressed fairly and expeditiously before, during and after pipeline construction. This program differed from the one recommended by the OPLA because, in ICP's view, the OPLA approach would result in the inappropriate delegation of authority to a committee for the construction and operation of facilities for which ICP would be ultimately liable and responsible. ICP did agree, however, to work with the OPLA to create an informal dispute resolution committee. ICP did not address the specific public consultation concerns raised by the OPLA members.

ICP's application made note of one general consultation issue raised by the public, namely a perceived lack of notification of the times at which the open houses would be held. ICP did not agree with this view since it felt that its notification process had been thorough. As well, ICP disagreed that it failed to notify the WIFN. ICP stated that it had corresponded with the WIFN as it had with all special interest groups. ICP stated that it saw no need for continuing consultation with the WIFN since its studies showed that there would be no impact on Walpole Island, which is approximately 25 km south of ICP's proposed river crossing. ICP also rejected the suggestion by Moore Township that its public consultation process with respect to notifying property owners along Moore Township Road 8 was a "sham and an afterthought", and submitted that the notification process was done in a timely and appropriate manner.

Views of the Board

The Board is of the view that the design and initial implementation of ICP's early public notification program was sound. However, the process broke down when ICP initiated changes to the project without providing an opportunity for further public consultation and when it introduced a land acquisition program which contained conflicting information and could be interpreted to override the public notification process. The result was confusion, suspicion and anger amongst landowners and the public.

Subsequent to its initial public consultation on route selection for the St. Clair to Sarnia segment, ICP chose Moore Township Road 8 as its preferred route. This route was not included in previous public information and had not been discussed at any general meeting. Thus the public was not afforded the opportunity to comment. The Board is of the view that a further public meeting should have been held, given the significance of ICP's change. Further consultation may have helped to dispel the impression that ICP was promoting a predetermined route.

ICP embarked on a land acquisition program shortly after commencing its early public notification program. This approach is not considered unusual, given the short time horizon needed by ICP to meet its projected in-service date. However, the early public notification program described a project intended solely to convert a single line from oil to gas transportation, whereas the legal documents served on landowners indicated an intention to acquire multiple line and multiple use rights. The overlapping of the public notification and land acquisition processes became merged in the minds of the public and since there has been historical animosity to IPL along the Existing Segment, the impression was created that ICP had no real interest in discussing landowner concerns.

It is the Board's view that ICP could have exercised more care and sensitivity in the design and implementation of its land acquisition program, in a way that respected the public notification process and avoided confusion.

The Board notes that the public and landowners had other concerns regarding errors in service of section 87 Notices and the associated legal requirements. The Board's views on these concerns are discussed in section 4.3.4 of these Reasons.

The Board further notes that the WIFN was active during the hearing in making its views known concerning the various projects along the St. Clair River north of Walpole Island. Although ICP considered that its project would not adversely affect the WIFN, the Board is of the view that a meeting to discuss the project would have been advisable.

Finally, the Board views the OPLA's initiative in proposing a landowner relations program, and ICP's agreement to work with the OPLA to create a joint dispute resolution committee as a positive step toward improving the current relationship between ICP and affected landowners. The Board encourages meaningful consultation and cooperation. However, the Board notes that it retains overall responsibility for the regulation of the construction, operation and maintenance of pipelines under its jurisdiction.

Chapter 4

Right-of-Way Matters

4.1 Route Selection Criteria and Selection Process

The application deals with five separate route segments as follows:

- The St. Clair River Crossing;
- the St. Clair to Sarnia Route Selection;
- Tecumseh Gas Storage Route Selection;
- the Millgrove to Milton Route Selection including metering facilities; and
- the existing pipeline conversion process, including the pressure regulating facilities east of Sarnia and the valve site excavations.

4.1.1 St. Clair River Crossing

The north and south limits of the study area were determined by identifying all reasonable crossing locations between connecting points on each side of the St. Clair River. The east/west limits of the study area were determined by including, a sufficient distance from the river so that a pipe stringing and make-up area could be located if required. For the St. Clair River crossing, a distance of 2 km from the river was considered adequate. A similar distance on the U.S. side of the river was included in the study area since the feasibility of a river crossing must be judged from both sides of the river.

The boundary at the north end of the study area is just north of the existing CN Rail Tunnel. The boundary to the east generally follows a hydro transmission corridor and railroad tracks. The boundary to the south is at Townline Road dividing Moore Township and Sombra Township and the boundary to the west follows the topographical map boundary.

Initially, ESP defined three crossing points of the St. Clair River. Crossings A and B were approximately 2 and 4 kms north of Stag Island, respectively. Crossing C was approximately 1 km north of Mooretown (Figure 4-1). This information was contained in ICP's February 1993 Newsletter which announced the project. Subsequently, Acres was hired to consider all possible crossings, and their work confirmed the three initial crossings and resulted in the identification of two additional crossings. One was 5 km north of Mooretown and the other some 10 km south (Figure 4-2).

The approach to corridor selection involved applying the following steps:

- preliminary identification of corridor options based on existing utility or transportation corridors;
- initial screening of the technical feasibility of directional drilling for each of the corridor options;
- determination of environmental, economic and engineering constraints for each alternative river crossing;
- evaluation and comparison of river crossing alternatives based on environmental, socio-economic and engineering constraints;

Figure 4-1
St Clair to Sarnia Routes
 as Presented in ICP February 1993 Newsletter

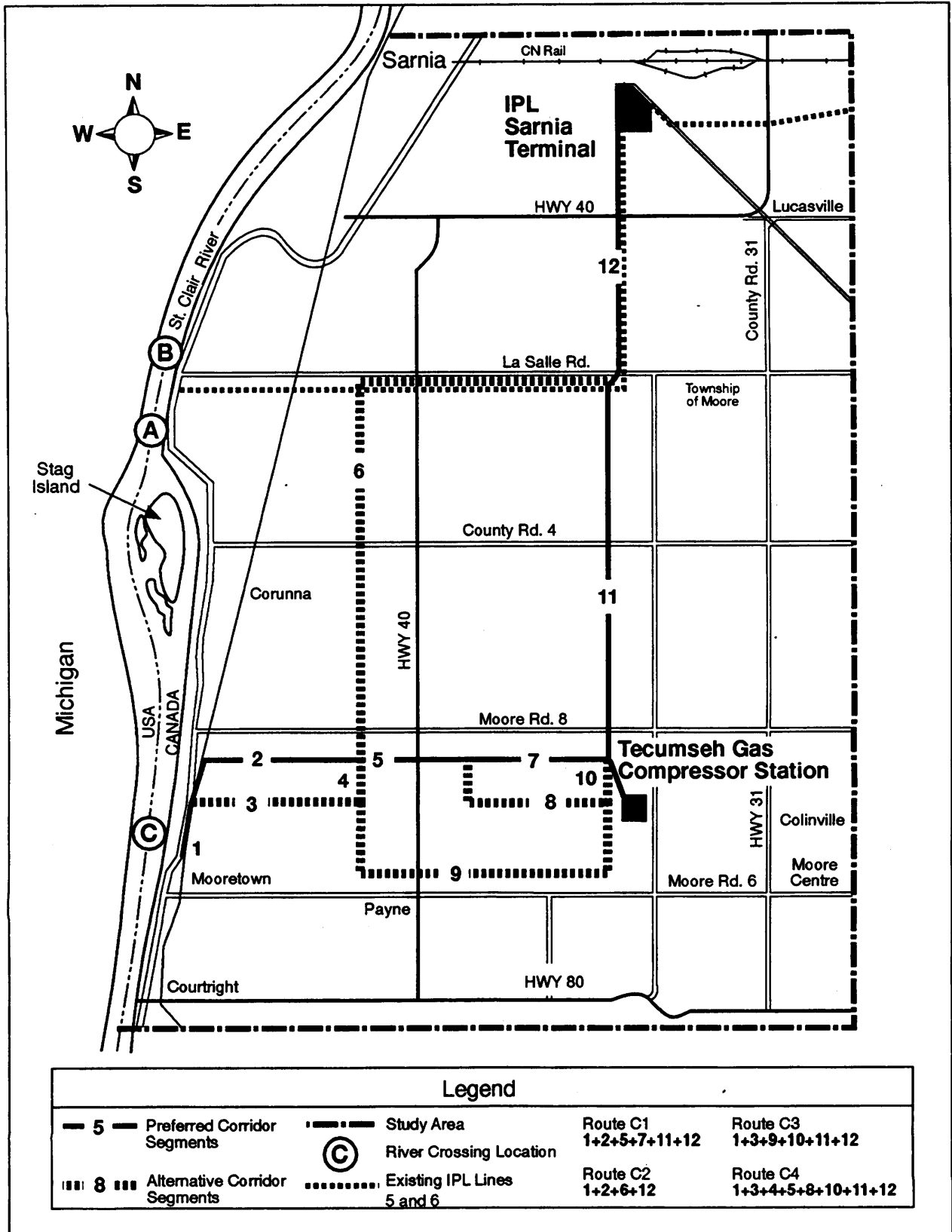
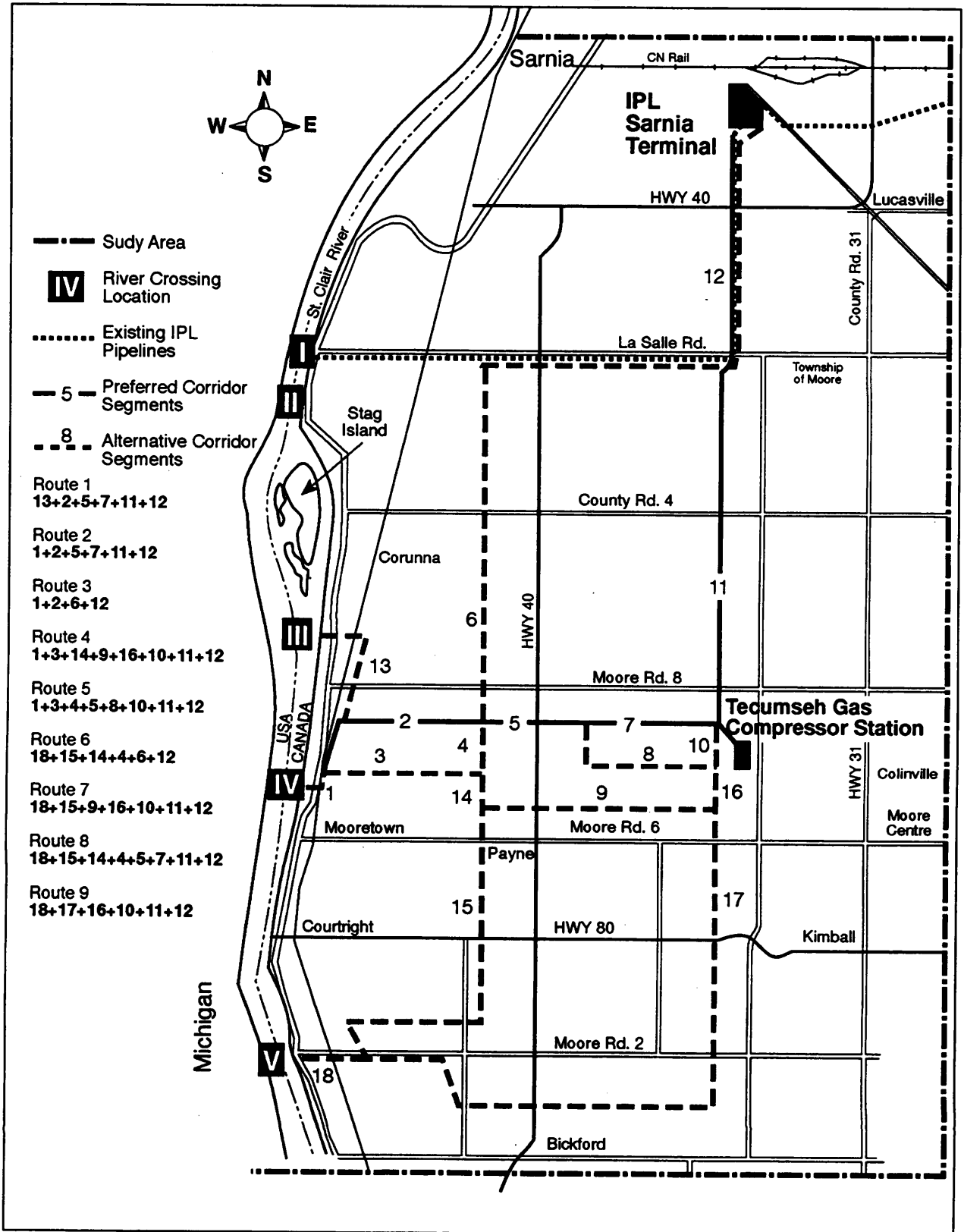


Figure 4-2
St. Clair to Sarnia Routes
 as Presented in March 1993 Update
 (Discussed in Mooretown Open House)



- identification of a preliminary preferred crossing location;
- public and agency consultation of river crossing alternatives;
- re-evaluation of river crossing alternatives based on public input; and
- selection of a preferred crossing of the St. Clair River.

The five preliminary river crossing locations are individually referred to as follows:

- Alternative I - ICP North Crossing (initial B crossing);
- Alternative II - ICP South Crossing (initial A crossing);
- Alternative III - Moore Township Road 8 Crossing;
- Alternative IV - Mooretown Crossing, (initial C crossing); and
- Alternative V - Lambton Crossing

ICP subjected each of these river crossing alternatives to a screening to determine its technical feasibility and any physical constraints. Following the screening, ICP eliminated alternatives I and II from consideration because there was insufficient room at the landfall sites and because there were existing pipeline crossings in the area, which could pose difficulties for the directional drilling process. Crossings III, IV and V were presented as possibilities at the April public meeting, with Crossings III and IV being preferred. ICP presented its comparison of these three alternatives in its application based on biophysical/socio-economic features and engineering/cost considerations. In May, ICP announced that Crossing V had been rejected because it had a greater environmental impact than either Crossings III or IV. In June, the application stated that Crossing III was the preferred alternative.

4.1.2 St. Clair to Sarnia Segment

Evaluation of the St. Clair to Sarnia Segment was conducted in three phases. The three-phase process was designed to select an environmentally preferred route within a defined study area.

Phase 1 included an environmental inventory of the study area and a description of the potential impacts of the new facilities within the study area. Phase 2 included an assessment of alternative routes based on the environmental inventory, the public consultation program and the potential impacts of the facilities. This phase also includes the selection of a preferred route. Phase 3 included a description of the potential environmental impacts of the facilities and recommendations for mitigation.

Alternative routes were initially developed using the following criteria and constraints:

- sensitive environmental and socio-economic features should be avoided;
- routes should minimize potential impacts on sensitive environmental and socio-economic features where they cannot be avoided;
- existing easements/rights-of-way should be used wherever possible;
- new, cross-country routes should be located on lot lines, preferably at the rear of the property;
- mature woodlots should be avoided; and
- rural residences should be avoided.

The route with the least environmental impact was determined to be the preferred pipeline route. ICP noted that existing linear features would include previously disturbed easements and rights-of-way and other culturally defined boundaries such as lot lines or roads. ICP submitted that paralleling these

linear features is environmentally preferred for the establishment of alternative routes, a methodology which would be consistent with Moore Township planning principles.

To facilitate storage requirements, gas delivery to and from Tecumseh Gas Storage ("TGS") is an essential component of the ICP project. Consequently, one of ICP's routing objectives was to minimize the environmental impact of constructing a pipeline from the St. Clair to Sarnia Segment to TGS.

A portion of two routes were cross-country routes running east/west through the middle of Concession VII. The east/west routes were generated through the middle of Concession VII due to the following constraints:

- the lack of existing east/west easements;
- the Novacorp chemical plant on Lots 25 and 26, Concession VII and VIII, Moore Township; and
- a mature woodlot along the rear lot line, between Concession VII and VIII.

Once the initial screening of the river crossing alternatives was complete, alternative routes were generated from river crossings III, IV and V to the Sarnia Terminal. A list of route comparison criteria was developed to compare the alternative routes. These criteria included:

- Class 2 and 3 agricultural land affected;
- tile drainage system impacts;
- watercourse or municipal drain crossings;
- woodlots potentially affected;
- archaeological and socio-economic features potentially affected;
- length of route not adjacent to existing easement or other linear features; and
- overall route length.

The next step consisted of calculating the impacts of each route based on the above-noted criteria. The potential impact on each feature was calculated using the area, number, or length of the feature crossed by the alternative route (eg. number of creek crossings, area of tile drained land affected, length of new easement). Area calculations were based on an easement requirement of 18 m (59 feet).

After an April 13 meeting with Moore Township Council, ICP introduced another criterion, which was in a sense an overriding criterion. This was that the route must comply with the Moore Township Official Plan and Zoning By-Law. To be consistent with requirements set out in the Official Plan and Zoning By-Law, alternative route development Generally utilized road allowances, lot lines or easements. Subsection 4.8 (b) of the Official Plan states: "the Township, through this subsection, states its preference and objective that any such facilities (including pipelines) should locate on or adjacent to road allowances, lot lines, existing rights-of-way, and existing access roads". In addition, subsection 6.1.5 (ii) of the Zoning By-Law states "where the proposed pipeline runs easterly and westerly it shall follow along, Concession Roads and/or Blind Lines (unopened road allowances)".

A comparative evaluation of the three river crossing alternatives resulted in the elimination of river C, crossing V. As a result, river crossings III and IV and two associated alternative routes to the Sarnia Terminal remained. These preliminary preferred routes were presented at the public information open houses.

Four alternative pipeline routes were presented in the February 1993 Newsletter, with the preference being Segments 1, 2, 5, 7, 11 and 12 (Figure 4-1). Following the Acres review of the crossings, nine alternatives were presented at the April public information open house (Figure 4-2). Again, the route which included Segments 2, 5, 7 was the preferred route. By the time that ICP made its application in June, twelve routes were being considered, but Segments 2, 5, 7 had been dropped from consideration, with no reason given by ICP at that time (Figure 4-3).

ICP stated that public input resulted in the refinement of the preliminary preferred routes. In response to public input, the cross-country portion of two routes was moved south to the other side of a lot line into Concession VII. In addition, a route was generated to the north of the cross-country route to parallel Moore Road 8. The new Moore Road 8 route parallels a utility corridor consisting of a gas line and a water discharge pipeline. The Moore Road 8 route involved two possible alignments, one on the north side of the road and a second on the south side of the road.

The results of Acres review of the St. Clair River crossings determined that, based on environmental and socio-economic criteria, Alternative III was the preferred crossing location. Following the selection of Alternative III, four alternative pipeline routes, two cross-country and two along Moore Road 8 remained to be compared. An analysis of the alternative routes indicated that the Moore Road 8 routes (Routes 8 and 9) would have the least impact on agricultural lands, tile drainage, municipal drains, woodlots, rural zoned lands, and length not adjacent to existing easement or other linear features. For these reasons, the Moore Road 8 routes (Routes 8 and 9) were further evaluated. No significantly different environmental features occur on either side of the road. The most important consideration used to determine which side of Moore Road 8 was preferred were socio-economic features. In particular, the anticipated levels of disruption to residents living on either side of Moore Road 8 were considered. A review determined that the north side of Moore Road 8 was preferred, east of Baby Creek, as there were fewer houses on the north side of the road than on the south side of Moore Road 8 east of Baby Creek.

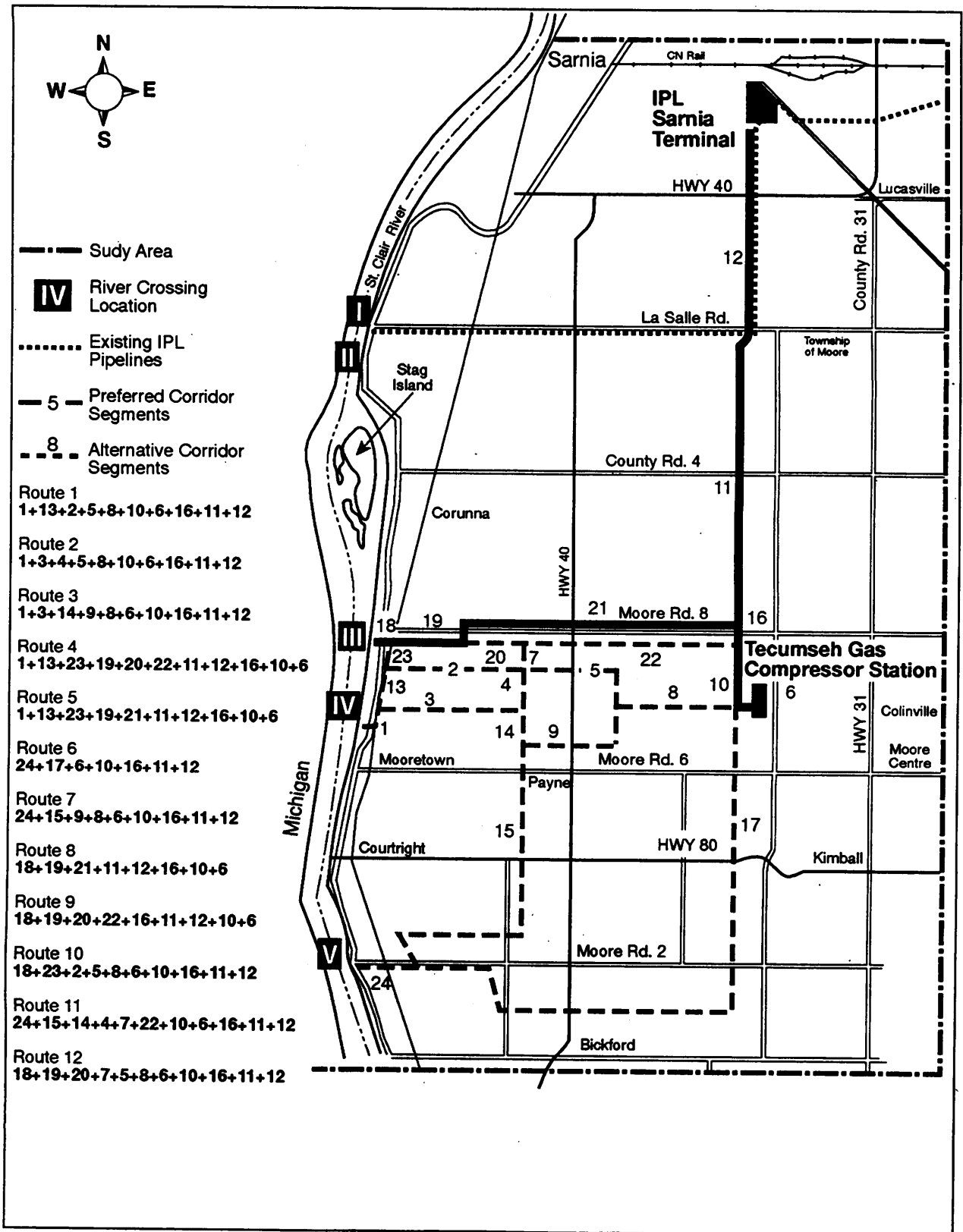
The route along Moore Road 8 split at the Ontario Hydro 115 kV steel tower line. From this point the preferred route extended south into the TGS Compressor Station and north to the Sarnia Terminal. The preferred route alignment is described in section 4.2.2.

4.1.3 Tecumseh Gas Storage Segment

Mr. T.E. McLaughlin, a landowner affected by ICP's proposed route, expressed concerns about ICP's routing process and ICP's applied-for route. From the original advertisement in the newspaper, Mr. McLaughlin was uncertain whether the proposed route would be crossing his property. At the April open house, which Mr. McLaughlin attended, ICP indicated that the route would traverse the centre of his property paralleling the TGS line diagonally across his property. Due to objections at the open house, ICP investigated moving the route and subsequently applied for a route south of Mr. McLaughlin's property. The applied-for route, being south of the Laur drain, avoided Mr. McLaughlin's woodlot and avoided severing the header tiles on Mr. McLaughlin's property.

Subsequently, ICP made an error in the preliminary right-of-way drawings such that the proposed route was shown as being located across the McLaughlin property and the properties of three other landowners north of the Laur drain. This resulted in the service of section 87 Notices on those property owners, but not to the owners of properties traversed by ICP's applied-for route.

Figure 4-3
St. Clair to Sarnia Routes
as Presented in ICP Application



ICP indicated that it appreciated that, in the minds of the landowners, receiving a section 87 Notice meant that the Company was seeking easement rights with respect to their lands. Those landowners who did not receive section 87 Notices may not have perceived any need to take an interest in this hearing. ICP requested that the Board accept a routing realignment at this location, amending the route to match the preliminary right-of-way drawing which had been the basis for the service of section 87 Notices.

ICP's environmental consultant stated that it would remain ESP's professional opinion, from a route selection perspective, that the originally applied-for route remained the preferred route. However, with the amended route, the impacts to the tile drainage systems could be mitigated.

4.1.4 Millgrove to Milton Segment

The process of generating alternative routes included the identification of environmental features and the use of existing linear features.

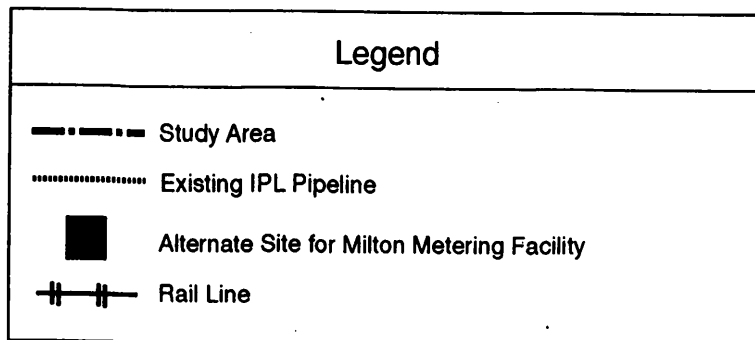
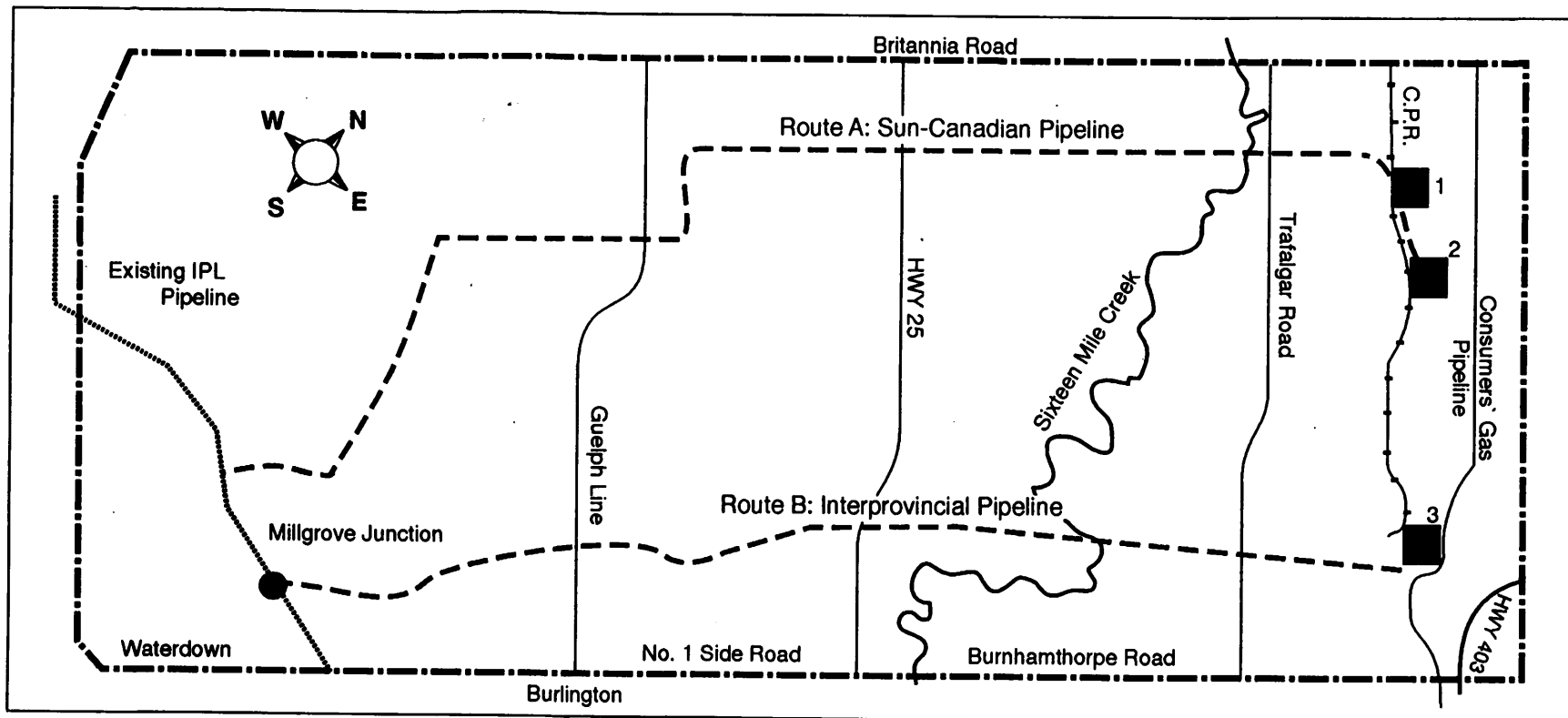
Alternative routes were developed using the following criteria:

- existing easements/rights-of-way should be used wherever possible;
- sensitive environmental and socio-economic features should be avoided;
- routes should minimize potential impacts on sensitive environmental and socio-economic features where they cannot be avoided; and
- new, cross-country routes should be located on lot lines, preferably at the rear of the property.

The alternative routes were generated using the above-noted criteria. Alternative Route A paralleled a Sun Canadian Pipeline easement across the northern portion of the study area. Route A was further refined into two alternatives. Route A1 and A2 shared an identical alignment with the exception of Route A1 terminating at Alternate Site 1 for the Milton Metering Facility. Route A2 would continue to parallel the Consumers' Gas Mississauga Southern Link ("MSL") to Alternate Site 2 (Figure 4-4). Alternative Route B paralleled an existing IPL and Sarnia Products easement across the southern portion of the study area and terminated at Milton Metering Alternate Site 3. Route B was also refined into two alternatives with Route B1 entirely within the existing easement (north of IPL's existing Line 9) and Route B2 requiring 11 in (35 feet) of new temporary easement for workspace on the south side of the easement. Following a comparative evaluation of the alternatives, utilizing the above-noted criteria, ICP stated that it chose the route with the least net impact on the environment as the preferred pipeline route (Figure 4-4).

Existing linear features include previously disturbed easements, rights-of-way and other defined boundaries such as lot lines or roads. Paralleling these linear features was not only environmentally preferred for the establishment of alternative routes but is a widely accepted environmental planning principle. The establishment of alternative routes using this methodology was consistent with Official Plan Objectives for the Regional Municipality of Hamilton-Wentworth, the Regional Municipality of Halton, City of Burlington, Town of Oakville, Town of Milton, and the Town of Flamborough, and with the planning policies of the Niagara Escarpment Commission ("NEC") and Parkway Belt West Plan.

**Figure 4-4
Millgrove to Milton Segment
Alternate Routes**



Two alternative routes were chosen that best satisfied the technical and environmental requirements. Both routes paralleled existing pipeline easements for their entire length. Other east/west corridors, namely roads and other easements outside of the study areas, were not considered as alternative routes. These routes did not provide a continuous east/west corridor, were of a significantly greater length, encroached upon residential developments and/or did not provide the potential to overlap easements. Preliminary alternative routes which were eliminated from consideration prior to the selection of the alternative routes included an east/west pipeline easement owned by Union, north of the study area, and two separate east/west easements south of the study area, one operated by TransCanada and the other by IPL.

Once environmental features were identified and the alternative routes were chosen, a detailed list of criteria was developed to compare the alternative routes. These criteria included:

- Class 1 to 4 agricultural land affected;
- Wetlands, ESAs, Area of Natural and Scientific Interest ("ANSI") and wildlife areas affected;
- tile drainage system impacts;
- watercourse or municipal drain crossings;
- woodlots potentially affected;
- archaeological and socio-economic land use features potentially affected;
- length of route not adjacent to existing easement or other linear features;
- number of residences near alternative routes; and
- overall route length.

Using the above-noted criteria, the two routes were comparatively evaluated. The alignment of each route was also considered. The significance of the net environmental impact of the two routes was determined by identifying the potential impacts, after considering mitigation measures, to each feature affected. Potential impacts were calculated using the area, number, or length of the feature (for example, number of creek crossings, area of tile drained land affected, length of new easement). Alternative routes and a preliminary preferred route were presented at a public information open house on 3 June 1993 to obtain agency and public input.

The route comparison matrix identified Routes BI and B2 to be environmentally preferred routes over A1 and A2. The BI and B2 Routes had the least impact on agriculture, land use/cultural resources and miscellaneous evaluation factors. All four routes had an equal impact upon natural environment features. Another advantage of Routes B1 and B2 was that all ICP operation and maintenance activities could be conducted within the existing IPL easement.

There is no significant difference between Routes BI and B2 in regard to their evaluation features. However, ICP had anticipated that Route BI would have less of an impact upon the subject matter of the route comparison criteria because Route B1 would be constructed entirely within a previously disturbed easement. Consequently, Route BI was selected as the preferred route.

4.1.5 Milton Metering Facility Sites

Three alternative metering station sites were identified to provide a connection with the Consumers' Gas MSL pipeline at the eastern end of the proposed segment. The metering facility was necessary to measure the volumes and properties of natural gas being shipped on the InterCoastal pipeline.

Approximately 40 m x 40 m (122 feet x 122 feet) of land would be required for the Milton Metering Facility.

Alternative Site 1 was located in Lot 4, Concession IX, North of Dundas Street, Town of Milton, at a point where the Sun-Canadian Line (Route A1) turns south to parallel the Consumers' Gas MSL. Alternative Site 2 was located in Lot 2, Concession IX, North of Dundas Street, Town of Milton where the Sun-Canadian Line (Route A2) crosses the Consumers' Gas MSL. Alternative Site 3 was situated at Lot 6, Concession II, North of Dundas Street, Town of Milton where the ICP line (Routes BI and B2) crosses the Consumers' Gas MSL (Figure 4-4).

The selection of Route BI as the preferred route necessitated the selection of Alternative Site 3 as the preferred location for the Milton Metering Facility.

Views of the Board

With respect to ICP's selection of a preferred crossing location for the directionally drilled crossing of the St. Clair River, the Board is of the view that the study area reviewed by ICP was a reasonable one, and that ICP's approach was acceptable.

With respect to the comparison of alternative routes, the Board is of the view that ICP's criteria for the generation of alternative routes were acceptable. The Board notes, however, that adverse environmental and socio-economic effects can loosely be categorized into two types: potentially long-term adverse effects and potentially short-term effects which can be mitigated within one to two years following construction. Due to the difficulty in otherwise mitigating long-term adverse effects, the Board is of the view that the primary form of mitigation for potentially long-term effects should be avoidance at the routing stage.

While the Board is of the view that it is appropriate to include all potential adverse effects of the routing options in a comparison of routing alternatives, the Board finds the selection of a preferred route on the basis of avoidance of primarily short-term and easily mitigated adverse effects is questionable when the same route would have the potential to cause other long-term adverse effects. The Board notes that ICP indicated that factors were implicitly weighted to address potential concerns. These implicit weighting factors were not well defined, making it difficult for the Board to understand ICP's rationale for selecting the proposed route.

4.2 Appropriateness of ICP's Applied-for Route

4.2.1 St. Clair River Crossing

Based on environmental and socio-economic criteria, ICP stated that Crossing III just north of Mooretown was preferred. It had fewer biophysical impacts than all the other routes, and was ranked second based on socio-economic criteria. The Lambton crossing ranked second environmentally, losing points to Crossing III on biophysical impacts. ICP considered this crossing to be better from a social perspective, since there would be no residences directly impacted or within 15 m (49 feet) of the centerline of the pipeline. Crossing IV at Mooretown ranked third environmentally and lost points

primarily in the area of social impacts due to the proximity of residences and a conservation/recreation area.

In consideration of the cost of directional drilling, and the pipeline to connect the ANR Link with the St. Clair to Sarnia segment, the Moore Township Road 8 crossing was estimated to be the least costly.

Based on the preliminary environmental and engineering review, ICP concluded that the 1380 in (4528 feet) long pipeline crossing of the St. Clair River at the Crossing II site could be successfully completed with a minimum of negative environmental impacts.

The WIFN and Moore Township inquired as to whether ICP's preferred crossing was the most appropriate. Both of these parties questioned why ICP was not using the existing CN Tunnel, which was scheduled for abandonment. It was argued that ICP could easily wait for the tunnel to become available. ICP stated in its route selection study that it dismissed this option-primarily on the basis of the tunnel's unavailability to suit ICP's project schedule. During the course of the hearing, ICP further noted that there was great uncertainty as to the availability of the tunnel and that this option may pose concerns associated with routing a pipeline through a railyard and with the possible presence of contaminated soils associated with the railyard.

Views of the Board

The Board is of the view that ICP thoroughly reviewed all of the possible crossing alternatives and has objectively arrived at the preferred crossing location. The Board is of the view that ICP's applied-for route for the crossing of the St. Clair River is appropriate. The Board concurs with ICP's assessment that the CN Tunnel did not constitute a viable alternative, given the considerable uncertainty about its availability on a timely basis and that it was not reasonable in these circumstances to pursue the tunnel option.

4.2.2 St. Clair to Sarnia Segment

There was discussion on the status of official plans and zoning by-laws with respect to the selection of Moore Township Road 8 as the preferred route of ICP. The issues revolved around the interpretation of the spirit and intent of the official plans and by-laws, and what role plans should play in guiding land uses, and in particular pipelines.

In the early stages of the project, ICP selected a preferred route (Segments 2,5,7) through the centre of Moore Township Concessions VII and VIII. A constraint was noted for Road 8, in that there were rural residences in close proximity to this route, and thus Road 8 was not considered as an alternative route. It was only after opposition to any pipeline construction from Mooretown residents and the Township Council that a route along Road 8 was selected as the preferred alternative. At the application stage, the originally preferred cross-country route (Segments 2,5,7) was no longer considered in what was to be the final route selection process. During the hearing, ICP stated that either Moore Road 8 or Segments 2,5,7 would be acceptable on environmental grounds. The relative merit of the Segments 2,5,7 route was that it would avoid residences and associated landscape features along Moore Road 8 and that it involved fewer municipal drain crossings. The relative merits of Moore Road 8 were that it avoided the severance of artificial drainage systems in the centre of fields, paralleled an identified utility corridor, and was in compliance with the Moore Township Official Plan.

ICP further stated that identification of Road 8 as a utility corridor and official plan compliance were the "primary and overriding rationale for selecting the preferred route along Moore Road 8". Moore Township stated in testimony, however, that the route comprised of Segments 2,5,7 was in compliance with its Official Plan.

ICP maintained that the selection of Road 8 was consistent with the Official Plans of Lambton County and Moore Township, and met the requirements of the Moore Township Zoning By-Law, which designated Road 8 as a utility corridor. It further stated that it had confirmed with responsible officials from both Lambton County and Moore Township that its interpretation was correct, and that there were no specific plans to amend the existing Township By-Law. ICP rejected as unfounded, the Township position that the proposed Road 8 route was not in compliance with the Official Plan and Zoning By-Law.

In response to public concern arising out of the early public notification process, Moore Township Council met on 13 April 1993 with ICP and local residents. The result of the meeting was a Council resolution requesting "the National Energy Board to hold a full Public Hearing ... on the proposed InterCoastal Pipe Line Project due to the sensitivity of the proposed pipeline location and conflict with the Township Official Plan and Zoning By-Law". The Council's preference was that the proposed pipeline not run through the Township, but that if it must, it should be through an area where there was no impact. The Council's position was that its By-Law encouraged alignments of major utilities in existing easements or transmission corridors, but differentiated these corridors from residential development corridors such as that along Road 8. The Council did not want a large diameter pipeline along Road 8 because of the immediate impact on residences and because of the potential impacts from any future looping. The Council's view was that official plans and zoning by-laws were subject to constant amendment and anything was possible for future development. It was of the opinion that a transmission pipeline would restrict this flexibility.

Certain landowners also presented evidence about the route selection process and the proposed route as it affected them individually. Mr. Puurunen raised a number of concerns including the fact that his front yard would be tom up, the possible damage to the roots of mature trees and the removal of other trees. During cross-examination, he indicated that his property contained a variety of mature sycamores, elm and cedar trees. Mr. Puurunen was of the view that the pipeline could seriously damage these trees as well as cause serious ecological damage to Baby Creek. Mr. and Mrs. R.J. McClemens expressed the concern that new easements across the front of their property would unduly constrain any plans they might have to replace their existing older house with a new house built closer to the road. They were also of the view that their property would be devalued.

Views of the Board

The application before this Board is in respect of the construction of a federally regulated pipeline. This activity clearly falls within the Board's Jurisdiction and authority. Although in the normal course of events the Board would expect pipeline companies under its jurisdiction to comply with municipal land use controls, such controls may be inapplicable to the Board given its jurisdiction over the construction and operation of federally-regulated pipelines. In this case, however, the Board notes that both the originally preferred route (Segments 2, 5, 7) and the applied-for route are in compliance with the Moore Township Official Plan.

The Board is of the view that the Moore Township Official Plan and By-Law and the Lambton County Plan permit a gas transmission pipeline along Road 8. The Board appreciates that this may not be the Township's preferred location for a gas transmission pipeline, or even an appropriate location, however it does comply with the Official Plan as now written. The Board recognizes that plans are amended from time to time to take into account changing circumstances or trends. However, there is no evidence that the Township's opposition is based on a routine or ongoing review of its development plans to address new circumstances.

The Board notes that the Moore Road 8 alternative is preferred by ICP primarily on the basis of short-term and easily mitigable effects, whereas this route may cause potential long-term adverse socio-economic effects. On the basis of the evidence before it, the Board is not persuaded that ICP has selected Road 8 as its preferred route in a manner that properly weighted all relevant factors. Firstly, ICP argued that the primary and overriding, rationale for selecting the preferred route along Moore Road 8 was its identification as a utility corridor and its compliance with the Township Official Plan. Conversely, in dealing with the selection of a preferred route 'In the Millgrove Junction to Milton area, ICP rejected the Parkway Belt West Utility Corridor, which is specifically designated for major utility transmission lines. The Board notes that these two decisions are inconsistent and suggests that further substantiation would have been warranted. Secondly, the earliest preferred route, Segments 2,5,7 was dropped from consideration as a viable alternative once the choice was made to accept Moore Road 8. The Board sees no rationale for this exclusion and notes that there has been no full assessment comparing Segments 2,5,7 and Road 8. Finally, the Township Official Plan does permit a cross-country pipeline route and the Township prefers a route, if there is to be a route, that has a neutral impact and affects the fewest landowners. In the Township's view, Road 8 is the least acceptable choice.

The onus is on the applicant to provide evidence of the acceptability of a particular route. Based on the foregoing, it is the Board's view that the evidence filed by ICP was not adequate to support a finding that Moore Road 8 should be considered as the preferred route.

4.2.3 Tecumseh Gas Storage Segment

Mr. McLaughlin suggested that it was inappropriate that ICP's route was located about 21 in (70 feet) inside his property from the lot line, meaning that ICP would have to cross the Laur drain and cut all the tile drains, as opposed to moving the pipeline 18 to 21 in (60 to 70 feet) south and avoiding this level of disturbance to the drainage system. Further, Mr. McLaughlin was of the view that if ICP cut a strip through the bush, the cut path would have limited agricultural potential, In wet weather, it would not dry and in dry weather, the trees would take all the moisture. At the hearing, ICP filed evidence regarding its proposed route realignment as discussed in section 4.1.3 above indicating that it would now propose to cross the McLaughlin property further to the north, which would reduce the impact on woodlots in the area.

Mr. McLaughlin also expressed a preference that, along the west side of his property, the line should be located to the west of the hydro towers. Mr. McLaughlin indicated that if the line was on the west

side, it would not impact him as much, however, if it was on the east side, it would be close to his house and trees, and would possibly interfere with an implement shed and a granary. ICP confirmed at the hearing that the applied-for route would be west of the hydro towers.

As noted previously, ICP originally applied for a route to the south of the Laur drain which did not affect Mr. McLaughlin's property. Mr. McLaughlin received a section 87 Notice due to an error in ICP's preliminary right-of-way drawings. Subsequent to Mr. McLaughlin's testimony, ICP amended its applied-for route to conform with its land acquisition program.

Views of the Board

With respect to the Tecumseh Gas Storage route, the Board notes that both ESP's preferred route and ICP's currently applied-for route should have no long-term residual effects. The Board notes, however, the public concern raised with respect to the applied-for route. Further, given the extent of errors and incorrect information distributed to landowners regarding this segment, the Board questions whether all of the affected landowners are actually aware of the precise location of the route.

While the impacts of routes north or south of the Laur drain are capable of mitigation and could be appropriate, the Board does not consider ICP's route selection process to be appropriate given that a portion of the route was ultimately selected on the basis of mistakenly served land acquisition notices.

4.2.4 Existing Segment

ICP proposed to convert 209.7 km (130.3 mi) of its existing oil pipeline to natural gas service. ICP proposed to use its existing route with no deviation.

Views of the Board

The Board is of the view that the considerations to be taken into account in routine, a natural gas pipeline may differ from an oil line, primarily with respect to environmental considerations and public safety. In the case of ICP's proposed conversion, the Board notes that the Lambton Board of Education expressed concerns regarding public safety. As discussed in section 2.4.3, the Board notes ICP's commitment to re-route around the Confederation Public School property. Subject to the matters discussed elsewhere in this report, the Board finds the use of the existing Line 8 route to be acceptable.

4.2.5 Millgrove to Milton Segment

Alternative routes for the Millgrove to Milton Segment were generated in a similar fashion as the St.Clair to Sarnia Segment. The two alternative Routes A and B were considered to be essentially equal by ICP in their impacts upon natural environment features, however, route B was preferred due to reduced impacts with respect to agriculture land use/cultural resources and other miscellaneous evaluation factors. ICP anticipated the preferred route (B1) would have the least adverse environmental and socio-economic effects, as it would be constructed entirely within a previously disturbed easement.

The NEC questioned the need for the pipeline to be routed through NEC lands. The NEC indicated that alternative routes which do not impact the Escarpment Natural Areas must be addressed, and that alternative routes south of the study areas using existing corridors required evaluation by ICP. The NEC indicated that if no alternative routes were feasible, then it was of the view that ICP's applied-for route would have the least impact on the NEC Plan Area. In response to the NEC's concerns, ICP indicated that routes south of the study area had been considered as preliminary alternatives, but that they had been eliminated from further consideration and excluded from the study area due to their length and greater potentially adverse environmental effects.

The Halton Regional Conservation Authority ("HRCA") expressed concern with Route B2 due to additional tree cutting which would impact bird species and wildlife. The Regional Municipality of Halton supported the Route B alternative. The City of Burlington supported the selection of Route B1 and supported the recommended conditions by the OPCC.

The Environmental Assessment and Coordinating Committee ("EACC") of Environment Canada - Ontario Region, in its letter of specialist advice to the Board, indicated that it was not satisfied that environmental considerations have been adequately incorporated into ICP's assessment process. The EACC noted that all four alternatives adversely affected a number of significant natural features. The EACC noted that the northern boundary of the study area was based on the potential use of the existing east/west linear corridors through the study area and that ICP had not justified its decision to eliminate three alternative routes which were outside the study area. The EACC noted that although the preferred route (B1) would be aligned within the existing ICP and Ontario Hydro easements, it would cause the greatest negative impacts on the significant environmental features of this area. The EACC expressed its concern with the cumulative effects caused by another pipeline through the study area and the possibility that there may be further demands for future similar development. ICP noted that the same evaluation process had been used on both the Millgrove to Milton Segment and the St. Clair to Sarnia Segment. ICP indicated that its commitment to confine construction to previously disturbed easements would minimize any potentially adverse environmental effects. ICP indicated that it had considered route deviations to avoid sensitive environmental features during its development of alternative routes, but that these alternative routes were rejected due to greater impacts on agricultural lands, stream crossings and rare species.

Views of the Board

The Board notes that although a number of agencies questioned ICP on its routing process, these agencies generally expressed a preference for ICP's proposed route, in the event that the project was approved. This preference was based on ICP demonstrating that alternatives avoiding the natural areas were not feasible and on ICP demonstrating that the proposed mitigative measures would be effective. The Board is of the view that ICP has effectively ruled out other routing options based on the preferred route having fewer long-term residual adverse effects, and that effective mitigative measures would be refined prior to the commencement of construction. Although the Board has concerns with ICP's routing process, the Board is of the view that ICP has adequately demonstrated that the applied-for route traversing the Millgrove to Milton Segment is adequate. After considering the fact that ICP's proposal does not involve disturbance of previously undisturbed areas and ICP's construction commitments as discussed in section 5.5, the Board is of the view that

ICP's proposed route would not cause an increase in long-term residual adverse effects. The Board does not consider it appropriate to take into account future similar developments, as these would be reviewed upon their submission to the Board.

4.3 Land Requirements/Acquisition

4.3.1 St. Clair to Sarnia Segment

ICP proposed to acquire 14.7 km (9.1 mi) of new 18.3 m (60 feet) wide right-of-way from the international border to a point of tie-in with its existing Line 5 right-of-way. This distance includes 1.9 km (1.2 mi) of new 18.3 m (60 feet) wide right-of-way for the lateral from the St. Clair interconnection to the Tecumseh Gas Storage facilities. ICP would also utilize approximately 3.9 km (2.4 mi) of its existing 18.3 m (60 feet) wide Line 5 right-of-way to enter its Sarnia Terminal facility.

Temporary working rights 10 m (33 feet) wide would be acquired parallel and adjacent to Line 5 and the new right-of-way for 18.6 km (11.6 mi) of the St. Clair to Sarnia Segment. Extra temporary working rights which have not been identified would be required for the crossing of the St. Clair River. (See Figure 4-5.)

During cross-examination Moore Township questioned ICP on its policy on acquiring right-of-way agreements either by grant of easement or through fee-simple purchase. ICP stated that it acquired rights-of-way through grant of easement but had purchased some sections in fee simple, specifically a property on the St. Clair Parkway. Moore Township questioned ICP on whether it would be offering that type of agreement to other landowners along the ICP route. ICP testified that it would not be offering such agreements. It explained that there were circumstances involved with that particular property which necessitated the outright purchase in fee simple.

For the particular property in question, ICP stated that there was an application with Moore Township to sever the property. The owners were severing the property and selling it for building lots. The owners were not willing to be subject to the Option Agreement and the timelines involved, therefore ICP made a business decision to purchase two lots that were being severed on the property.

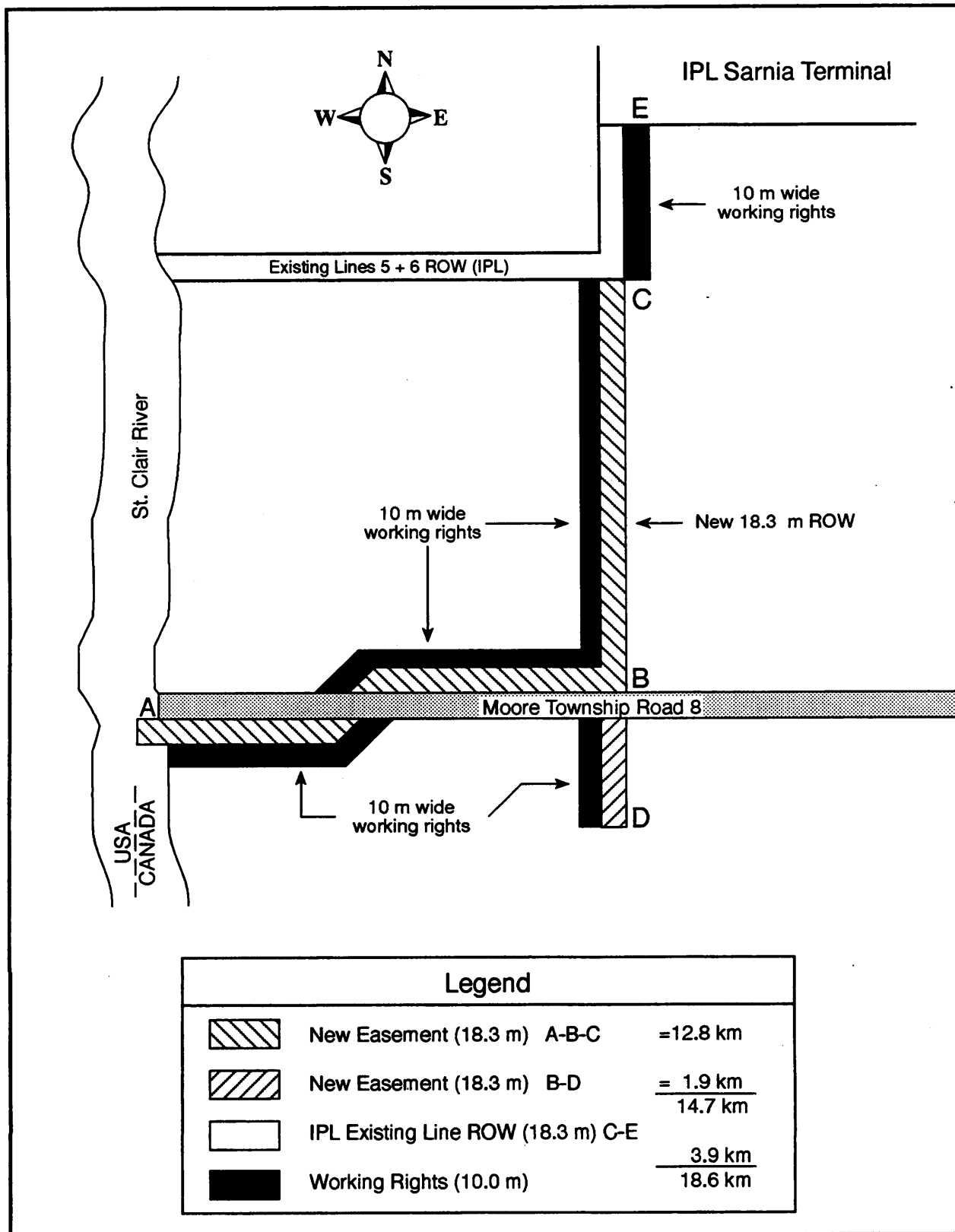
ICP indicated that it would negotiate option agreements in respect of the new easements that would be required for the St. Clair to Sarnia Segment, with the exception of that portion of the proposed pipeline that would be located within existing easements held by ICP in respect of Line 5. Those Line 5 easements were acquired pursuant to agreements that permitted the grantee to transport "oil and its products". ICP stated that it was currently negotiating option agreements to amend the Line 5 easement agreements in order to provide expressly for the transportation of natural gas.

4.3.2 Existing Segment

The Existing Segment would consist of the conversion of 209.7 km (130.3 mi) of IPL's existing 508 mm diameter (20 in) Line 8 crude oil pipeline extending, from IPL's Sarnia Terminal to Millgrove Junction to accommodate natural gas service. No new permanent easements would be required along the Existing Segment.

With respect to land rights for the Existing Segment, ICP stated that it would negotiate an option agreement. That option agreement, when exercised, would entitle ICP to obtain the easement amending agreement against the existing agreement and would then permit the conversion of the pipeline to natural gas service.

Figure 4-5
St. Clair to Sarnia Segment
New Permanent and Temporary Land Rights



ICP would also require temporary working rights at each of the existing valve sites to accommodate the conversion.

The Existing Segment is located within existing easements held by IPL in respect of Line 7. These easements were acquired by IPL in 1957 pursuant to Agreements for Right-of-Way and Easement. The 1957 Easement Agreements permit the grantee to transport "oil and its products". ICP stated that it is currently negotiating option agreements to the 1957 Easement Agreements in order to provide expressly for the transportation of natural gas.

IPL proposed granting a licence to ICP to use the right-of-way within which the Existing Segment and the new facilities would be located. ICP stated that a copy of that licence agreement between IPL and ICP would be filed with the Board as soon as it became available.

4.3.3 Millgrove to Milton Segment

The Millgrove to Milton Segment would consist of approximately 22.4 km (13.9 mi) of 508 mm diameter (20 in) line pipe and related facilities extending from a point of connection with the Existing Segment at Millgrove Junction to a point of connection with the natural gas distribution pipeline system of Consumers' Gas near Milton, Ontario.

ICP proposed utilizing approximately 14.3 km (8.9 mi) of its existing 18.3 m (60 feet) wide Line 9 right-of-way for the initial portion of the Millgrove to Milton Segment. IPL also proposed acquiring from Ontario Hydro 8.1 km (5.0 mi) of new 3.0 m (10 feet) wide right-of-way along the last 8.1 km (5 mi) of the Millgrove to Milton Segment (Figure 4-6).

Temporary working rights 17 m (55 feet) wide would be acquired parallel and adjacent to the new 3.0 m (10 feet) wide right-of-way on the Ontario Hydro lands.

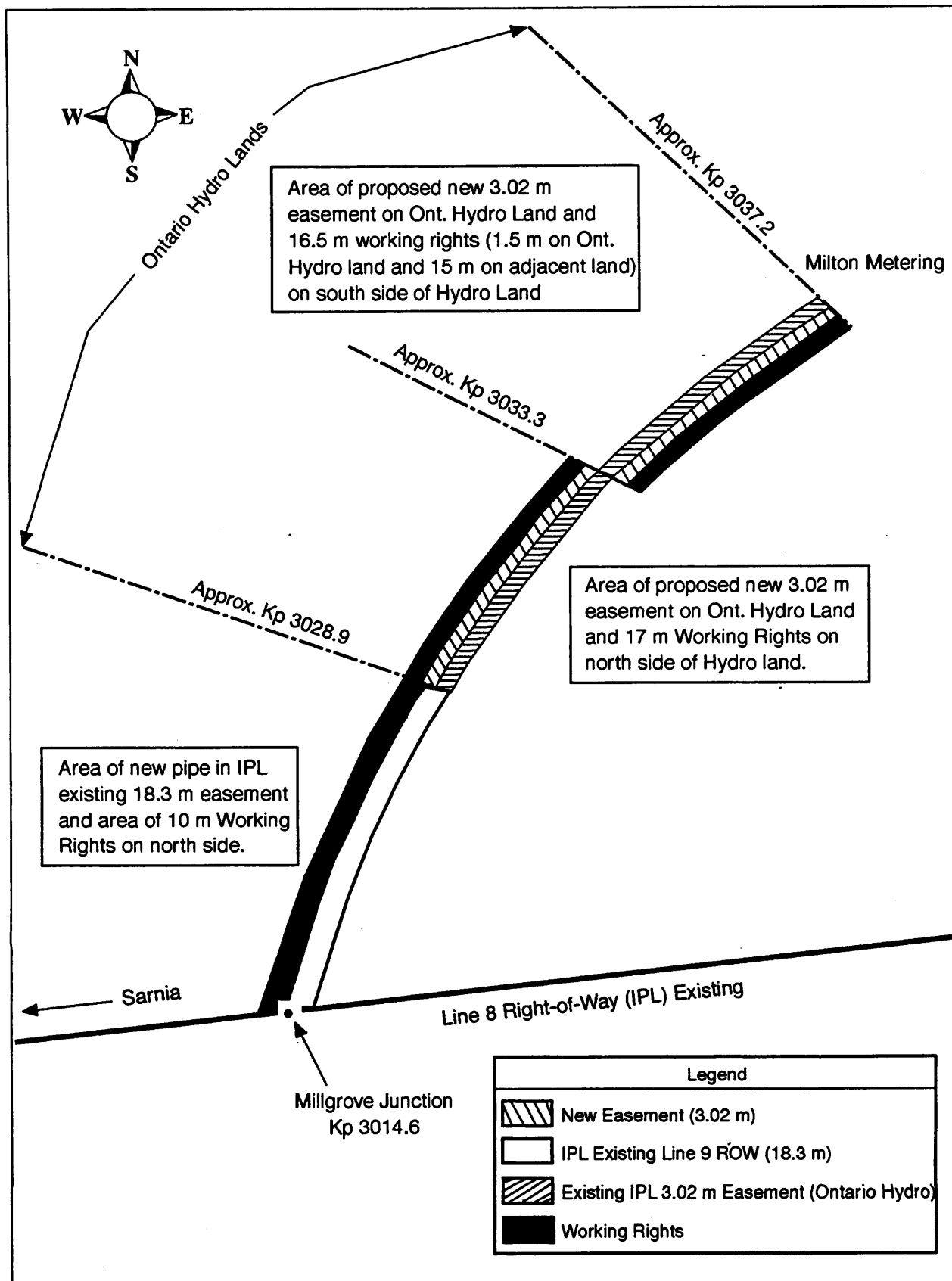
With respect to the portion of the Millgrove to Milton Segment that would be located within existing easements held by IPL in respect of Line 9, ICP indicated that no further action was required (other than acquiring working rights) since the existing easements provide for the transportation of natural gas.

ICP stated that it was currently negotiating an easement agreement with Ontario Hydro in respect of the portion of the Millgrove to Milton Segment that was not located within the existing Line 9 easement.

4.3.4 Pressure Regulating Facilities

ICP proposed the installation of two pressure regulating facilities. The facilities would be located 11.8 km (7.3 mi) and 81.7 km (50.8 mi) east of the Sarnia Terminal on the Existing Segment. The facility located 11.8 km (7.3 mi) east of the Sarnia Terminal would require a land base of approximately 78 m² (840 square feet). The facility located 81.7 km (50.8 mi) east of the Sarnia Terminal would require a land base of approximately 60 m² (646 square feet). The proposed lands are zoned agricultural.

Figure 4-6
Millgrove to Milton Segment
New Permanent and Temporary Land Rights



ICP indicated that it currently possesses an 18.3 m (60 feet) easement acquired in 1957 alone, the Existing Segment. This current agreement allows for the transportation of oil and its products. Above ground facilities are permitted within the easement limits, which state "the grantee covenants that it will not make any above ground installation upon, or fence in any part of the said land without paying the grantor or his heirs, executors, administrators, successors or assigns additional compensation therefore at a price to be agreed upon or failing agreement to be settled by arbitration". IPL on behalf of ICP proposed to install the pressure regulating facility under the terms and conditions of IPL's existing 1957 agreement upon the landowner entering an Option for Easement Amendment with Working Rights. Negotiations with the landowner were continuing for an Option for Easement Amendment with Working Rights.

4.3.5 Milton Metering Station

The Milton Metering Station would require an approximate land base of 1600 m² (16 900 square feet). ICP proposed acquiring the necessary land rights from Ontario Hydro. Temporary working rights at this location would also be required. The zoning of the proposed station location is agricultural and agricultural/parkway belt.

Land rights would be required from either Ontario Hydro or the Management Board Secretariat (former Ministry of Government Services). In either case, the facility would be permitted under conditions set out in a license prepared by the owner of the lands. The Town of Milton has stated that a metering facility may be permitted as an accessory to a natural gas pipeline depending on the size of the facility. The Town was unwilling to commit to a metering facility until further details were available. Design drawings were being prepared for circulation to the affected parties.

Views of the Board

The amount of permanent easements and temporary work space required for pipeline construction is generally of concern to the Board because of the potential effects on landowners. In the present application, the Board is of the view that ICP's anticipated requirements for permanent easements and temporary work space are reasonable and justified.

4.3.6 Section 87 Notices

In its application, ICP stated that it was in the process of serving land acquisition notices under section 87 of the Act ("section 87 Notices") on approximately 35 landowners along the St. Clair to Sarnia Segment from whom easement agreements or easement amendment agreements would be required. Along the Existing Segment there are approximately 565 landowners who would be required to be served with section 87 Notices and from whom easement amending agreements must be obtained. For the Millgrove to Milton Segment, ICP indicated that it would be serving section 87 Notices with respect to temporary working rights that would be acquired parallel and adjacent to its existing right-of-way. Approximately 45 landowners would be affected along that segment. With respect to the Millgrove to Milton Segment on Ontario Hydro property, ICP would serve section 87 Notices on Ontario Hydro and the four tenants residing along this segment.

ICP stated that it was of the view that the acquisition of temporary working rights may be properly characterized as either the acquisition of an interest in land or as the acquisition of contractual rights to

carry out specified activities within a defined area, subject to the terms and conditions of the contractual agreement. Where an interest in land was to be acquired, section 87 Notices must be served and ICP may apply to the Board, if necessary, for a right of entry order under section 104 of the Act. If the interest to be acquired is contractual, section 87 Notices would not be required and a right of entry order could not be issued. The temporary working rights that IPL would acquire in respect of ICP would be in the nature of contractual rights. Accordingly, ICP did not intend to serve section 87 Notices. In the event that ICP was unable to negotiate suitable contractual arrangement with a particular landowner, ICP stated that it would seek an interest in the necessary land, serve a section 87 Notice on the landowner and, if necessary, apply for a right of entry order.

During cross-examination the OPLA questioned ICP as to the nature of the application before the Board. ICP testified that the present application was limited to the conversion of Line 8 from an oil line to a line to transport natural gas in gaseous form. The OPLA then raised the question of the intent of the section 87 Notice. ICP confirmed that the purpose of the section 87 Notice was only in respect of ICP's proposed use of Line 8 to transport natural gas. The OPLA-referred ICP to its sample section 87 Notice filed as part of ICP's application, which, in part, stated:

“To accommodate such conversion, it is necessary that ICP's Easement be amended to permit additional uses including, use for natural gas pipelines by ICP and its lessees and licensees according to the terms of the Easement Amending Agreement attached to the Option Agreement both of which agreements are attached hereto.”

As such, the OPLA stated that the section 87 Notice appeared to say that the proposed amendment was necessary to accommodate a conversion of Line 8 to permit additional uses of Line 8, including, use as a natural gas pipeline. The OPLA's position, therefore, was that to accommodate the conversion of Line 8, as requested in the application, it was not necessary to amend the Easement Agreement to permit any additional use, other than the transport of natural gas in Line 8.

ICP agreed that it was not necessary to amend the agreement to provide for anything other than the transport of natural gas. ICP further indicated that if it were to transport any other products through Line 8, ICP would be bound by the restriction-on-use clause, which states that ICP must obtain permission from the landowner and compensate the landowner accordingly.

In summary, the OPLA stated that the section 87 Notice presented to landowners indicated that it was for a particular purpose, which seemed to be a much broader purpose than the purpose that ICP indicated. Therefore, the section 87 Notice overstated the purpose for which the Amending Agreement was required for this application.

In commenting on the appropriateness of the section 87 Notice, Mr. Kozowyk stated that he did not believe that ICP complied with all the requirements of section 87 of the Act. Specifically, Mr. Kozowyk referred to section 87(1)(c) which requires:

“(c) a detailed statement made by the company of the value of the lands required in respect of which compensation is offered;”

Mr. Kozowyk indicated that ICP only quoted a figure for the market value of the lands, but did not provide details on how that figure was arrived at other than stating that market value was based on an "informal assessment". ICP further stated that the market value of the lands was based on location,

present use, use of adjacent lands, current zoning and recent land sales in the area. In summary, Mr. Kozowyk stated that, in his view, the section 87 Notice did not comply with the requirements of the Act with regard to compensation and should not be considered a proper notice. As such, pursuant to section 87(2) of the Act, all land acquisition agreements entered into with the owner of lands should be considered void.

Mr. Kozowyk further raised a point with respect to service of the section 87 Notices. Mr. Kozowyk was of the opinion that offering an option agreement at the same time as serving the section 87 Notice was not "in the spirit of the Act", which was to give everyone a fair opportunity to review and understand the proposal.

With respect to the interpretation of section 87(1)(c) and as a result the questions raised by Mr. Kozowyk, ICP stated that it reviewed the sample section 87 Notice and found that it complied with the requirements of the Act and that the detailed statement of value of lands was appropriate.

ICP further indicated that it was not acquiring new easement lands, but rather was acquiring additional user rights within lands subject to IPL's existing easement. Therefore, the value of the land that was the subject of the easement amending agreement was the same on a dollar per acre basis, regardless of location, because all landowners would have the same residual surface rights. ICP established a market value of \$3,000 per acre based on an informal assessment of market values along the Existing Segment.

Views of the Board

With respect to the section 87 Notice, the Board notes two major concerns. Firstly, the Board agrees with the OPLA that section 1 of ICP's section 87 Notice is confusing since it refers to "uses". However, ICP seeks a single use and the "Restriction-on-use of Right-of-Way Lands" clause would require the company to return to the landowner for permission, should additional uses be requested.

Secondly, it appears to the Board that, as a result of route adjustments, the section 87 Notice became a part of ICP's consultation process. Although it is a company's decision as to when to serve section 87 Notices, it would appear that in this situation, service of those notices did cause confusion. Specifically, a number of landowners were served section 87 Notices who were not affected and certain landowners received section 87 Notices in lieu of early public notification, after the filing of ICP's application.

With respect to the issues raised by Mr. Kozowyk, the Board has reviewed samples of the notice of proposed acquisition of lands required under section 87 of the Act that have been filed by ICP with the Board and has found that they comply with the requirements of the Act. Having reviewed a section 87 Notice filed by a landowner, the Board is of the opinion that the detailed statement of the value of the lands is appropriate.

As to the timing of the filing of a section 87 Notice, the Board reiterates that the only requirement set out in the Act regarding the timing of the section 87 Notice is that the

Notice must be served prior to the signing of a land acquisition agreement. This requirement can be found under section 87(2) of the Act which states:

“Where a land acquisition agreement referred to in section 86 is entered into with an owner of lands before a notice is served on the owner pursuant to this section, that agreement is void.”

An agreement is not "entered into" until it is signed by both the landowner and the company. In the Board's view, the intent of this provision is to ensure that a landowner does not sign a land acquisition agreement without being aware of the information set out in section 87, which may not all be in the terms of a land acquisition agreement. Thus, the company has met the requirements and intent of the Act by sending out the notice and option agreement at the same time. Further, the Board notes that, after receiving the option agreement, the landowner may take such time as he/she feels is necessary to become familiar with the issues before deciding whether to sign the agreement. The landowner should not be pressured into such a signing.

4.3.7 Option/Easement Amending Agreements

In its original application, ICP filed a number of sample agreements to be utilized for land acquisition on both the existing and new pipeline segments. These included an Option Agreement, Easement Amending Agreement, and Agreement for Right-of-Way and Easement with the Province of Ontario.

Following service of section 87 Notices on the affected landowners in the spring of 1993, some landowners expressed various concerns about the form of the Option Agreement and Easement Amending Agreement to ICP and the Board.

Although ICP did not necessarily agree with the landowners' interpretation, it stated that it was prepared to address the landowners' concerns and to clear up any misunderstandings regarding the Option Agreement and Easement Amending Agreement. By letter dated 16 September 1993, ICP contacted all landowners and advised them of the proposed changes to the Option Agreement and Easement Amending Agreement. ICP indicated that the letter would be sent to all landowners, whether or not they had signed Option Agreements.

On 28 October 1993, representatives of ICP and the OPLA met to address additional OPLA concerns with respect to the InterCoastal pipeline, including concerns with the Option and Easement Amending Agreements. Subsequent to that meeting, ICP responded to the OPLA's concerns and forwarded a copy of the amended agreements to the OPLA by letter dated 1 December 1993. ICP stated that its view was that it had adequately addressed the concerns of the OPLA.

On 1 December 1993, ICP again contacted all landowners by letter and attached revised Option and Easement Amending Agreements. In that letter, ICP indicated that it would be contacting landowners to review the changes to the documents and to answer any questions that the landowners might have. ICP emphasized that this was its final offer with respect to the Option Agreement and Easement Amending Agreement.

Views of the Board

The Board is of the view that the land acquisition negotiations process is between the landowner and the company. In this application, the Board is cognizant of the concerns of landowners with respect to the Option and Easement Amending Agreements. The Board notes ICP's proposed amendments to those agreements to resolve certain of the concerns raised.

Regarding the form of agreement for the acquisition of lands, the Board notes that section 86(2) of the Act provides that the "land Acquisition agreement" must contain certain provisions. Though it does not specifically state that the Board must approve the agreement, the section does state that the agreement must include a provision for compensation by one lump sum payment, or by annual or periodic payments of equal or different amounts, with a review every five years where annual or periodic payments are selected. Clauses must also be included with regard to compensation for all operations of the company, indemnification from all liabilities save those resulting from the owner's negligence or willful misconduct, and the restriction of the "use of the lands to the line of pipe". In addition, provision is made for the inclusion of "such additional matters" as may be required to be included in such an agreement by any regulations in force at that time.

Section 86(2) specifies minimum conditions which, if met, constitute compliance with the Act. In the event that a company does not comply with section 86(2) of the Act, then the company may not acquire the land. The Act is explicit in stating that "a company may not acquire lands for a pipeline under a land acquisition agreement unless the agreement includes provisions set out in paragraphs (a) to (f) of subsection 86(2)".

Chapter 5

Environmental and Socio-economic Matters

5.1 Environmental Issues and Appropriateness of ICP's Proposed Construction, Restoration, Operation and Monitoring Practices

The Board, as part of its responsibilities under the Act, pays specific attention to environmental issues associated with applications for the construction of facilities. Notwithstanding concerns with respect to routing, which are the subject of Chapter 4, the Board has a responsibility to consider all environmental issues associated with the applied-for facilities in rendering a decision.

ICP adopted all of the recommendations made by its environmental consultants including, the Environmental Issues List ("EIL") filed with those consultants' reports. IPL's Environmental Standards and Guidelines for Pipeline and Facility Construction manual ("EGPC"), which sets out IPL's policy and standard practices and procedures to mitigate adverse environmental effects of pipeline and facility construction, was adopted by ICP and forms part of ICP's and IPL's applications. In the event that unforeseen environmental conditions are encountered during construction, ICP undertook to obtain further approval from the Board prior to making any changes.

5.1.1 Soils and Agriculture

ICP provided information on typical soil profile descriptions including horizons, thickness of horizons, texture, colour, chemical properties and organic matter content. Topsoil thickness generally varies between 10 cm (4 in) and 30 cm (12 in), with a noticeable colour change between the topsoil and subsoil. ICP indicated that topsoil depth could increase in the vicinity of non-agricultural lands, such as woodlots, due to deposition of leaf litter.

5.1.1.1 Soil Preservation

Along the entire length of the preferred route, with the exception of areas in or adjacent to woodlots, ICP proposed that topsoil would be stripped over the trench and under the spoil pile and stockpiled separately from subsoil during dry soil conditions. ICP indicated that careless topsoil stripping, topsoil storage or topsoil replacement could potentially result in unnecessary mixing of topsoil and subsoil. Colour and texture changes between the topsoil and subsoil interface would be monitored to ensure that all topsoil is stripped from the spoil side of the casement. This information would be confirmed by an ICP environmental inspector during construction. In woodlots, topsoil would be stripped only directly over the trench line (blade width), to avoid unnecessary removal of vegetation by clearing additional work space for topsoil storage.

ICP indicated that the varying characteristics of the climate in its study area require special consideration during the planning and construction phases of the new segments. In particular, pipeline construction during wet months could adversely affect agricultural and landscaped areas. The characteristic clay soils along the preferred route are susceptible to rutting and compaction, with susceptibility increasing as moisture levels in poorly and imperfectly drained clay loam soil increase. Construction during wet soil conditions may cause soil rutting, soil compaction, surface erosion and

mixing of the topsoil and subsoil. These potentially adverse effects may break down soil structure and affect soil fertility, thereby reducing productivity. ICP indicated that construction activities would take place during the dry summer months and be completed by early fall, during the period when soil moisture levels are anticipated to be low. Final clean-up would be completed the following spring. After periods of excessive rainfall or saturated soil conditions, construction would be suspended until suitable construction conditions return. With respect to ICP's wet soil shut down policy, ICP indicated that the inherent variability in a number of factors precludes the consideration of only one factor when implementing wet soil shut down. ICP indicated that the following factors, among others, are commonly used by an environmental inspector in making a decision on wet soil shut down:

- plasticity of the surface soil to a depth of approximately 10 to 20 cm;
- location and depth of the wetting front in relation to the A and B horizons;
- extent of surface ponding;
- extent of surface rutting;
- areal extent and location of potential rutting and compaction; and
- type of equipment and nature of the construction operations proposed for that day.

In addition to wet climatic conditions, wind is another varying climatic characteristic in the study area which would require special consideration during the planning and construction phases. High winds during a dry summer may result in permanent loss of topsoil and create excessive dust which is a nuisance to residential, agricultural, business and industrial properties located near the preferred route. In general, the soils occurring in the pipeline construction areas would have a low susceptibility to wind erosion. Under wet conditions, soils may be particularly susceptible to water erosion in areas with steeply sloping topography. ICP has proposed a number of mitigative measures to avoid soil erosion including stabilizing topsoil piles with straw mulch or tackifier, promptly stabilizing erosion prone slopes and suspending certain activities in high winds.

The OPLA expressed concern that agricultural productivity could be reduced due to the erosion of tillable land or topsoil/subsoil mixing from ICP's operations. The OPLA was of the view that stripping of the entire easement would remove the potential for mixing and compaction of the topsoils. The OPLA submitted that it was necessary to strip the entire easement because piling of subsoils on top of topsoil and movement of equipment creates a significant risk of mixing and compaction of topsoil. Further, the OPLA expressed concern that previously undisturbed topsoil should not be mixed with topsoil which had been previously disturbed by past IPL pipeline construction. The OPLA requested that topsoil be stripped to a depth where colour change is evident to avoid topsoil/subsoil mixing. The OPLA noted that ICP proposed to strip topsoil to the colour change, 10 cm (4 in) or plough layer, whichever is deepest, with a maximum stripping depth of 30 cm (12 in). The OPLA noted that no rationale was given for these figures, and submitted that all topsoils should be preserved. Based on discussions with landowners, the OPLA proposed the use of a dozer and grader as it believed that this would achieve more precise topsoil stripping. The OPLA further submitted that topsoil should be stripped at the request and under the direction of landowners in wetlands and woodlots, to facilitate agricultural or other use of these areas following construction. The OPLA requested that ICP be required to abide by the wishes of each individual landowner with respect to implementation of the above-noted soil preservation policies, practices and procedures, as a condition of the approval of ICP's application.

The OPLA also expressed concerns that operations during wet weather would permanently damage soil structure and that the subjective nature of the factors proposed by ICP for consideration of when to

shut down activities in wet soil conditions, were not adequate to prevent damage to soils. The OPLA expressed the view that the depth of rutting in wet soil conditions should not exceed a maximum of 5 cm (2 in), unless otherwise agreed to by ICP and the landowner. The OPLA further expressed concern that the burden of compaction should be distributed equally on all landowners, and requested a condition of approval which would ensure that heavy equipment would not travel along the right-of-way unless necessary. The OPLA expressed concern that shut downs in farm operations could result in missed planting deadlines, adversely affecting productivity. Therefore, the OPLA requested a condition of approval requiring ICP to provide access across the trench when requested by the landowner.

- ICP indicated that the above-noted proposed conditions of approval would be acceptable with the following clarifications:
- the conditions should be restricted to the construction of the ICP project;
- ICP committed to consult with landowners with respect to conditions requested by the OPLA, but did not agree to accept a condition to abide by their wishes;
- the option for full easement stripping would be offered to each landowner by ICP provided that temporary working rights would be granted by the landowner to accommodate the larger volume of topsoil that would require storage;
- in wetlands, organic soil would only be stripped where it is underlain by a mineral soil;
- with respect to determining the appropriate conditions under which to implement wet soil shut down, ICP indicated that a maximum depth of rutting of 5 cm (2 in) was unacceptable. ICP submitted that a maximum depth of rutting of 15 cm (6 in) or greater would be acceptable.

Views of the Board

The Board is of the view that the measures proposed by ICP in its application and in response to concerns raised by the OPLA are acceptable to preserve soil capability. In the event that the Board were to approve ICP's application, the Board is of the view that it would be appropriate to condition such approval upon the soil preservation conditions agreed to between the OPLA and ICP, with the following exceptions:

- The Board would require ICP to abide by the wishes of the individual landowners with respect to the above-noted soil preservation practices.
- The Board would not consider it appropriate to reiterate in conditions, commitments which are clearly stated in ICP's EGPC and the application, such as the separate piling of topsoil and subsoil with one metre of separation. As the Board generally conditions approvals to require compliance with the application and supporting documentation adopted by the applicant, such conditions would be redundant. Further, the Board notes that some of these conditions would not be required in the event that ICP were to amend its application or file an updated EGPC consistent with any of these points of agreement.

- The Board further notes that the OPLA has requested an objective rutting standard to be added to the factors to be considered by ICP for determining when to shut down operations in wet soil conditions. Specifically, the OPLA has requested a maximum depth of rutting of 5 cm (2 in), whereas ICP has responded that 15 cm (6 in) or greater would be more appropriate. The Board is of the view that designating a maximum 15 cm (6 in) depth of rutting to be allowed under wet soil conditions would be appropriate for this proposal. In arriving at this view, the Board notes that, based on ICP's commitments, ICP's environmental inspector would have sufficient experience to determine when rutting would become a threat to the maintenance of soil capability.
- The Board notes ICP's agreement to strip topsoil if underlain by mineral soil in wetlands. The Board is of the view that any condition of approval requiring this activity at the request of the landowner should be based on the clear understanding that ICP has not made application for alteration of any wetland drainage and any activity which might alter such drainage would require prior Board approval.

Based on ICP's soil preservation commitments and with the above-noted conditions of approval, the Board is of the view that any potentially adverse effects to soil capability could be mitigated to the level of insignificance.

5.1.1.2 Soil Restoration

ICP stated that its first priority would be to restore the land to its previous capability or better. Construction activity would take place during the dry summer months and be completed by early fall, with final clean-up being completed the following spring. ICP proposed to replace salvaged topsoil evenly, removing stones of greater than 10 cm (4 in) in diameter to a depth of 30 cm (12 in). Stones would be disposed of at an approved location. Seeding and fertilizing would be conducted in consultation with IPL's environmental department and with landowners. ICP would conduct penetrometer readings to monitor for compaction at depths of 15, 30, 45 and 60 cm (6, 11, 17 and 24 in). Where subsoil has been compacted by heavy construction equipment, compaction would be alleviated by means of a multi-shank ripper followed by discing, chisel ploughing or cultivating. In areas where mixing is identified to have occurred as a result of chisel ploughing, ICP would monitor for productivity and soil quality in the post-construction monitoring programs completed one and two years following construction.

The OPLA requested a number of specific conditions of approval to address various concerns with respect to soil restoration. Specifically, the OPLA proposed a number of measures to ensure that topsoil is left in a state consistent with the pre-construction condition. The OPLA submitted that topsoil/subsoils should be returned to the trench in a manner consistent with the original soil horizon and compaction, to avoid future mixing of topsoil with subsoil during ploughing operations. The OPLA proposed an increased intensity of chisel-ploughing and stone-picking for best results, based on the OPLA's experience with other local pipeline construction operations. The OPLA expressed concerns with ICP's proposed methodology to address trench-line subsidence, as crowning of the subsoil over the trench could result in either too much or too little subsoil being replaced. The OPLA proposed that, at the request of the landowner, stripped topsoil remain piled for the year following

construction and be returned to the easement after the subsoils had been chisel ploughed and stone-picked. The OPLA requested that stones of greater than a 5 cm (2 in) diameter be removed. Further, if requested by the landowner, during the intervening period, the OPLA requested that ICP spread straw bales along the easement to minimize erosion of the exposed subsoils. The OPLA expressed concern that construction might not be completed early enough in the growing season to allow for the establishment of cover crops which would facilitate the return of soil nutrients and avoid erosion of the topsoil. The OPLA also requested, as a condition of approval, that construction be completed between 15 May and 15 September to permit the establishment of cover crops following construction.

ICP agreed that subsoils would be returned to the trench in a manner consistent with the original horizon and compaction, with the exception that all separate subsoil horizons would have to be excavated together. ICP felt it would be inappropriate to agree to respect landowners' wishes as to whether topsoil would be replaced the year following construction. ICP indicated that, if subsidence or mounding exists one year after construction causing adverse affects to drainage or fanning operations, ICP would resolve those problems. ICP agreed that removal of stones following construction to a smaller standard of stone diameter than 10 cm (4 in) could be appropriate, depending on the condition of the surrounding field. ICP agreed to accept a condition to pick stones of 5 cm (2 in) or greater in diameter, if the prevalence of stones off-easement was 5 cm (2 in) or greater. ICP agreed that, following restoration and cultivation of the topsoil, it would remove stones on a site-specific basis. If at a latter date, in consultation with the landowner, ICP deemed it necessary, ICP would arrange for additional cultivation or chisel ploughing to the depth of the topsoil and further stone removal. ICP agreed that in order to facilitate the establishment of cover crops, completion of construction prior to 15 September in any given growing season would be preferred. However, ICP did not wish to agree to a condition which would require this.

Views of the Board

The Board is of the view that the measures ICP has proposed in its application and in response to concerns raised by the OPLA are appropriate to restore soil capability. In the event that the Board were to approve ICP's application, the Board is of the view that it would be appropriate to condition such approval upon the soil restoration conditions agreed to between the OPLA and ICP. Further, the Board would expect ICP to make every effort to complete construction prior to 15 September. The Board is of the view that the measures ICP has proposed to mitigate mounding over the trench or subsidence, are acceptable. Given the fact that leaving topsoil piled over winter can in and of itself create potentially adverse environmental effects such as erosion and/or loss of soil capability, the Board is of the view that in some circumstances, judgement as to when to replace the topsoil must be exercised on a site-specific basis. In the event that the Board were to approve the ICP project, it would expect ICP to work with landowners and to respect all reasonable requests. The Board notes that some of the above-noted conditions may not be required in the event that ICP were to amend its application or file an updated EGPC consistent with any of these points of agreement. Based on ICP's soil restoration commitments and the above-noted conditions, the Board is of the view that adverse effects to soil capability could be mitigated to the level of insignificance.

5.1.1.3 Interference with Tile and Surface Drainage Systems

Artificial drainage mapping indicates that a significant portion of the preferred route through Moore Township is tile drained. No tile drained lands have been identified on the Millgrove to Milton Segment, however, random drainage may still be encountered during construction.

ICP indicated that where the preferred route crosses tile drained fields, all tiles encountered during excavation of the trench would be severed during trenching and/or could be crushed by the movement of vehicles along or across the easement during saturated soil conditions. Temporary or permanent disruption of water flow caused by severed or crushed tiles could result in soil erosion or crop loss due to flooding.

ICP indicated that landowners would be contacted prior to construction to determine the location of existing tile drains and to discuss future plans for tile drainage. Tile drains severed during trenching would be recorded, flagged and repaired immediately following lowering in of the pipeline. If a main header tile or large diameter tile is severed a temporary repair would be made to maintain field drainage and to prevent flooding of the trench. Severed tile drains which are not immediately repaired would be capped to prevent the entry of soil, debris or rodents. After the repair of each severed tile, and prior to backfilling, landowners would be invited to inspect and approve the repair. Where a significant number of tiles are severed, a tile drainage contractor would be retained to assist ICP and the landowner in developing a tile drainage restoration plan. In the unlikely event that flooding of fields adjacent to the easement occurred, the affected area would be rehabilitated as soon as possible.

The OPLA expressed concern that large distances of exposed trench could result in tile drains loading water into the trench, which would require pumping across non-easement lands resulting in erosion or crop damage. The OPLA proposed a condition of approval that would require that no more than 6 km (4 mi) of trench be opened by ICP at any given time.

Further, the OPLA expressed concern that the ICP operation would result in the destruction of tile drainage systems, which would reduce farm productivity. The OPLA indicated that destruction of, or capping of, tiles would destroy the integrity of the entire drainage system. The OPLA submitted that if repair of severed or crushed tile was not conducted immediately, the integrity of the tile drain system and thus the farm operation would be in danger. The OPLA proposed a number of conditions of approval which would require ICP to:

- immediately install temporary steel drainage pipes across the open trench where tile drains are damaged by ICP's activities;
- have the tile drains inspected by an independent licensed tile drain contractor following conversion/reconstruction/construction, with repairs or replacements undertaken in accordance with the contractor's recommendations;
- where advised by the tile drain contractor and approved by the landowner, install header tiles along the pipeline;
- undertake inspection and repairs, on the recommendation of the tile contractor and by agreement between ICP and the landowner, both in the year of

construction/repair/reconstruction and in the following year before and after restoration of the topsoil;

- ensure that soil mixing does not occur during tile replacement or repair; and
- guarantee the integrity of all tile drains located on the pipeline easement in perpetuity, except that ICP would not be responsible for tile drain repair or damage by others.

ICP indicated that the above-noted conditions would be acceptable with the following changes and clarifications:

- ICP would retain a licensed tile drain contractor to address tile drainage issues; and
- ICP would not agree to install steel drainage pipe across the trench where damage occurred to tile drains due to ICP activities. ICP would follow the recommendations of its tile drain contractor to address concerns arising during construction.

Views of the Board

The Board notes that ICP took no issue with being required to hire a licensed tile drainage contractor and to be bound by his recommendations.

The Board is of the view that the measures ICP has proposed in its application and in response to the concerns raised by the OPLA are appropriate to ensure the integrity of drainage systems. Therefore, the Board is of the view that it is not necessary that the tile drain contractor be retained independently. Further, the Board is of the view that it would be inappropriate to require ICP to comply with a specific mitigative measure such as the use of temporary steel drain pipe, given that other appropriate measures may also be feasible. In the event that the Board were to approve ICP's application, the Board would condition such approval to require ICP to fulfil the conditions on tile drainage as agreed to between the OPLA and ICP. The Board notes that some of these conditions may not be required in the event that ICP were to amend its application or file an updated EGPC consistent with any of these points of agreement. Based on ICP's commitments and the above-noted conditions, the Board is of the view that adverse effects to drainage systems could be mitigated to the level of significance.

5.1.2 Fisheries and Hydrology

ICP's proposal involves the crossing of a number of natural watercourses, with potentially adverse environmental effects due to construction-related activities inherent with every water crossing. Construction activities typically include clearing and grading, installation of vehicle access, trenching, trench backfilling, hydrostatic testing and other related activities such as equipment maintenance and waste disposal. ICP submitted that adverse effects involved in watercourse crossings at the crossing points, as well as downstream, could be as follows: alteration of bottom substrate including increased suspended sediments and downstream sediment deposition; alteration of stream banks; changes in microinvertebrate populations and species diversity; changes in water quality and interruption of stream-flows. A potential concern associated with pipeline crossings of watercourses is the effect of siltation on the aquatic environment. ICP submitted that typically, the sediment load experienced

during pipeline construction is no greater than that anticipated during a significant rainfall event. ICP noted however, that siltation becomes a concern when unanticipated construction problems arise and contingency plans have not been established to address that concern. The potentially adverse effects of siltation on the aquatic environment include: the abrasion or clogging of fish gills and invertebrates; mortality of fish eggs, larvae and sessile invertebrates; decrease in light penetration in the watercourse causing restricted plant growth; and the loss of fish spawning habitat. Another potentially adverse effect is the disruption of fish spawning during construction activities, through the destruction of habitat or interference with spawning activity.

ICP identified twenty-two watercourses and five drains to be crossed, and proceeded with detailed on-site sampling and field investigations. ICP proposed to complete the St. Clair River Crossing by directionally drilling under the river. As a result, no adverse effects would be expected on fish habitat or resources in the St. Clair River. Fifteen of the watercourses to be crossed were identified as not having the potential to exhibit stream flow during the construction period and the crossings were considered to have no adverse effects on fish habitat or-resources. Of the remaining seven watercourses to be crossed, all were classified as wan-n-water but only three were considered to have sensitive fisheries habitat. These three are all located in the Millgrove to Milton Segment and all three have periods during which construction is not normally permitted (see section 5.5.2 below).

ICP conducted, and filed as part of its application, a fisheries resource assessment for the proposal, detailing watercourse sensitivities, mitigative measures, timing constraints, crossing methods and vehicle access methods. Further, ICP has adopted all of the recommendations made in that report.

ICP's proposed construction schedule would avoid spawning or migratory periods. In addition to the measures detailed in the fisheries report, to minimize the probability of run-off of fertilizer into water bodies, ICP would avoid spreading fertilizer within 100 m (328 feet) of any watercourse or wetland in the event that the currently available regional weather forecast includes a heavy rainfall warning.

ICP indicated that it would develop enhancement plans in consultation with the Ontario Ministry of Natural Resources ("OMNR") and the Department of Fisheries and Oceans ("DFO"). ICP undertook to maintain copies of the enhancement plans, or any recommendations of DFO in the construction offices and to provide the above information in the post-construction environmental monitoring report to be filed within six months after the last leave to open is granted for the applied-for facilities.

ICP agreed to adopt the undertakings proposed by the OPCC which set out various requirements of government agencies within Ontario. Concerning the OMNR requirements, ICP undertook, *inter alia*, to obtain and adhere to an OMNR work permit for all construction on Crown land, shore-lands and at all water crossings. ICP agreed to adhere to the Ontario Generic Sediment Control Plans, February 1992 (Revised Feb. 1993), prepared by the OMNR, unless the OMNR, in consultation with ICP determined that site-specific plans of construction and sediment control would be required. ICP further undertook to obtain the appropriate authorization under the federal *Fisheries Act* from the DFO, should the OMNR and/or the DFO be of the opinion that such authorization was required.

In its letter of specialist advice to the Board, the DFO concurred with requiring ICP to comply with its undertakings to the OPCC, should the Board grant approval of the application. The DFO expressed the view that it appeared that wet crossings of water courses would result in the harmful alteration, disruption, or destruction of fish habitat. Although these crossings would harmfully affect fish habitat, DFO felt that any adverse environmental effects would be either insignificant or could be compensated

for, or mitigated, with known technology. The DFO indicated that an authorization pursuant to section 35(2) of the *Fisheries Act* would be prepared for each wet crossing, once the site-specific details of the compensation and mitigation measures were developed. This authorization would be approved by both the DFO, Fisheries and Habitat Management - Ontario Area and the ONM, with the specific details of the compensation and mitigation included as conditions in the authorization issued to ICP.

ICP indicated that it had taken into consideration the sensitivity of the watercourses and had selected water crossing methods for each watercourse that would provide an appropriate level of protection. ICP outlined a number of mitigative/restorative measures to be followed for all watercourse crossings in an effort to eliminate potential adverse environmental effects associated with those crossings, and indicated that those measures would mitigate any adverse effects as a result of pipeline construction. In addition, ICP indicated that an environmental inspector would be on-site during water crossings to ensure compliance with any required environmental legislation for water crossings and that any issues set out by the OMNR and the DFO would be resolved. For all watercourses, ICP undertook to provide to the Board and the DFO with copies of the geotechnical investigations, site-specific crossing plans and sediment control plans prior to the commencement of construction. ICP indicated that construction would occur outside of any sensitive timing constraint periods where required.

Views of the Board

Based on ICP's commitments and proposed mitigative measures, the Board is of the view that any potentially adverse environmental effects on fisheries and hydrology would be insignificant or mitigated to the level of insignificance.

5.1.3 Surficial Geology and Ground Water Resources

Potentially adverse environmental effects on ground water, or social effects directly related to those environmental effects, could be caused by construction activities. Specifically, construction activities such as blasting could temporarily or permanently disrupt well water supply or cause contamination of a well water source. ICP undertook to mitigate these potential effects through either the provision of a temporary water supply followed by the restoration of a full water supply, or through the provision of a new supply where the original supply could not be restored. ICP submitted that it would consult with the local board of health to identify potential sources and solutions to water quality and quantity problems. As a minimum, ICP proposed to monitor well water quantity and quality within 50 m (164 feet) of pipeline construction. Further, ICP undertook to report on the nature of all water well complaints received, in the post-construction environmental report filed with the Board within six months of the date that leave to open is granted. ICP submitted that it would provide the Board with the results of the well monitoring program in the post-construction environmental reports.

Topography along the preferred routes is relatively flat. On the St. Clair to Sarnia Segment, areas of relief are slight and slope stabilization concerns are limited to the banks of Baby and Talfourd Creeks, as well as municipal drains. On the Millgrove to Milton Segment, slopes associated with the Niagara Escarpment, Bronte, Sixteen Mile and East Sixteen Mile Creeks would require special stabilization plans to identify erosion control methods and contingency plans to be implemented during construction and throughout the clean-up and reclamation stage. The slopes approaching the remaining creeks and municipal drains are not sufficiently steep to require grading. Topsoil would not be removed from the banks of the remaining creeks and municipal drains except directly over the trench line. All creeks and

municipal drains would be restored to their original grade and profile and stabilized immediately following backfilling.

The OPLA expressed concern that ICP's activities could result in the contamination of water supplies. The OPLA was not aware of any testing by ICP. The OPLA requested a condition of approval that would require that ICP conduct a pre- and post-construction monitoring study of any well within 50 m (164 feet) of the proposed activities, and any other well if so requested by the landowner. The OPLA further requested a condition which would require ICP to be responsible for remediation measures, including providing a potable water supply and restoration or replacement of the well, in the event of any decrease in well water quantity or quality.

ICP indicated that the well monitoring and remediation conditions requested by the OPLA were acceptable in part, with the clarification that ICP would conduct monitoring of wells as noted above and as outlined in section 5.5.2. ICP's well monitoring commitments did not include monitoring any wells outside the specified distances, even though requested by the landowner.

Views of the Board

The Board notes that ICP has made well monitoring commitments in excess of the commitments requested by the OPLA, with the exception that the OPLA has requested well monitoring at any distance if so requested by the landowner. The Board is of the view that in the event that approval were granted for this proposal it would be appropriate to condition such approval to require ICP to monitor any well, within a reasonable distance from the right-of-way, if so requested by the landowner. Based on ICP's commitments and the above-noted condition, the Board is of the view that adverse effects to surficial geology and Groundwater resources would be insignificant or mitigated to the level of insignificance.

5.1.4 Vegetation and Significant Ecological Communities

Four significant natural areas are crossed by the proposed facilities, all of which are traversed along the Millgrove to Milton Segment, and are therefore discussed under section 5.5.4 below.

As part of the information package that was distributed to landowners, ICP stated that it would afford landowners the opportunity to request specific seed and fertilizer mixes. On agricultural lands where the landowner does not recommend a fertilizer or seed mix, ICP would not seed the right-of-way, but would fertilize it according to the results of its soil fertility analysis. All other areas would be reseeded with a mix approved by the appropriate local or provincial commission or authority.

5.1.4.1 Interference with Woodlots and Hedge Rows

Along the St. Clair to Sarnia Segment, a number of woodlots and hedgerows may be adversely affected by the proposed pipeline construction. On the Millgrove to Milton Segment, some hedgerows, brush and woodlots could be affected by temporary work space requirements, although there would be no new clearing required. ICP stated that the potentially adverse effects of vegetation removal along the preferred route was anticipated to be minimal. Of the nine woodlots potentially affected, ICP expected significant clearing would occur only in one. ICP anticipated that adverse effects on the

remaining woodlots would be non-existent or extremely minimal due to their location, species, composition or previous exposure to disturbance.

In the event that ICP were granted approval for the proposal, ICP would undertake tree inventories and flag all specimen trees in woodlots and hedgerows to be protected. During construction, tree clearing along the preferred route would be minimized by restricting work space wherever possible. ICP stated in its application that it would offer all trees removed to the landowner for either sawlogs or fuelwood. During clean-up and reclamation, woodlots would be reseeded with a seed mix and fertilized using application rates approved by the landowner. Only Certified Canada No. 1 seed from a local supplier would be used.

The OPLA requested that an independent, qualified forester be appointed to make recommendations for transplanting or replacing trees. The OPLA further expressed concern that woodlots which are destroyed should be left in a state which is capable of being used for agricultural purposes. The OPLA proposed conditions requiring ICP to, at the request of the landowner:

- establish a windbreak across the easement where the easement divides an established woodlot at a property or fence line;
- salvage and retain for the use of the landowner, timber cut from the easement and temporary work space, according to the landowner's specifications; and
- remove and destroy stumps by means of a mechanical chipper or grinder to ensure that the area which previously housed the stump is capable of being ploughed.

The OPLA requested conditions which would preclude ICP from bulldozing woodlots and would require hedge rows removed from easement lands to be transplanted or replaced off-easement.

ICP expressed disagreement with the proposed condition of approval requiring the appointment of an independent, qualified forester. Further, ICP indicated that the proposed construction would not divide any established woodlots and therefore, a windbreak would not be required. ICP indicated it would accept a condition to salvage and retain timber for the use of the landowner and according to the landowner's specifications, from the easement and temporary work space. ICP clarified, however, that it wished to retain first right of timber use for pipeline construction purposes. ICP indicated that otherwise the landowner could request two or three metre logs which ICP would stack at the edge of the easement.

ICP indicated it was prepared to remove stumps from cleared areas, but would only chip stumps if more than a few stumps were present on the right-of-way. ICP indicated that it would replace hedge rows by planting, where applicable, as it could not commit to transplanting hedge rows due to the potential mortality of the trees.

Views of the Board

The Board is of the view that the measures ICP has proposed in its application and in response to concerns raised by the OPLA are acceptable. In the event that the Board were to approve ICP's application, the Board is of the view that it would be appropriate to condition such approval with the woodlot preservation conditions agreed

to between the OPLA and ICP, with one exception. Specifically, the Board notes from the Option and Easement Amending Agreements that ICP has not specifically set out the right to first refusal of the existing timber along the right-of-way. The Board is of the view that the right of first refusal for the timber is a matter of private negotiation between a company and the landowner. Based on ICP's commitments and the above-noted conditions the Board is of the view that adverse effects to vegetation would be insignificant or mitigated to the level of insignificance.

5.1.5 Wildlife

ICP indicated that sensitive wildlife habitat could suffer adverse environmental or directly related social effects due to:

- loss of wildlife habitat through agency-designated environmentally sensitive areas or in non-designated wooded areas;
- disturbance to avian species during their nesting period (April 15 to July 15);
- disturbance to deer wintering yards; and
- disturbance to significant/sensitive wildlife or related habitat identified during pre-construction surveys.

To mitigate these potentially adverse effects, ICP committed to restrict all clearing to within the existing easement in agency-designated sensitive areas and to restrict easement width in wooded areas to the smallest area possible. To minimize disturbance to breeding birds, clearing would not be undertaken during the peak bird nesting season of April 15 to July 15, unless a nesting survey has been conducted alone, the preferred route and approval to proceed with clearing activities has been given by a qualified ornithologist. The discovery of any large bird nests, large ground nests, burrows or dens would be reported to the OMNR wildlife biologist.

ICP submitted that it would conduct field surveys in April, May and June of 1994 to determine the potential for sensitive wildlife habitat. ICP indicated that following a right-of-way survey of sensitive wildlife habitat, construction would be scheduled to avoid periods of wildlife breeding. ICP's proposed schedule would also avoid other seasonal habitat requirements such as deer wintering yards between the period December to March. ICP would consult with the OMNR and the NEC to develop site-specific plans for avoidance of potentially adverse effects to significant or sensitive wildlife species. ICP would also develop habitat enhancement plans (i.e. plantings) for construction within Escarpment Natural Areas and creek valleys.

In the event that the Board were to grant approval for ICP's proposal, ICP indicated that it could accept a condition of approval to ensure that, during construction, specialized habitat for wildlife/plants with a designated status, or for any raptors, would be avoided, relocated or restored in consultation with the appropriate regulatory agencies. Further, ICP indicated that it would accept a condition to file with the Board the results of the sensitive wildlife habitat surveys a minimum of 10 working days prior to the commencement of construction.

Views of the Board

In the event that the Board were to grant approval for the proposal, the Board is of the view that it would be appropriate to condition such approval with the above-noted wildlife conditions. With the exception of the site-specific wildlife issues which are the subject of sections 5.3.3 and 5.5.4 below, based on ICP's commitments and the Board's proposed conditions of approval, the Board is of the view that any potentially adverse environmental effects on wildlife would be insignificant or mitigated to the level of insignificance.

5.1.6 Archaeological and Heritage Resources

ICP has identified the need for heritage resource surveys and impact assessments for the InterCoastal Project. ICP indicated that it could accept a condition of approval to provide the results of the final report(s) to the Board a minimum of 10 working days prior to the commencement of construction. Further, ICP indicated that it could accept a condition to serve the heritage resource surveys on the Ontario Ministry of Culture, Tourism and Recreation ("OMCTR"), and to seek its opinion concerning the acceptability of the surveys. IPL undertook to advise the Board of the opinion of the OMCTR.

ICP indicated that significant sites would be avoided, and in the event that archaeological sites or artifacts are discovered during construction, all construction activities at that location would cease until the proper authorities were notified and permission was granted to proceed with construction.

The OMCTR indicated that it would require an opportunity to review and comment on the archaeological survey results prior to construction.

Views of the Board

The Board notes that the proposed condition of approval which would require ICP to file the heritage surveys with the OMCTR would address the concern raised by this Ministry. The Board is of the view that the above-noted proposed conditions would be appropriate in the event that the Board were to approve ICP's proposal. Based on ICP's proposed mitigative measures and the Board's proposed conditions, the Board is of the view that any potentially adverse environmental effects on archaeological and heritage resources would be insignificant or mitigated to the level of insignificance.

5.1.7 Restoration and Operational Practices

ICP submitted that it intends to make every possible effort to restore and maintain the right-of-way as close as possible to its pre-construction condition. This would include attempting to return crop productivity to a level equal to unaffected areas. ICP would also make every effort possible to restore factors such as grade and drainage; however, ICP could not replace mature trees.

The OPLA questioned whether ICP would go back and repair existing damage on IPL's lines. Further, The OPLA expressed concern about the increased probability of repair and maintenance work being required on the Existing Segment, due to the age and quality of the line. The OPLA expressed the view that any proposed conditions of approval agreed to between ICP and the OPLA should also apply to work conducted on this line by IPL or ICP in the future. The OPLA requested that some provision

be made, either in a condition of approval or by requiring the filing of guidelines, that the conditions agreed to between ICP and the OPLA would apply to future work for which there would not be any additional opportunity for the OPLA's input.

ICP indicated that its agreement with the OPLA's proposed conditions of approval was with respect to the ICP application only.

Views of the Board

The Board is aware of the concerns raised by the OPLA in respect of IPL's ongoing activities and of future construction activities in respect of ICP's pipeline should it be approved. However, these matters are outside the scope of this hearing. The Board is cognizant of the concerns and will consider these matters separately. In considering appropriate conditions of approval, the Board has had regard only to the applied-for activities.

5.1.8 Inspection and Monitoring

In the event that the Board were to approve ICP's application, ICP indicated that it could accept a condition of approval which would require ICP to file with the Board, prior to the commencement of construction of the additional facilities, an updated EIL prepared by ICP in accordance with paragraph 28(1)(a) of the Regulations. Further, if any additional issues arise during construction, ICP agreed that it could file an updated EIL in accordance with subsection 28(2) of the Regulations and could take appropriate action to resolve those issues.

ICP stated that it would assign full-time Environmental Inspectors to each pipeline spread. The Environmental Inspectors would receive training in respect of the environmental issues relevant to the spreads that they would be inspecting. ICP would ensure that the qualifications held by the environmental inspector provide adequate knowledge to address all environmental issues on this particular project. In addition to a relevant university degree, ICP would seek candidates with previous experience with respect to the environmental inspection of pipeline construction. The environmental inspectors would have the authority to recommend to the chief inspector, or his/her designate, that a construction activity be shut down immediately if significant adverse environmental effects are occurring. ICP indicated that, during construction, the chief inspector would be bound by a recommendation by the Environmental Inspector to shut down the activity in question until the situation was reviewed and mitigative measures were developed and implemented.

The environmental inspector would confirm topsoil depths on site prior to construction and would monitor topsoil stripping to ensure that the correct amount of topsoil is removed and that soil mixing does not occur. Relative soil compaction measurements on and off the easement would be undertaken on cultivated lands after trench backfilling to identify any areas which would require remediation.

ICP indicated that potential soil problems, on and off the easement, including trench subsidence, soil erosion and stoniness would be noted by the Environmental Inspector during the construction period and after one winter. Soil characteristics, including depth-to-carbonates and percent organic matter, would be randomly analyzed on and off the easement after the final construction clean-up. In this way the relative degree of topsoil/subsoil mixing could be identified and assessed, and corrective measures could be developed.

ICP indicated that each creek and drain crossing would be inspected prior to construction to identify erosion sources. A line-walk after construction would be undertaken to visually inspect each crossing. At that time, a site evaluation would be undertaken to determine whether bank restoration and erosion mitigation measures were successful.

ICP indicated that, since tile drains would be severed during construction, their efficient operation would be monitored immediately after final clean-up and after the spring-thaw the following year. Landowners and administrators would be consulted and given the opportunity to inspect and approve tile repairs prior to trench backfilling. A line-walk along the trench line would be undertaken after the spring-thaw to determine if trench subsidence had occurred. A key element of the line-walk would be a visual inspection of fields connected to repaired tile, to determine if any standing water on the fields was due to recent rainfall or faulty tile repair.

ICP indicated that in the event that the Board were to approve ICP's application, ICP would accept a condition of approval requiring ICP to file with the Board three post-construction environmental reports: the first within six months of the date that the last leave to open is granted for the facilities, and the remaining two before the ends of the two years that follow the first two complete growing seasons after the first report is filed. These reports would outline the resolved, unresolved and any new environmental issues and would provide a description of the measures ICP proposes to take in respect of any unresolved issues.

ICP indicated that it would also file with the Board the proposed sampling and statistical analysis to be used in the post-construction environmental monitoring reports. ICP stated that this would be completed immediately after construction.

The OPLA requested a condition of approval which would require ICP to furnish the Board's designated representative with every reasonable facility for ascertaining, whether the work has been, and is being, performed according to the Board's certificate/order. Further, the OPLA requested a condition which would require ICP to designate one of its employees as a project engineer who would be responsible for the fulfilment of conditions and undertakings on the construction site. This condition would require ICP to provide the name of the project engineer to the Board's designated representative, and to prepare a list of the conditions imposed by the Board and the undertakings given by ICP's counsel and witnesses during the hearing. ICP would have to provide the list to the Board's designated representative for verification and to the project engineer for compliance during construction.

Further, the OPLA expressed concern that soils would be returned, as closely as possible, to their pre-construction condition. To facilitate this return, the OPLA requested a condition of approval which would, by agreement with the landowner, require ICP to:

- make available to the landowner the results of an independent soil survey, including post-construction sampling of on/off-easement soils;
- sample soils at least 46 m (150 feet) off-easement for the control (off-easement) samples;
- include an analysis of carbonate content and organic matter in the soil testing; and

- identify deficiencies in on-easement soils and recommend remediation measures to be undertaken.

In addition to the concerns expressed by the OPLA, the OMEE requested that it be provided with the results of the water well monitoring and the results of the water quality monitoring from the hydrostatic testing of the pipeline.

ICP indicated that the above-noted conditions requested by the OPLA would be acceptable, with the exception that ICP felt there was no scientific rationale for requiring soil samples to be obtained 46 m (150 feet) off-easement. Subsequently, ICP agreed to sample at least 15 m (50 feet) off-easement. ICP further undertook to the OPCC to provide the OMEE with the results of the water well monitoring and the results of the water quality monitoring from the hydrostatic testing of the pipeline.

Views of the Board

In the event that the Board were to approve ICP's application, the Board would consider it appropriate to condition such approval to require ICP, prior to the commencement of construction of the additional facilities, to file with the Board an updated EIL. The Board is of the view that maintaining an updated EIL is generally sufficient to facilitate the tracking of the various issues requiring resolution.

The Board is of the view that in the event that an approval would be granted for the applied-for facilities, it would not be necessary to condition the approval to require ICP to furnish the Board's designated representative with every reasonable facility for ascertaining whether the work has been and is being performed according to the Board's certificate or order. A company is responsible for satisfactorily demonstrating compliance with the Board's certificates or orders, if requested to do so by the Board, and it is not necessary to condition an approval to this extent. The Board notes that it is standard industry practice to designate a project manager. Companies generally provide the name of this contact, and if necessary, the Board has the authority to request the name of the project manager without conditioning an approval requiring that this be provided. Further, it is not necessary for the Applicant to provide the Board with a list of conditions imposed by the Board, or with the undertakings given by an Applicant during a hearing. The Board is aware of this information and generally details this information in its Reasons for Decision. The Board expects that the specifics of environmental and land-use issues, and information on how these issues are to be addressed would be filed as part of the EIL.

The Board is of the view that 15 m (50 feet) is generally an appropriate distance to obtain off-easement soil samples; however, the Board does not consider it appropriate to condition an approval as such, due to the fact that some field judgement on the part of the investigator is required to sample at a similar slope position to the on-easement samples. With respect to soil testing, the Board would not accept a monitoring report for a pipeline crossing agricultural lands which did not contain soils information of the type requested by the OPLA. In the event that the Board would approve an application for these facilities, the Board would condition such approval to require ICP to provide the Board with a plan for its proposed monitoring program. Prior to commencement of such a program, ICP would be required to demonstrate to Board, *inter alia*, that

appropriate and comprehensive soil monitoring was to be conducted. Further, the Board would consider it appropriate to condition such approval to require ICP to make the monitoring results available to the individual landowner.

5.2 St. Clair River Crossing

In addition to those issues discussed above, a number of site-specific issues were reviewed with respect to the proposed directionally drilled crossing of the St. Clair River. ICP submitted a report prepared by Acres and adopted in-principle all of the recommendations made by the consultant in that report as its proposal for the St. Clair River crossing, with the exception that ICP noted that the layout of the staging sites would be tailored to the specific equipment of the selected contractor.

5.2.1 Ability to Complete a Drilled Crossing in an Accurate and Timely Fashion

ICP indicated that the probability of collapse of the subject pipe in the borehole would be minimal, and estimated that maximum pull loads would be in the order of 10 percent of the pipe yield strength. ICP submitted that the more likely form of damage to the pipe would occur if the pipeline became stuck in the borehole during the pull-back, and attempts were made to dislodge it from the hole. In this case large tensile and bonding loads could be applied to the pipe and could cause localized failure in bending or shear. ICP would maintain excess pipe amounting to approximately 5 percent of the crossing length for use in the event of pipe damage. ICP predicted that the replacement of damaged pipe would not require more than a few days.

The directional control of the pilot hole would be primarily achieved by the use of a magnetic guidance system ("MGS"). The MGS may be influenced by the presence of electromagnetic fields induced by factors such as overhead power lines. ICP indicated that it could mitigate inaccuracies in the guidance system through the use of a surface tracking system to provide independent verification of the bore path. The proposed crossing location lies in a zone relatively free of interferences to the MGS. ICP submitted that large ferrous masses, such as a passing freighter or other vessels, would have little or no effect on the steering of the directional drill. In the event of a coincident vessel crossing while drilling in the vicinity of the shipping channel, the driller could stop operations for the few minutes required for the passage of the vessel. ICP predicted that the accuracy of the drill would be within a few meters of the planned drill exit point.

ANR stated that it was not aware of any encounters with boulders or cobbles in the two previous directionally drilled pipeline crossings of the St. Clair River with which it was familiar. ANR also stated that there has been a significant improvement in the steering capability of directional drilling units in the last five years, specifically with the advent of a surface tracking unit, commonly known as a "TruTracker", which provides a backup and additional data to the downhole steering data which is derived from the steering tool. ANR indicated that the "TruTracker" device allows a more precise drilling from the drill rig to the water's edge, and from the water's edge back to the exit point.

Views of the Board

The Board is well informed about directional drill technology and it is aware of the advantages and possible concerns with this technology. The Board is of the view that ICP has provided sufficient information to demonstrate the ability to complete the proposed directional drill of the St. Clair River in a timely and accurate fashion.

5.2.2 Disturbances Associated with Staging Area

ICP anticipated that, since the bore path lies entirely within soft ground, vibrations would not be caused by the underground drilling operations. However, ICP stated that the above-ground drilling equipment and other support equipment could generate some vibrations which would be mitigated using various techniques such as mounting the equipment on trailers supported by axles, or on mats to absorb the vibrations.

ICP indicated that the construction staging area would be located on both sides of the St. Clair Parkway. The size of the staging area would be approximately 35 m (115 feet) by 40 m (131 feet) on the east side and 30 m (98 feet) by 35 m (115 feet) on the west side of the Parkway. The sites are a woodlot between the St. Clair Parkway and the river Just area. ICP submitted that the staging area would be carefully to the existing trees. If any small tree seedlings have to be they would be replaced on completion of the work. The site maintain proper surface drainage.

ICP anticipated minimal impacts to wildlife, given the open area of the construction staging area and the site's proximity to the St. Clair Parkway. ICP did not expect the adverse effects to existing land use to be major, since the proposed construction staging areas would be mowed lawns between residences and not in active agricultural production. ICP undertook to provide the adjacent landowner east of the Parkway with the option of boarding horses elsewhere during the period of construction, or adequate fencing would be provided to isolate the horses from the construction activities.

ICP noted that aesthetics, safety and noise at the construction site could be a concern given its close proximity to residences. To minimize the adverse effects of noise, construction equipment would be properly muffled and diesel generators and pumps would be surrounded by noise baffles. ICP noted that the *Environmental Guidelines for Pipelines in Ontario* (Ontario Ministry of the Environment¹, 1982) recommends limiting construction activities to the period of 7 a.m. to 8 p.m., Monday to Saturday. However, ICP suggested that it may work seven days per week during daylight hours to shorten the duration of the project, and thereby reduce the overall length of disruption to local residents. To further reduce noise and to ensure public safety, a plywood barrier fence would be constructed around the staging area and entry would be restricted to a single gated access point. All staging areas would be stripped of topsoil. The topsoil would be stockpiled and seeded and surrounded with impermeable plastic sheeting to control run-off and erosion. The staging area would have a gravel base over geotextile for ease of equipment movement and to minimize dust emissions and tracking of mud off the site. Also, the entire staging area would have plastic sheeting around its perimeter to constrain run-off and erosion from the site.

Oil, fuel and chemical storage is another potential concern and these materials would be properly stored with an impermeable base and curb to provide containment of any spills. ICP indicated it would place impermeable plastic sheeting on the ground to prevent any spills from seeping into the groundwater. In addition, drums would be placed on pallets over the plastic sheeting. Spill absorbent materials would also be available nearby.

¹ On 3 February 1993 the Ontario Ministry of Environment and the Ontario Ministry of Energy were combined creating the OMEE.

ICP stated that no residual adverse effects were anticipated following completion of construction and site restoration, except for a restriction in land use on the pipeline corridor. The temporary access roads into the construction site would be removed and there would be no visual impact, as there would be no valve site on either side of the river.

The EACC noted that the proposed schedule should avoid any conflicts with waterfowl which use the St. Clair River to overwinter; however, the EACC felt that ICP should consult with the OMNR about specific scheduling constraints. ICP confirmed with the OMNR that there would be no timing restrictions on the river crossing pertaining to waterfowl or other wildlife using the Stag Island wetlands.

Views of the Board

Based on ICP's commitments, the Board is of the view that any adverse environmental effects, or social effects directly related to those environmental effects, associated with the staging of the directional drill would be insignificant or mitigated to the level of insignificance.

5.2.3 Drilling Fluid Composition, Handling, Containment and Disposal

ICP indicated that the drilling would utilize a bentonite and water drilling slurry. The volume of slurry required would be minimized through recirculation. ICP estimated that the fluid pumping for all operations from the pilot hole to final pipe pull would be in the order of 1100 m³ to 1300³. Based on the displacement required for the installation of the pipeline, approximately two-thirds of that volume would require subsequent disposal; being comprised of about 500 m³ of water and 300 m of solids. During drilling, silt and coarse solids would be screened from the circulating slurry, collected in steel containers, tested and, if the OMEE standards are met, periodically hauled away for disposal. After completion of pull-back, all slurry in the slurry handling system would be flushed into containment tanks, which would serve as the final collection point tanks.

ICP submitted that final disposal of drill slurry and slurry solids would be in accordance with the OMEE regulations and guidelines, and would be carried out in consultation with the Sarnia District of the OMEE. The proposed drill slurry disposal plan would consist of testing the slurry during the boring of the pilot hole, as set out in ICP's application, and periodically thereafter during the reaming operations. The results would be given to OMEE to allow for comment.

ICP proposed to then transport the slurry to IPL's Sarnia Terminal, where it would be securely contained. ICP would then centrifuge the free water from the slurry and direct that water to IPL's water treatment plant if necessary. The remaining solids would either be left to dry naturally or would have inert dry material added to them. If the material is not contaminated, the resulting mixture would remain on site to be used for construction purposes within the confines of the property. In the event that there was any concern resulting from the chemical analysis, both the liquid and solid portions of the slurry would be disposed of at an approved landfill site in consultation with the OMEE.

ICP proposed to install the pipeline at least 10 m (33 feet) below the river bank to avoid any known areas of subsidence or ground surface movements on both sides of the river. ICP noted that the drill path would traverse a glacio-lacustrine silty clay layer overlain with a stiffer layer of the same silty clay material. ICP stated that once the drill penetrates through the weathered upper silty clay there

would be little potential for drilling fluid to enter fissures. ICP also stated that preliminary borehole data did not indicate evidence of faulting in the glacio-lacustrine silty clay. As a result, ICP submitted that the potential for drilling fluids exiting through discontinuities in the subsurface would be minimal. ICP was confident that the installation of the pipeline would not add any concern with respect to slope instabilities given the minimum 10 m (33 feet) pipeline installation depth.

ICP took 15 soil/sediment samples from vertical boreholes along the proposed crossing alignment at different elevations. These samples were analyzed for 137 chemical parameters. ICP consulted the OMEE and the Michigan Department of Natural Resources for comments on its analysis program. For each chemical parameter found through this analysis, ICP then performed a comprehensive comparative analysis against typical background concentration parameters for the Great Lakes Basin Region. This comparison included using the Canadian Council of Ministers of the Environment ("CCME") "Guidelines for Decommissioning and Cleanup of Sites in Ontario, February 1989", the CCME "Interim Canadian Environmental Quality Criteria for Contaminated Sites, 1991", the Ontario Ministry of the Environment Guidelines "Regulation 347 General-Waste Management under part V of the *Environmental Protection Act*" and the Ontario Provincial Sediment Quality Guidelines for its terms of reference. ICP indicated that the framework for the definition and classification of wastes came from Regulation 347, and that the suitability of material for use as inert fill came from the CCME Decommissioning Guidelines. The comparative analyses revealed that with the exception of molybdenum, there were no significant differences in metal concentrations in the various substrates to that of the background concentrations. In an attempt to anticipate the possible worst-case scenario, ICP compared these chemical results, including those results found to be slightly higher than background, to the above-noted documents. From this comparison and from ICP's leachate tests, ICP indicated that the demonstrated concentration amounts were far below the limit that could be used to classify solid waste as toxic; therefore, the solid waste material could be classifiable as inert fill. ICP noted that the slightly elevated levels of molybdenum could be considered to have no adverse environmental effects, since the land use is zoned industrial and the levels for molybdenum are well below industrial land use requirements.

ICP concluded that the results of the borehole sampling and chemical analysis program provided sufficient evidence that the slurry to be generated during the construction drilling could be characterized as uncontaminated: the solids portion as a nonhazardous non-registerable waste, and the aqueous portion as river water with contaminant concentrations not significantly above background values for the St. Clair River. ICP further concluded that the proposed drill path was suitable in terms of avoiding contamination of the drill slurry and that the alignment of the drill path was not critical since the soils adjacent to the drill path are not contaminated. ICP testified that three other directionally drilled pipeline crossings of the St. Clair River had been successfully completed; two of these were upstream and one downstream of ICP's proposed crossing location. ICP discussed with the OMEE Sarnia their experience with those crossings and, more particularly, whether any of the slurry was contaminated and how it was subsequently handled. ICP indicated that the OMEE reported that, to the best of its knowledge, there was no contamination associated with the referenced crossings.

In addition to the many contingency plans outlined in IPL's EGPC, ICP outlined a number of contingency plans related to drilling fluid containment. An impermeable spill control barrier such as heavy polyethylene over straw bales secured to the ground surface would be installed at the base of the slope near the river to contain any slurry spilled as a result of drill hole leakage on land outside the plywood barrier. ICP proposed a procedure for immediate response to a leakage of drill slurry into

the river or up to the surface on land. This procedure included the reduction or suspension of drilling operations until the problem was corrected, sampling the drill slurry for future analysis if required, advising the OMEE and the NEB, notifying drinking water treatment plants downstream on both sides of the river and monitoring turbidity along the drill path to detect any significant changes in the turbidity levels across the river. If no evidence of leakage was found, but leakage was still suspected, the drilling would then recommence at a reduced borehole pressure and rate of advance while observations to locate possible sources of leakage would continue. If these response measures did not permit drilling to continue or restart without harmful leakage, then the hole would be redrilled along a different alignment from a point behind where the leakage occurred. In the event that this was not possible, the complete hole would be abandoned and a new hole drilled, subject to the same conditions as the original hole. Abandonment would consist of filling the hole with the drill slurry being used and plugging the surface opening with a cement grout to a suitable depth.

The WIFN questioned whether ICP's sampling program was comprehensive, due to the fact that none of the borehole samples were taken where typically highest contaminant levels would be expected; that is within 100 m (386 feet) of the shoreline or during low flow periods. The WIFN testified that although it agreed that typically the path of least resistance would be the slurry pathway created by the drilling jet, if that annular space became plugged or clogged, the slurry could blow through the firm consolidated and undisturbed clay that surrounds the drill path. Further, if the drilling proceeded and it did not become plugged, and if it encountered a pocket of loose or unconsolidated overburden, the WIFN expressed concern that fracturing could occur on a minor or major scale.

The WIFN further testified that it was of the view that the use of water, as opposed to a water and bentonite slurry, in this type of geologic formation was preferred as it made the overall handling and disposal less problematic. This opinion was based on its experience with the Novacorp directional drill, which the WIFN believed utilized water as opposed to bentonite.

The WIFN indicated that if the CN tunnel was not to be used and the preferred crossing route remained, then conditions of approval should be applied which would require ICP to conduct environmental and geotechnical analysis of the bed of the St. Clair River. Specifically, the WIFN indicated that ICP should be required to implement further drilling and testing in accordance with established sediment quality guidelines.

ICP indicated that if the WIFN could prove specific impacts which resulted from previous drills, ICP would undertake further environmental and socio-economic analysis specific to those adverse effects. Otherwise, ICP stated that it stood behind the scope and quality of the work done by Acres and the conclusions derived therefrom and that it would not be drilling further boreholes or conducting additional sediment sample work. Further, ICP indicated that it intended to retain the choice of bentonite mud as the lubricant for the directional drill, since it was previously proven that there were no adverse environmental effects associated with this choice. ICP noted that it had previously committed to performing water quality monitoring during the drilling operation in the manner requested by the WIFN and that it would make those results available to the WIFN at ICP's construction office.

Views of the Board

The Board is of the view that ICP has satisfactorily demonstrated that the probability of an inadvertent return of drilling fluid into the St. Clair River is minimal, given ICP's proposed procedures and the nature of the substrate through which the drill would pass.

The Board notes that ICP undertook an investigation of the river sediment to ensure that appropriate contingency plans would be in place, in the event that an inadvertent return of drilling fluid were to occur. The Board is of the view that ICP's sampling program to determine the presence of contaminated sediments was adequate. The Board notes that the samples were collected at the expected locations of sediment accumulation based on river flow dynamics and at periods consistent with the expected flow rates at the time of construction. Finally, the Board is of the view that ICP used an appropriate methodology to analyse the samples.

The Board is of the view that bentonite, being a swelling clay with self-sealing properties, is an appropriate medium for use as a drilling fluid. Given ICP's proposals for containment and disposal of the drilling fluid, the Board is of the view that any adverse effects associated with this substance would be insignificant or mitigated to the level of insignificance.

The Board also notes that ICP has made commitments Generally consistent with some of the conditions proposed by the WIFN. As the Board generally conditions its approvals to require compliance with all of the commitments made by the Applicant, the inclusion of the specific conditions proposed by the WIFN to any approval which may be issued would be redundant.

5.2.4 Monitoring and Inspection

ICP stated that an environmental inspector would be assigned full-time to inspect the river crossing construction activities and the St. Clair to Sarnia segment of the pipeline construction. The inspector would oversee the construction activities to ensure compliance with regulatory requirements, to provide technical advice on environmental issues, to supervise the monitoring program and to interface with the OMEE on testing and disposal matters.

ICP agreed to adopt the undertakings proposed by the OPCC which set out various requirements of government agencies within Ontario. Concerning the OMEE requirements, ICP undertook to consult with the Sarnia OMEE District Office regarding the handling, monitoring and disposal of the drill slurry, and the emergency response program at the St. Clair River Crossing.

In the event that approval were granted for the proposed facilities, ICP indicated that it would accept a condition of approval to monitor the chemical composition of the drilling fluid. In the event that any chemical analysis indicated that the level of any monitored substance exceeds the background level presented in ICP's initial assessment, ICP would file further information with the Board detailing any further mitigative requirements.

The EACC recommended that ICP verify the effectiveness of its mitigation by conducting environmental quality monitoring downstream of the site during the construction phase.

As noted above, the WIFN indicated that if the CN tunnel was not to be used, conditions of approval should be applied to require ICP to conduct certain monitoring. Specifically ICP would be required to:

- establish a visual monitoring program at the entry and exit points of the directional drilling sites on either side of the river;
- monitor the fluid head pressure to ensure that hydraulic fracturing does not occur during construction; and
- implement a visual inspection during drilling operations in case the emergency response plan needs to be implemented quickly.

In response to the concerns expressed, ICP proposed to undertake a comprehensive water quality monitoring program, both upstream and downstream of the crossing during its drilling operations.

ICP indicated that, in the extremely unlikely event that there was any leakage of slurry into the river, it would notify downstream water treatment plants, including Wallaceburg and Walpole. ICP stated that it would guarantee a water supply until the problem was corrected. ICP stated that it would also inform the Board of the results and the action that it would take in that eventuality. Further, ICP committed to visually monitor the fluid head pressure in case of leakage.

Views of the Board

The Board is of the view that ICP's proposal for monitoring is appropriate and consistent with the monitoring conditions of approval requested by the WIFN. In the event that the Board were to approve ICP's proposal, the Board is of the view that it would be unnecessary to condition such approval of this proposal with the conditions proposed by the WIFN.

5.3 St. Clair to Sarnia Segment

Although the Board has concerns with the process used to determine the proposed route, as was discussed in section 4.1.2, the Board has still considered the site-specific environmental effects of the applied-for route. In addition to those issues discussed in section 5.1 above, a number of site-specific environmental issues were reviewed with respect to the proposed St. Clair to Sarnia Segment.

5.3.1 Fisheries

The potential concerns for pipeline construction across the watercourses listed in section 5.1.2 above, are applicable to the crossings of Baby and Talfourd Creeks. The low fisheries potential in the municipal drains and intermittent streams eliminates many of the concerns associated with natural watercourses.

With respect to ICP's proposal for the directionally drilled crossing of the St. Clair River, ICP indicated that no adverse effects to fisheries were anticipated since the spawning areas are upstream

from the crossing point and the majority of the drilling fluids would be handled toward the end of construction during the nonsensitive period. ICP maintained that drilling wastes would be contained at all times until final disposal, and at that time the water and solids would be chemically tested and then disposed of in accordance with the OMEE requirements. ICP indicated that the hydrostatic testing of the pipe would be done on the American side of the river. If any water was to be discharged to the Canadian side of the St. Clair River, ICP indicated that an appropriate permit would be obtained from the OMEE.

ICP noted that potential adverse effects associated with the crossings of Baby and Talfourd Creeks include disturbance and downstream deposition of contaminated sediments. ICP undertook to the OPCC to determine, through sampling prior to construction, whether there are any contaminated sediments in Baby and Talfourd Creeks, and to contact the OMEE during preparations for crossing of these creeks. If contaminated sediments were identified, ICP would consult with the local OMEE for disposal requirements. If contaminated sediments' required disposal, ICP would backfill the pipeline trench with uncontaminated materials.

Views of the Board

Although the Board has concerns with the route selection process used by ICP, the Board is of the view that ICP's commitments with respect to the applied-for crossings of Baby and Talfourd Creeks would be sufficient to mitigate potentially adverse environmental effects to the level of insignificance.

5.3.2 Vegetation and Significant Ecological Communities

The St. Clair to Sarnia Segment does not cross any areas which are designated as environmentally sensitive by federal, provincial or municipal agencies, therefore ICP has not developed specific protection measures. However, in the event that a species or a site that is considered sensitive by regulating authorities is encountered during construction, ICP would adhere to wildlife protection measures as set out in its EGPC in addition to the commitments outlined in section 5.1.4 above. Following identification of an environmentally sensitive area, specific and detailed protection measures would be prepared by IPL's environmental department.

ICP indicated that on the St. Clair to Sarnia Segment, significant specimen trees would be removed from each of the five hedgerows during construction.

5.3.3 Wildlife

ICP submitted that the St. Clair to Sarnia Segment does not cross any areas of significant wildlife habitat. Woodlots along the preferred route may be inhabited by white-tailed deer. Other small mammals common to southern Ontario may also inhabit woodlots. As vegetation is minimal, ICP anticipated the level of disturbance to wildlife habitat to be minimal, and specific protection measures were not developed for the St. Clair to Sarnia Segment. In the event that a species or site that is considered significant by regulating authorities were encountered during construction, ICP stated that it would adhere to wildlife protection measures as set out in its EGPC in addition to the commitments outlined in section 5.1.5 above. Following identification of significant wildlife habitat, specific and detailed protection measures would be prepared by IPL's environmental department. ICP stated that it would ensure that harassment of wildlife would be prohibited.

With respect to the St. Clair to Sarnia Segment, the EACC noted that ICP proposed to identify significant habitats before April 1994. However, the EACC recommended that the field work be undertaken after the spring migration, when the rare species with the potential of being in the area would have returned to their breeding habitats (late-May to June). ICP indicated it would comply with the EACC's recommendations for the scheduling of field work, consistent with the 1994 spring migration.

Views of the Board

Although the Board has concerns with the route selection process used by ICP, the Board is of the view that the potentially adverse environmental effects of the construction of the applied-for St. Clair to Sarnia Segment with respect to wildlife, would be insignificant or mitigated to the level of insignificance.

5.4 Conversion of the Existing Segment

In addition to those issues discussed in section 5.1 above, a number of site-specific environmental issues were discussed with respect to the proposed conversion of the Existing Segment. The Existing Segment (Sarnia Terminal to Millgrove Junction) must be prepared for the conversion from oil to natural gas to ensure the pipeline's safe and efficient operation. Required preparation includes:

- pipeline cleaning and disposal of cleaning solvents;
- construction of two pressure regulating facilities;
- removal and replacement of nine existing mainline valves including excavation of approximately 61 m (200 feet) of pipeline;
- the installation of two new valves;
- hydrostatic testing of the converted ICP section; and
- drying of the converted IPL section.

The cleaning process would require three steps as follows:

- a section of the pipeline would be removed and its contents would be analyzed, in order to determine the solvents required, soak times and methods for disposal of the used solvents;
- the mechanical cleaning process would involve two phases: a single mechanical cleaning train that would dissolve and suspend paraffin and asphaltine deposits; and a chemical cleaning train which would utilize degreasing detergents and cleaning solutions to remove residual hydrocarbons, iron oxide and scale from the pipeline; and
- venting of the line at completion of the cleaning operation.

The cleaning trains would proceed from west to east and be removed from the pipeline at Bronte Junction. The residues and cleaning solvents removed from the pipeline would be analyzed to confirm their contents. If the cleaning by-products meet the delivery specifications, the cleaning train would be refined at the Petro Canada refinery. If the by-products exceed the allowable standards, the solvents would be treated as liquid hazardous waste. Disposal would then be carried out in accordance with OMEE guidelines for the disposal of hazardous wastes.

Potentially adverse environmental effects of a solvent spill would be assessed by IPL as part of the response to the spill. These effects would be dependent on the nature of the spill, volume, location,

weather conditions and other factors affecting any spill-site. IPL indicated that its contingency plans for solvent spills would be sufficient for all potential solvents which may be used. To minimize the potential effect of a spill, the area surrounding the cleaning train removal points would be bermed. In the event that a spill occurs while preparing the cleaning train solution for transport to the PetroCanada refinery, immediate measures would be taken to mitigate potential adverse environmental effects. The spill would be contained within as small an area as possible. Absorbent material would be spread on the spill site and clean-up and disposal of the material would commence as soon as possible. If tests conducted after clean-up, continue to exhibit soils contamination, IPL noted that it may be necessary to excavate the area. ICP would then dispose the excavated soils in an appropriate manner.

IPL would use a mixture of hydrocarbons with flammable and slightly corrosive properties to clean the Existing Segment. IPL stated that it would coordinate disposal methods with the applicable regulatory authority. IPL's Waste Management Plan would be used to determine the most appropriate method for the handling, treatment and disposal of all waste materials related to cleaning of the Existing Segment. IPL would ensure that all wastes are handled in accordance with applicable laws.

As part of the conversion process, nine existing mainline valves would be removed and modified. Modifications would include valve reconditioning or replacement, and the addition of blowdown and crossover assemblies and two pressure regulating facilities. In addition, 61 in (200 feet) of existing pipeline at each of the valve assemblies would be excavated to accommodate installation of the valve assemblies. One existing mainline valve located in IPL's Keyser Station would be removed and replaced with straight pipe.

ICP consulted a number of published and unpublished data sources to identify sensitive environmental features located at the valve sites. For the most part, the valve sites and the pressure regulating facilities would be located in areas of similar environmental features. Most of the areas are dominated by Class 1 and 2 agricultural lands and are actively farmed. ICP does not anticipate that any woodlot removal would be necessary if work space is limited to the existing easement. With the exception of construction activities which would occur during installation of the new valves, only one block valve (KP 2864.5) replacement would experience a net adverse environmental or social effect as the other sites are at locations where there is an existing valve. Following construction of the new valve site at KP 2864.5, a temporary access road to the valve site would be removed, and the lands affected by the temporary access road would be returned to its original condition. Construction of this block valve would result in the permanent removal of approximately 36 m² (388 square feet) of productive agricultural lands.

ICP discussed the proposed locations for the two proposed pressure regulating facilities with the directly affected landowners. ICP indicated that there are no adjacent landowners that would be affected by the pressure regulating facilities. Both of the pressure regulating facility sites contain existing crude oil valves with fenced enclosures, which would be expanded within the easement limits to incorporate the pressure regulating facilities. The lands at both sites are under agricultural land use. Access to the sites is by foot for the first and via the landowner's access road for the second. ICP predicted that noise impacts from the pressure regulating facilities would be less than 20 dB(A) at the nearest dwellings, which would be well within the requirements of the Ontario Noise Guidelines.

ICP proposed installing split sleeves as crack arrestors on Loops 38 and A-2 at nominal intervals of approximately 350 m (1148 feet). In addition to engineering criteria, environmental criteria were used

to review and modify split sleeve locations. These criteria included locating the sleeves as close as possible to an existing road laneway or other easement access, in areas not actively cultivated or artificially drained and not within 15 m (49 feet) of a watercourse or within a classified wetland. ICP conducted an environmental review of the preliminary locations identified for crack arrestor installation. This review identified that there were no designated environmentally sensitive areas in either loops A-2 or 38.

Potential adverse environmental effects from the installation of the pre-stressed sleeves, valves or pressure regulating facilities are consistent with effects discussed in section 5.1 above. In addition to IPL's EGPC and the mitigative measures noted under section 5.1 above, the following general mitigative measures would be followed during construction for valve sites and crack arrestors:

- temporary access over municipal drains would be installed using oversized culverts to accommodate unexpected water flows;
- for crack arrestor installation, in the event that temporary access was required over a drainage ditch, the bank slopes would be contoured and any debris removed from the drain;
- for crack arrestor installation, in the event that work was undertaken near a stream or creek, a 15 m (49 feet) buffer zone would be established and the necessary stream protection procedures employed to prevent any damage to the watercourse environment;
- all construction activities would be confined to existing easements. Where additional work space was required, landowners would be notified;
- fences that were cut would be replaced to their original conditions. In pasture areas, temporary gates and fences would be constructed to restrict livestock access to the construction site;
- backfilling would commence as soon as the pipeline was tied-in. Backfilling activities would be completed in a manner which would avoid compaction of soils or trench subsidence; and
- clean-up and site restoration would commence immediately following backfilling. All debris would be removed from the site. Landowners would be contacted to approve the final clean-up.

ICP indicated that each site with depth of cover less than that specified for new pipeline design would be evaluated, and where the pipeline integrity would be affected, mitigative measures would be undertaken. Remedial measures to address loss of cover would include the addition of extra soil cover, the installation of protective barriers above the pipeline, the lowering of the line, or the installation of a new section of pipeline. ICP confirmed that it intended to obtain Board approval prior to conducting any physical work for which an environmental review has not been completed.

IPL undertook to visually assess signs of site contamination at all excavation sites associated with the pipeline conversion and at scraper trap and valve facilities which IPL proposed to remove. At locations where contamination is visually noted, IPL would use the CCME Interim Canadian Quality Criteria for

Contaminated Sites to ascertain whether such excavated soils required remediation. IPL would report on the above-noted assessment and investigation in the post-construction monitoring reports.

ICP stated that its first priority would be to restore the land to its former capability or better. Further, ICP indicated that this particular commitment did not only extend to the ICP project. ICP stated that its commitments to environmental protection included operation and maintenance activities. ICP confirmed that if there were any environmental problems related to the InterCoastal project, it would have a responsibility as a company to address those, and that it was prepared to do that within the context of this project, or at any other time. For matters related to prior disturbances and reclamation, IPL would take responsibility. As part of IPL's operation procedures, it has an annual public awareness program whereby it visits each landowner yearly, to determine any concerns the landowner may have and to follow up on those concerns.

Views of the Board

The Board notes that ICP has yet to adequately demonstrate the acceptability of certain engineering design proposals as discussed in Chapter 2. In the event that the Board were satisfied that there would be no adverse environmental effects which may be related to engineering safety, then the Board would be of the view that the potentially adverse effects of the activities associated with the proposed conversion of the Existing Segment would be insignificant or mitigated to the level of insignificance.

5.5 Millgrove to Milton Segment

In addition to those issues discussed in section 5.1 above, a number of site-specific environmental issues were reviewed with respect to the proposed Millgrove to Milton Segment.

5.5.1 Fisheries

The potential concerns for pipeline construction across watercourses, as noted in section 5.1.2, are applicable to all watercourse crossings on the Millgrove to Milton Segment, especially the three major creek crossings. The low fisheries potential in the municipal drains and intermittent streams eliminates many of the concerns associated with these natural watercourses.

All of the watercourses on the Millgrove to Milton Segment are classified as having warm-water fisheries habitat, but only three have sensitive fisheries habitat with associated instream timing constraints in which construction is not normally permitted. In addition to providing warm-water fisheries habitat, Bronte, Sixteen Mile and East Sixteen Mile Creeks provide a migratory corridor for salmonoids travelling to upstream cold-water spawning habitats. Additionally, the silver shiner, a rare fish species, as classified by the Committee on the Status of Endangered Wildlife in Canada, has been identified in Bronte Creek.

Bronte and Sixteen Mile Creeks have construction windows from July 1 to September 15 whereas East Sixteen Mile Creek has a construction window from July 1 to March 1. These construction windows would avoid fish spawning and migration periods and also correspond to low flow periods that minimize the potential for downstream sedimentation. ICP confirmed that the crossings would be completed outside of all the timing constraints relating to migratory runs and spawning periods.

The Halton Regional Conservation Authority ("HRCA") recommended the use of directional drilling for Bronte, Sixteen Mile and East Sixteen Mile Creeks. ICP investigated the potential for directional drilling these creeks and found that directional drilling was not economically feasible at these locations. Due to the volume of water flow, ICP has proposed wet crossings for these creeks. To avoid potential disturbance of fish habitat, ICP's crossing plans include sediment control techniques and bank stabilization techniques. ICP indicated that blasting may be required to cross Bronte Creek, Sixteen Mile Creek and East Sixteen Mile Creek. ICP would comply with the DFO's Guidelines for the Use of Explosives in Canadian Fisheries Waters (DFO, 1993).

The HRCA requested that the sizing of rip-rap for erosion protection of fish habitat be based on stream flow velocities as well as fish habitat considerations. Further, the HRCA noted that permits would be required for the crossings of all the HRCA regulated watercourses and the Lake Medad Valley, with detailed design to accompany any permit application. ICP undertook to obtain the necessary permits. Further, ICP made an undertaking to the OPCC to provide a copy of the fisheries habitat assessment to the OMEE for review and comment with respect to the Millgrove to Milton Segment.

ICP stated that it would have a contingency plan for unanticipated incidents available for each watercourse at the time of the crossing. For example, in the event of heavy rainfall, work shut down on steep slopes would be enforced. In addition, materials and personnel would be available to re-stabilize slopes which showed evidence of erosion during constriction.

ICP submitted that if these mitigation and restoration measures were implemented, including those measures described in IPL's EGPC and the Fisheries Resource Assessment, the adverse effects of pipeline construction on these watercourses would not result in the loss of fish habitat.

Views of the Board

Based on ICP's commitments and proposed mitigative measures, the Board is of the view that any potentially adverse environmental effects on fisheries and hydrology along the Millgrove to Milton Segment would be insignificant or mitigated to the level of insignificance.

5.5.2 Surficial Geology and Ground Water Resources

The Regional Municipality of Halton raised questions regarding construction, blasting, and tunneling methods with respect to potentially adverse effects to local groundwater aquifers. ICP identified areas with both shallow bedrock and shallow water tables along the Millgrove to Milton Segment. Areas along the preferred route where blasting would be required due to substrates of shallow drift over bedrock are identified on ICP's photomosaics. Adverse effects associated with blasting would include noise, fly-rock damage, and blasting vibration. ICP stated that it would undertake the handling, transportation and storage of explosives in a safe and secure manner in accordance with the appropriate regulations and Acts. Since blasting shock may affect nearby wells, monitoring of wells within 100 m (328 feet) of the blast area would be conducted prior to and following construction. ICP stated that it would also monitor wells within 100 m (328 feet) of the right-of-way for wells supplied by a shallow water table. Well water monitoring would include water quality and water quantity sampling. Blasting procedures would be conducted in accordance with explosives laws and regulations.

On the Millgrove to Milton Segment, steep slopes with a high erosion hazard occur at the Niagara Escarpment and at the banks of Bronte, Sixteen Mile and East Sixteen Mile Creeks. ICP indicated that these slopes would be restored to prevent erosion and sedimentation. To reduce the potential erosion hazard, ICP would minimize the time between disturbance and stabilization. Prompt action would be taken to correct visible erosion problems which may develop during construction. Steep slopes which have been effected by constriction would be protected from further disturbance, such as damage from livestock, construction equipment and recreationalists. Prior to construction, slope stabilization plans would be developed for each steep slope encountered by the preferred route. These plans would identify erosion control methods and contingency plans to be implemented during construction and throughout the clean-up and reclamation stage.

As well, IPL's EGPC addressed specific measures for erosion control, including, the use of diversion berms and cross ditches. In addition to steep topography, the Millgrove to Milton Segment traverses a large area west of the Niagara Escarpment which is designated as a bedrock resource suitable for extraction. ICP stated that pipeline construction would not sterilize portions of this resource as the route would parallel existing easements.

Views of the Board

Based on ICP's commitments and proposed mitigative measures, the Board is of the view that any potentially adverse environmental effects related to surficial geology or ground water resources along the Millgrove to Milton Segment would be insignificant or mitigated to the level of insignificance.

5.5.3 Vegetation and Significant Ecological Communities

5.5.3.1 Natural Areas

ICP indicated that the proposed construction could cause the loss of woody vegetation within the existing easement through NEC Natural Areas. In NEC administered lands, ICP proposed to conduct a tree inventory to identify trees of greater than 200 mm (8 in) diameter at breast height to identify enhancement opportunities in consultation with the NEC.

The proposed Millgrove to Milton Segment crosses four significant natural areas: the Medad Valley Area which is a regionally significant Earth and Life ANSI, a Class 1 wetland, and a municipally designated ESA; the Mount Nemo Area which is a provincially significant Earth and Life ANSI, and a municipally designated ESA; the Bronte Creek Area which is a regionally significant Life ANSI and a municipally designated ESA; and Sixteen Mile Creek which is a regionally significant Earth ANSI and a municipally designated ESA. The Medad Valley, Mount Nemo and Bronte Creek areas are within lands administered by the NEC. The preferred route alignment is to be located within the existing IPL Line 9 easement and previously disturbed Ontario Hydro lands. ICP submitted that impacts to the above-noted features would be restricted to the previously disturbed easement.

ICP indicated that pipeline construction could cause soil erosion and consequent loss of vegetative cover and/or exposure of pipeline if slopes were not stabilized. ICP proposed the preparation of slope stability plans for slopes within the NEC lands to address physical and biological requirements to ensure stable slopes throughout the constriction period, and follow-up monitoring of the success of stabilization after construction. In the event that the Board were to grant approval of this application,

ICP indicated that it could accept a condition requiring these plans to be filed with the Board prior to the commencement of construction.

A number of parties expressed interest in the natural areas traversed by the Millgrove to Milton Segment. The NEC noted that the proposed watercourse crossing techniques would be assessed based on the ability of the technique to minimize negative physical and visual effects and not solely on the adverse effects to fisheries. In NEC Natural Areas, the NEC has identified eight areas through which restricted work space would be required. The HRCA requested site-specific design information for the Medad Valley Wetland and ESA, the Bronte Creek Valley Watercourse and ESA, the Sixteen Mile Creek Valley Watercourse and ESA and the East Sixteen Mile Creek Watercourse and ESA. The Regional Municipality of Halton raised questions regarding the four regional ESA's located within the route alignment. The Ecological and Environmental Advisory Committee of the Regional Municipality of Halton requested that it be involved in the design of the construction rehabilitation and post-construction monitoring activities in these areas.

In response to the concerns and questions raised by interested parties, ICP made a number of commitments. In areas identified by the NEC as requiring restricted work space, ICP would narrow its work space to the previously disturbed right-of-way. In areas where the NEC has not requested restricted work space ICP indicated it may require 10 m (33 feet) of additional work space. Through NEC lands, approximately 18.8 ha (46.5 acres) of previously undisturbed lands would be affected. The majority of this land would be agricultural. However, as much as 4.0 ha (9.9 acres) of mature woodlot could be removed from temporary work space areas. ICP, in its undertakings to the OPCC concerning NEC requirements, agreed to obtain a Niagara Escarpment Development Permit prior to construction within the Niagara Escarpment Area of Development Control. ICP undertook to the OPCC to demarcate the limits of the existing IPL easement requiring restricted working space. ICP also agreed that it would meet with the NEC's landscape architect to review and develop potential landscape mitigation measures. ICP undertook to consult with the Regional Municipality of Halton during the detailed design stage so that issues of design, rehabilitation and post-construction monitoring could be addressed.

ICP indicated that areas of potential new disturbance may include significant wildlife habitat or plant species of designated status (that is, species which are nationally, provincially or regionally rare or threatened). ICP has undertaken to complete a vegetation survey in the month of May, prior to the commencement of construction, to identify such species and to develop the appropriate mitigative measures where such species would be adversely effected by the proposed construction.

Views of the Board

In the event that approval were granted for the applied-for facilities, the Board is of the view that it would be appropriate to condition such approval to require ICP to file its proposed wildlife habitat and rare plant surveys with the Board as soon as they become available and a minimum of 10 working days prior to the commencement of construction.

Based on the Board's proposed conditions of approval and ICP's further commitments and proposed mitigative measures, the Board is of the view that any potentially adverse environmental effects associated with the natural areas crossed by the Millgrove to Milton Segment would be mitigated to the level of insignificance.

5.5.3.2 Medad Wetland Complex

The Medad wetland complex, situated within NEC lands at the western-most portion of the Millgrove to Milton Segment, is designated a provincially significant Class 1 wetland. There are five major wetland community types located within the Lake Medad Valley. These are an open water wetland community, a marsh, a mixed low-land tangle, a conifer bog and a maturing deciduous forest. ICP stated that it would confirm those communities prior to construction, in terms of their specific location and the extent to which they border the existing easement. ICP noted that the hydrology of a wetland complex, and particularly a Class 1 wetland, is such that if several wetland communities are all interconnected, affecting one community would affect others in the complex.

ICP indicated that the only natural feature which may be temporarily disturbed during construction is the Medad Valley Class 1 wetland. Wetlands such as this provide storage and control functions which restrict erosion and flooding and improve water quality. Pipeline construction activities, such as access road construction, may result in localized minor adverse effects to the wetland community. Temporary disruptions would include the removal of overgrown brush and the placement of excavated trench material adjacent to the trench.

ICP submitted that the removal of brush should not cause significant adverse environmental effects to the wetland as vegetation is continually controlled along this easement. Access roads would be constructed using a geotextile cloth to ensure separation of granular padding material from the underlying organic matter. Following construction, ICP submitted that it would ensure complete separation and removal of granular padding and geotextile filter cloth. Trenching through the wetland would be delayed until just prior to lowering-in to minimize the risk of trench sloughing. Water movement across the easement through the wetland area would be maintained by leaving breaks in the ditch every 100 m (328 feet) and installing culverts under the access road. Following construction ICP would allow natural regeneration. Seed and fertilizer would not be used; however, ICP indicated that it would hand-plant contiguous stock.

The EACC of Environment Canada, Ontario Region, indicated in its letter of specialist advice to the Board that the proposed de-watering of the trench and construction of access roads could disrupt the hydrology of the wetland and have the potential to cause a loss of wetland function. The EACC recommended that prior to approval of construction through the wetland, a hydrological study be conducted to demonstrate that the proposed mitigation would be able to maintain the existing water movement through the wetland. Further, the EACC noted that the Lake Medad Valley Swamp overlaps the watersheds of both Bronte and Grindstone Creeks. The EACC recommended that ICP establish that the proposed construction activities, such as de-watering, would not affect downstream areas. The EACC also expressed concerns that foreign plant species could be introduced into significant vegetative communities, due to the use of commercially available seed mixtures.

ICP contended that the construction would have minimal effects on water levels within the wetland, due to the fact that construction would occur during the driest months when water levels would be lowest and the least likely to be affected. ICP stated that it would minimize disruption of the hydrology as a result of trenching through this area, by de-watering the trench in the direction of the natural drainage and by maintaining hard plugs to prevent drainage along the trench. To minimize the duration of water level drop from de-watering of the trench, ICP stated that it would minimize the duration of construction activities in the wetland. Pipe would be strung and welded outside of the

wetland prior to commencement of ditching, in the wetland. ICP undertook to install piezometers and undertake a hydrology study of the wetland before, during and after construction. The final results of the study would be reported in ICP's post-construction monitoring report.

Views of the Board

In the event that approval were granted for the applied-for facilities, the Board is of the view that it would be appropriate to condition such approval to require ICP to file a study with the Board for approval which would include a detailed description of the wetland communities that may be adversely affected by the proposal, the above-noted hydrological monitoring and the mitigative measures ICP would undertake to address any identified adverse environmental effects. The Board would require this study to also be filed with the EACC to facilitate comment prior to granting approval to begin construction through this sensitive wetland.

Based on the Board's proposed condition of approval and ICP's further commitments and proposed mitigative measures, the Board is of the view that any potentially adverse environmental effects associated with construction through the Medad Wetland complex, would be mitigated to the level of insignificance.

5.5.4 Wildlife

The Millgrove to Milton Segment crosses four areas which may be inhabited by significant wildlife species. These significant wildlife areas are associated with the four natural areas discussed earlier. At Medad Valley, the preferred route crosses a significant waterfowl habitat area and a deer wintering yard. Woodlots along the preferred route may be inhabited by a variety of birds and mammal species. As clearing would be restricted to the removal of overgrown vegetation on the existing easement and on temporary work space at roads, creeks and pipeline crossings, ICP anticipated the level of disturbance to wildlife habitat would be minimal.

ICP submitted that the spring waterfowl breeding season would not be a concern given the proposed summer construction schedule. Summer construction would also avoid conflicting with the deer wintering yard where the peak period of use occurs during the winter season. The HRCA also requested that construction scheduling give consideration to bird nesting and herptile breeding.

Views of the Board

The Board notes ICP's commitments to conduct surveys of sensitive wildlife habitat and to avoid sensitive breeding areas or periods. Based on ICP's commitments and proposed mitigative measures, the Board is of the view that any potentially adverse environmental effects associated with wildlife along the Millgrove to Milton Segment would be insignificant or mitigated to the level of insignificance.

5.6 Municipal Services and Infrastructure

Historically, local governments have raised concerns when pipeline construction and operation are perceived to have an effect upon municipal services and costs. The concerns include the provision,

upgrading or maintenance of municipal services related to pipeline operations or construction and the determination of responsibility for financing and carrying out those activities.

The Township of London ("Township") raised three concerns. Two concerns were safety issues relating to fire fighting and road surface conditions at pipeline crossings. The third concern is an ongoing issue relating to responsibility for the maintenance of drainage systems. The fire fighting concern dealt with the fact that the Township has a volunteer fire department that is not familiar with circumstances that could arise with respect to a natural gas accident and/or fire. Specifically, the Township asked whether ICP was willing to provide any necessary specialized training to the Township's fire department to deal with a potential natural gas fire, and what type of support it was prepared to provide in response to a natural gas fire. ICP stated that it would work with the Township Fire Department to explain the nature of a natural gas fire, and the equipment and resources available from ICP to deal with any emergency. As part of its role, ICP would assist in securing the affected area and advising residents if evacuation was required.

The issue of road surface conditions dealt with a series of depressions in roadways caused by differential thawing and freezing over multiple pipeline crossings. The Township was of the view that the resulting set of road hollows could pose a hazard under certain circumstances. The Township asked ICP if it would rectify the problem when depressions in the road occur. ICP replied that it was normally company practice to work with local agencies to correct problems that result from the installation of its pipelines.

Finally, the Township raised the question of ICP deepening a drain transacted by its pipeline in the event that the pipeline was impeding the flow of water. ICP replied that payment for remediation is usually a question of negotiation and depends on the specific situation.

Views of the Board

It is the view of the Board that companies operating pipelines have a responsibility to work with local governments to develop plans and procedures to deal with potential public safety issues. Should the Board approve this application, it would require ICP to develop an emergency plan that states ICP's responsibilities and the support it would provide to local protective services authorities to deal with any emergency. This should include any training requirements and a training plan to ensure local protective services personnel can deal effectively with any potential incidents.

With respect to road surface conditions related to pipeline construction or operation, it is the Board's view that it is ICP's responsibility to avoid such damages and, where they do occur, to resolve them.

Additionally, the Board finds ICP's position with respect to accepting responsibility for the impact of its pipeline construction on existing drains to be unacceptable. The Board notes that the Act clearly sets out a company's responsibility to divert or relocate its pipeline in order to prevent or remove an interference with drainage systems. Specifically, subsection 46(1)(b) states:

"The Board may, on such terms and conditions as it considers proper, direct a company to divert or relocate its pipeline if the Board is of the opinion that the

diversion or relocation is necessary ... or (b) to prevent or remove an interference with a drainage system.”

Further, subsection 46(2) of the Act empowers the Board to assign the cost of the diversion or relocation. Subsection 46(2) states:

“The Board may direct by whom and to whom the costs of the diversion or relocation referred to in subsection (1) shall be paid.”

The Board expects ICP to address complaints. If there is no resolution, an application pursuant to section 46(1) can either be made by ICP or other affected parties for resolution.

5.7 Financial Liability

Environmental issues are an increasing concern in today’s society and are being reflected in legislation, which among other things identifies those having financial liability for restoring the environment and paying any damages. Under recent legislation the person or company responsible for clean-up following an environmental incident may include the landowner as well as the polluter. This could be the case, for instance, if the polluter was insolvent. In turn, if the landowner became insolvent, financial institutions who hold loans or mortgages on the land could become liable for the environmental clean-up of affected lands. For these reasons it is becoming a practice of financial institutions to undertake environmental risk reviews of farm credit applications. One question frequently asked in a risk review is whether or not there are hydrocarbon pipelines crossing a property.

The OPLA expressed concern that its members could be considered financially liable for the clean-up of pollutants arising from the operation of pipelines and that the perception of the environmental risks of pipeline operation and abandonment may affect dealings with financial institutions and ultimately reduce property values and marketability. The OPLA, therefore, suggested that it was necessary to know the particulars and amount of insurance coverage that ICP would carry on the proposed gas line. It suggested that only then could a judgement be made on the appropriateness and adequacy of insurance to cover the potential liability of landowners. The OPLA asked the Board to impose a condition of approval requiring the disclosure of insurance coverage if approval of the application were to be granted.

The OPLA was of the view that the Board should decide on the appropriate upper limit for insurance. Above that limit, the OPLA proposed that the federal government should be responsible for any additional liability. In the OPLA’s view, this would eliminate the credit issues related to financial institutions’ environmental risk policies and the landowners’ financial risks in the event of an incident.

The OPLA also requested that the Board give serious attention to planning requirements for the abandonment of pipelines. The OPLA’s particular concern was with respect to the case where a company became insolvent after a pipeline was abandoned.

ICP stated that it understood the landowners’ concern with respect to the financial liability of potential environmental risks, and that as a borrower ICP faced the same requirement. ICP stated that it had a formalized environmental policy that addressed all environmental concerns for landowners. With respect to insurance, ICP expressed a willingness to disclose particulars on coverage on request.

However, ICP did not agree that the value and marketability of a property would be negatively affected by the presence of a pipeline. ICP stated that problems related to remortgaging or a devaluation of a landowner's property had never been brought to its attention in its many years of operation.

ICP did not directly address the issue of financial liability and abandonment in respect to insolvency. In a letter to the OPLA it did, however, note that it is a member of a task force of major Canadian pipeline companies that is reviewing the abandonment issues, including the issue of funding for eventual abandonment.

Views of the Board

The Board appreciates the concern expressed by intervenors regarding the possible financial liability related to environmental risks. The Board notes that ICP has a similar concern, and is aware of the added responsibilities posed by recent environmental legislation. As a prudent business practice, ICP does have liability insurance to cover damage and clean-up costs arising from foreseeable accidents. The Board is of the view that the coverage and amount of this insurance is a business decision best left to ICP and its lenders and insurers. The Board would not see its role under normal circumstances as determining the adequacy of an individual insurance policy. Additionally, the Board does not consider it appropriate for the Board or the federal government to assume the role of underwriting extraordinary commercial risks. However, the Board agrees that the particulars of the insurance should be publicly available, and notes that ICP has agreed to such an undertaking.

The Board considers long-term planning for pipeline abandonment as a key area for policy development to provide a reasonable assurance that pipeline companies have funding in place for that purpose. The Board views the policy development as a responsibility of pipeline companies and one that can best be initially done as a collaborative effort among the companies. With respect to pipeline abandonment, the Board notes that this issue is being considered by a task force representing major Canadian pipeline companies.

Chapter 6

Gas Supply

In considering Part III applications, the Board reviews both the overall and project-specific gas supply. Overall supply refers to the total supply of natural gas that would be available to the proposed facilities. In this regard, the Board considered whether there would be adequate gas supply to keep the pipeline fully utilized over its economic life. Project-specific supply refers to the supply supporting the request for service. The Board examined whether Consumers' Gas had secured, or would secure, adequate supply to meet its obligations.

6.1 Overall Supply

Consumers' Gas, the only shipper on the InterCoastal pipeline, has developed its current gas supply portfolio based mainly on reserves from the Western Canada Sedimentary Basin. The Board is familiar with the overall supply potential from this basin.

In addition to the overall Canadian supply, Consumers' Gas has stated its objective of adding U.S.-sourced gas to its system supply portfolio. For this application, ICP and Consumers' Gas submitted overall supply evidence by referencing, and including the following:

- U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, Energy Information Administration - 1991 Annual Report;
- Potential Supply of Natural Gas in the United States (December 31, 1992) - Report of the Potential Gas Committee; and
- Natural Gas Reserves of Selected Fields in the U.S. and of Canada - prepared by the American Gas Association and the Canadian Petroleum Association (as of December 31, 1991).

ICP expected that Consumers' Gas would primarily access the Anadarko and Gulf Coast basins for incremental gas supply.

The InterCoastal project would allow Consumers' Gas to access U.S. supply basins which have future potential reserves larger than the Western Canada Sedimentary Basin. ICP's evidence indicated that there would be adequate overall gas supply available to Consumers' Gas and the proposed InterCoastal system.

No intervenors challenged the overall supply evidence.

6.2 Project-Specific Supply

Consumers' Gas stated that it intended to use the InterCoastal project to increase the aggregate capability of its portfolio of gas supply arrangements to meet growth in its annual, seasonal, and peak day demands. Consumers' Gas viewed the InterCoastal project as serving incremental market requirements.

ICP noted that U.S.-sourced gas would normally flow into Tecumseh storage during the summer months, along with some Canadian sourced gas. During the winter, U.S.-sourced gas would flow through the InterCoastal line during peak flow periods along with the combined U.S./Canadian-sourced gas flowing from Tecumseh storage. This storage gas would be sourced from the company’s complete gas supply portfolio, which includes firm long term contracts for system supply from Western Canadian suppliers. Table 6-1 compares Consumers’ Gas’ gas supply volumes with its firm service entitlement.

Consumers’ Gas intends to develop a U.S. supply portfolio by entering into gas supply contracts ranging from one to five years in duration. Consumers’ Gas indicated that its corporate objective was to add shorter term contracts to balance its current gas supply portfolio, which is comprised mostly of long term contracts. Consumers’ Gas stated that its objective of adding shorter term contracts would enhance its ability to obtain contracts with favorable provisions on duration and price, and to expand the group of suppliers willing and able to provide this supply on Consumers’ Gas’ terms.

To support its intention of pursuing U.S. short term gas supply contracts, Consumers’ Gas noted that the Board had apparently recognized that a trade-off between firm long ten-n gas supply arrangements and firm long term market commitments may be appropriate. Further, Consumers’ Gas submitted that its interpretation of the Board’s RH-3-92 Reasons for Decision indicated the Board’s acceptance of a 10-year transportation service agreement, together with either a firm 10-year gas supply and a firm two-year market, or a firm two-year gas supply and a firm 10-year market, as sufficient to establish that additional pipeline capacity is needed.

No intervenors challenged the project-specific supply evidence.

Views of the Board

The Board is satisfied that there will be adequate gas supply to ensure the long term utilization of the proposed InterCoastal facilities.

**Table 6-1
Gas Supply and Firm Service Entitlement
10³m³/d (MMcfd)**

| <u>Year</u> | <u>Service Entitlement</u> | | <u>Tecumseh Peak Day</u> | | <u>U.S. Portfolio</u> | |
|---------------------------|----------------------------|-------|--------------------------|-------|-----------------------|------|
| 1994/95 | 3 115 | (110) | 1 983 | (70) | 1 132 | (40) |
| 1995/96 | 3 766 | (133) | 2 351 | (83) | 1 415 | (50) |
| 1996/97 | 4 247 | (150) | 2 549 | (90) | 1 698 | (60) |
| 1997/98 and thereafter | 4 955 | (175) | 3 086 | (109) | 1 869 | (66) |

Chapter 7

Markets, Transportation, Tolls and Tariff

7.1 Markets and Transportation Service Agreements

7.1.1 Requirements

The InterCoastal project is intended to provide an alternative means of delivering Canadian and U.S. - sourced natural gas to markets in eastern Canada and the northeast U.S. Currently, Canadian-sourced natural gas flows primarily to these markets from Western Canada through the TransCanada system. By means of the InterCoastal project, the gas would be transported to market directly or indirectly through exchange and displacement arrangements to serve a portion of Consumers' Gas' incremental annual, seasonal, and peak day market requirements.

The InterCoastal facilities would provide firm transportation service from Consumers' Gas' supply regions to its service area during the winter season and to its Tecumseh Gas Storage operation during the summer season. The facilities would also allow Consumers' Gas to transport gas on a firm basis from its Tecumseh Gas Storage to its service area in the winter season to meet its forecasted incremental seasonal and peak day requirements.

Consumers' Gas, the largest natural gas distribution utility in Canada, serves over one million residential, commercial and industrial customers in southern and eastern Ontario. The residential and commercial sectors represent 72 percent of Consumers' Gas market demand. The industrial sector includes both load displacement cogeneration and power generation loads. Consumers' Gas also provides gas supply and services to its affiliate, Gazifère Inc., which serves western Québec.

Consumers' Gas' market is forecast to increase from $10.6 \times 10^9 \text{m}^3$ (375 Bcf) to 12.7×10^9 (450 Bcf) over the 1991/92 to 1998/99 forecast period, representing an average annual growth rate of 2.6 percent. Temperature sensitive residential and commercial sectors, where gas is used for space and water heating purposes, were identified as the main reasons for this growth. Market growth is also expected to occur in the industrial sector due to increased consumption by cogeneration/electric generators. Consumers' Gas also expects that gas cooling will develop over the latter part of the forecast period. Consumers' Gas expects peak day demand to increase from $77.7 \times 10^6 \text{m}^3/\text{d}$ (2 743 MMcfd) in 1992/93 to $89.3 \times 10^6 \text{m}^3/\text{d}$ (3 152 MMcfd) in 1998/99 representing an average annual growth rate of 2.3 percent.

In the short term, Consumers' Gas would be the only shipper on InterCoastal, representing 83 percent of the available InterCoastal capacity in the period 1994/95, 100 percent in the period 1995/96, 86 percent in the period 1996/97, and 100 percent from 1997/98 to the end of the term of the transportation contract in 2009. The contract is renewable (refer to Table 7-1).

Table 7-1
Transportation Capacity
10³m³/d (MMcfd)

| Year | 1994/95 | 1995/96 | 1996/97 | 1997/98 |
|---------------------|---------|---------|---------|---------|
| Contracted | 3 115 | 3 766 | 4 247 | 4 955 |
| Capacity | (110) | (133) | (150) | (175) |
| Uncontracted | 651 | 0 | 708 | 0 |
| Capacity | (23) | | (25) | |
| Available | 3 766 | 3 766 | 4 955 | 4 955 |
| Capacity | (133) | (133) | (175) | (175) |

Although Consumers' Gas would be the only shipper in the near term, ICP is currently negotiating with other shippers for the uncontracted capacity available in 1994/95 and 1996/97. There is a provision in the InterCoastal Conditions Precedent Agreement which would allow ICP to reduce its contracted capacity with Consumers' Gas after year two. In these circumstances, Consumers' Gas requires a minimum of 27-months notice. However, the notice period could be less than the minimum 27 months in the event that Consumers' Gas is able to secure alternative transportation service to its service area.

Views of the Board

The Board finds Consumers' Gas' requirements forecast to be reasonable and that it justifies the need for the InterCoastal facilities. The InterCoastal project would enable Consumers' Gas to serve its incremental market requirements, and would also provide it with new sources of gas supply and marketing flexibility.

7.1.2 Transportation Service Agreements

ICP, Consumers' Gas, IPL, Interprovincial Pipe Line System Inc. ("Interprovincial"), and ANR Pipeline Company ("ANR") have executed a fifteen-year Conditions Precedent Agreement, dated 24 June 1993, for firm transportation service on the InterCoastal pipeline. Under this Agreement, Consumers' Gas would be provided firm service on the InterCoastal pipeline for 3 115 10³m³/d (110 MMcfd), 3 766 10³m³/d (133 MMcfd), 4 247 10³m³/d (150 MMcfd) in contract years one, two and three, respectively, and 4 955 10³m³/d (175 MMcfd) thereafter, commencing on the later of 1 November 1994 or on the in-service date.

The receipt points are St. Clair, Ontario, where the facilities would interconnect with the new ANR segment, and Tecumseh, Ontario, where the facilities would interconnect with Consumers' Gas' underground storage and related facilities in southern Ontario for storage withdrawals. Delivery points include Tecumseh, for storage injections, and Milton, Ontario, where the facilities would interconnect with Consumers' Gas' distribution system.

Consumers' Gas would use its InterCoastal capacity to transport U.S.-sourced gas to its Tecumseh storage from April through October. In the winter period, from November through March, Consumers' Gas would ship both U.S.-sourced and Canadian-sourced gas from Tecumseh storage, as well as U.S.-sourced gas delivered by ANR directly, to its distribution system.

Currently, Consumers' Gas' Tecumseh storage facilities are connected to both TransCanada's and Union's transmission systems at Dawn, Ontario. Consumers' Gas noted that current and planned use of this underground storage, together with the InterCoastal pipeline, would continue to enable it to meet seasonal shifts in market demand, as well as to optimize the use of its upstream pipeline service and gas supply arrangements.

With respect to upstream firm transportation service, ANR and Consumers' Gas have executed a fifteen-year Precedent Agreement dated 24 June 1993. Under this arrangement, gas would be transported from the Louisiana and mid-continent supply basins-served by ANR's southeast and southwest mainlines to existing interconnections with Great Lakes Gas Transmission Limited Partnership ("Great Lakes") at Farwell, Michigan and Michigan Consolidated Gas Company ("MichCon") at Willow Run, Michigan. The capacity available to Consumers' Gas under the ANR agreement corresponds to the capacity available under the InterCoastal Agreement. ANR would then provide Consumers' Gas with transportation from interconnecting points on Great Lakes at Muttonville, Michigan, and on MichCon at Columbus, Michigan, to the St. Clair receipt point on the InterCoastal pipeline commencing on the in-service date.

Consumers' Gas and Great Lakes have executed a ten-year Transportation Service Agreement, dated 14 December 1993, for service commencing on the latter of 1 April 1995, the in-service date, or 1 April of the year following, the in-service date. Great Lakes would have required the construction of additional facilities to provide service to Consumers' Gas; however, Rochester Gas and Electric Corporation ("RG&E") has assigned and released a portion of its existing capacity on Great Lakes to Consumers' Gas. A Capacity Release Letter was executed between RG&E and Consumers' Gas on 29 October 1993 under which RG&E would provide Consumers' Gas with firm transportation service during the summer period for 10 years. Consumers' Gas has also executed a Transportation Agreement, dated 11 November 1993, with MichCon for the delivery of gas in the winter months on a firm basis for a ten-year term commencing on the latter of 1 November 1994 or the in-service date. The volumes of gas that would be transported on the Great Lakes and the MichCon systems correspond to Consumers' Gas' service entitlement under the ANR Agreement.

An export order was issued to Consumers' Gas by the U.S. Department of Energy/Office of Fossil Energy on 9 December 1993. This order authorizes Consumers' Gas to export a quantity of natural gas equivalent to that under the ANR Agreement for a fifteen-year term commencing on the latter of 1 November 1994 or InterCoastal's in-service date. Consumers' Gas is expected to file, in due course, an application with the Board for authorization to import corresponding volumes of gas.

ANR has filed two applications with the Federal Energy Regulatory Commission on 19 July 1993 for certificates of public convenience and necessity to construct, own and operate its new facilities connecting the InterCoastal pipeline. A decision on each of these applications is pending.

With respect to other regulatory approvals in progress, ANR and MichCon are finalizing negotiations for ANR to construct and own the needed tie-in facilities at the interconnections between the two pipeline systems.

Views of the Board

The Board is satisfied that all transportation arrangements and Canadian and U.S. regulatory approvals are sufficiently advanced and support the InterCoastal project. The Board is satisfied that any outstanding contractual and regulatory matters could be finalized in a timely manner to allow the project to proceed as currently anticipated.

7.1.3 Alternate Transportation Agreement

ICP, ANR and Interprovincial executed an Alternate Transportation Agreement ("ATA") with Consumers' Gas dated 24 June 1993. The ATA would provide Consumers' Gas with certain peak day alternate gas supply and transportation arrangements on a firm basis, as well as gas supply and transportation arrangements on an interruptible basis, in the event that the InterCoastal project is delayed or denied. Under this Agreement, Consumers' Gas would receive gas as of 1 November 1994 until the earlier of 31 October 1995 or the in-service date.

Specifically, the ATA provides for peak day alternate transportation arrangements in accordance with which Consumers' Gas would be Guaranteed up to ten days of firm gas supply and related transportation service for up to $2\,690\,10^3\text{m}^3/\text{d}$ (95 MMcfd) to be taken from 15 December 1994 to 15 March 1995. This peak day service has been secured with third parties by ICP, Interprovincial and ANR.

A second component of the ATA would assist Consumers' Gas in acquiring alternate transportation arrangements. Consumers' Gas would receive \$500,000 from ICP to secure additional firm service for $425\,10^3\text{m}^3/\text{d}$ (15 MMcfd) on its own.

A third provision of the ATA would allow for Consumers' Gas to purchase, on an interruptible service basis, and to arrange transportation for volumes of gas of up to the first year's firm service commitment on the ANR Segment, less any volumes given under the above firm arrangements, which would almost equal the second component of this ATA. In addition, ICP and ANR would have the option to propose to Consumers' Gas alternative contractual arrangements if they are less expensive and equally reliable from Consumers' Gas' point of view.

Consumers' Gas has termination rights under the ATA at any time prior to implementation. If Consumers' Gas was to terminate the peak day ATA component prior to implementation, ICP proposed to capitalize and include in its rate base the \$500,000 alternate firm transportation fee and all peak day ATA commitment, termination and similar fees paid by ICP to secure, and subsequently terminate, contractual arrangements with third parties in providing firm peaking gas supply to Consumers' Gas. In the event that the ATA is utilized, ICP stated that it or its shareholders would absorb the above-noted costs, as long as the costs actually incurred under this Agreement would exceed Consumers' Gas' costs incurred if ICP would have met its in-service date.

When questioned by several intervenors about the uniqueness of this type of arrangement, ICP argued that this Agreement was necessary in the development and the marketing of the InterCoastal project.

Views of the Board

The Board finds the Alternate Transportation Agreement appropriate for the applied-for facilities. The Board concurs with ICP and Consumers' Gas that the ATA is required to protect the interests of Consumers' Gas in the event that the InterCoastal project should be delayed or denied. The Board agrees that the fees payable under the ATA could properly be included in ICP's rate base in the event that the project is approved.

7.2 Purchase of Assets From IPL

7.2.1 Purchase Price of Existing Segment

With respect to the sale of a portion of IPL's Line 8 to ICP, the Board's accounting regulations require that the transfer of assets between related companies be recorded at the net book value. ICP proposed purchasing 94.05 percent of IPL's Line 8 and provided the following information relating to the calculation of the net book value of the assets it proposes to purchase:

| | |
|--|--------------|
| Original Installed Value | \$13,734,000 |
| Net Book Value 30 June 1994 | 4,533,000 |
| Percentage of Pipe Required for Gas | 94.05% |
| Net Book Value of Assets to be Transferred\$ | 4,263,000 |

Petro-Canada pointed out that the portion of IPL's Line 8 not being sold to ICP which lies between Millgrove Junction and the Petro-Canada refinery at Oakville would be left idle and unused. It noted that this orphaned piece of pipeline would still be on the books of IPL and that the associated costs would be paid by IPL's shippers although they would derive no benefit from it. Petro-Canada submitted that the costs associated with the idle portion of the IPL unconverted Line 8 should be recognized as costs associated with the conversion of the line to a natural gas pipeline. Petro-Canada argued that this portion of the line should also be sold to ICP and be included in the capital costs of the new pipeline.

Views of the Board

The Board is of the view that ICP should not be required to purchase assets for which it has no need. To the extent that a party may consider that any assets of IPL are no longer used and useful as a result of this transaction, the Board would be prepared to consider the issue during a proceeding in respect of IPL's tolls.

The Board finds that the assets to be transferred from IPL to ICP should be transferred at their net book value.

7.2.2 Transfer of Deferred Income Taxes

IPL calculated that, as of the proposed date of the sale of the Line 8 assets to ICP, it would have a balance of deferred taxes on its books relating to the assets to be transferred totalling \$1,114,000. This balance of deferred taxes relates to the timing differences between the income taxes provided for in IPL's tolls based on IPL's accounting 'Income and the income taxes actually paid. The difference occurs primarily due to the differences between IPL's depreciation rates and the capital cost allowance ("CCA") rates allowed under the *Income Tax Act*. The balance of deferred income taxes relating to the assets proposed to be transferred was calculated as the difference between the net book value and the undepreciated capital cost ("UCC") multiplied by the tax rate of 49.19 percent. As IPL was placed on

the flow-through method of accounting for income taxes effective 1 January 1992, the company has used the net book value as of that date for the purpose of calculating the net timing difference.

| | |
|---|-------------|
| Net Book Value as of 1 January 1992 | \$5,531,000 |
| UCC at date of Transfer | 3,266,000 |
| Timing Difference | 2,265,000 |
| Multiply by Tax Rate | 49.19% |
| Deferred Taxes Associated With Assets Transferred | \$1,114,000 |

ICP's evidence stated that the transfer of the associated deferred income taxes was in accordance with generally accepted accounting principles and equitable to both the seller and the purchaser. For ICP, the CCA claim would be lower, and thus its income tax payments would be higher, because for tax purposes the transferred assets would be deemed to have been acquired at their UCC, which is lower than the net book value. This would be offset by the benefit of the deferred tax balance transferred which would be credited to the rate base, thus reducing the level of required return and associated income taxes. For the transferor, IPL, if the associated deferred income taxes were not transferred at UCC, the proceeds of the sale would be deemed to have been the higher net book value, with the result that future CCA claims would be lower and therefore income taxes would be higher. No parties objected to the proposed transfer of the associated deferred income taxes from IPL to ICP.

Views of the Board

The Board notes IPL's evidence that the proposed tax treatment of the transfer of assets from IPL to ICP is permissible under the *Income Tax Act*. The recording of the sale at the UCC for tax purposes, and the resultant transfer of deferred taxes to ICP, appears to be beneficial to both the vendor and the purchaser. The Board would be prepared to accept the proposed income tax treatment of the asset transfer.

7.3 Tolls and Tariff Issues

The key elements of the applied for tariff and toll methodology were agreed to in a Precedent Agreement dated 24 June 1993 between ICP, Consumers' Gas, IPL, Interprovincial Pipe Line System Inc., and ANR Pipeline Company. This Agreement addresses all aspects of the proposed tariff and toll design including use of the reverse sum of the years depreciation ("RSYD") methodology, capital structure, rate of return, the use of a deferral account for direct operating expenses and the calculation of the provision for income taxes on the flow-through basis.

7.3.1 Level of Regulation

ICP has proposed that it be categorized by the Board as a Group 2 pipeline. In accordance with the Board's Memorandum of Guidance dated 22 November 1990, Group 2 companies are subject to a reduced degree of financial regulation. The financial regulation of Group 2 companies is normally carried out on a complaint basis, with a consequent reduction in financial reporting requirements. Detailed information in support of a tariff filing is generally only required after a complaint has been registered, or in response to the Board's specific request.

Group 2 companies make a lesser contribution toward NEB cost recovery. Group 1 companies are assessed a share of the NEB cost recovery charges on the basis of their annual throughput. ICP estimated that its share of the NEB cost recovery charges as a Group 1 company would have been approximately \$80,000. Group 2 companies similar in size to ICP pay a flat charge of \$10,000. ICP

suggested that it was seeking the reduced level of regulatory burden associated with being classified as a Group 2 company, and that cost was not a factor in its preference. In support of its request, ICP pointed to the fact that it is a relatively small pipeline with one firm service shipper to date who has effectively contracted for the entire firm service capacity for a 15 year term, and who has agreed that the requirements governing a Group 2 company are appropriate for ICP.

No parties objected to ICP's proposal to be regulated as a Group 2 company.

Views of the Board

The Board is of the view that ICP's only customer, Consumers' Gas is fully capable of protecting its own interests. Further, the Board notes that costs incurred by Consumers' Gas are subject to review by the Ontario Energy Board. With respect to the allocation of costs between IPL and ICP, the Board notes that IPL's cost allocations are subject to Board regulation and scrutiny as a Group 1 company.

Therefore, the Board is of the view that regulation, on a complaint basis, as a Group 2 company would be appropriate for ICP.

7.3.2 Capital Structure and Cost of Capital

7.3.2.1 Capital Structure

The Precedent Agreement between ICP and Consumers' Gas provides for a deemed debt equity ratio to be determined by the Board for the life of the project. ICP initially proposed a deemed capital structure of 37.5 percent common equity and 62.5 percent debt. The application was subsequently amended to reflect 35 percent common equity and 65 percent debt pursuant to an agreement with Consumers' Gas. No parties to the hearing objected to the proposed capital structure.

Views of the Board

It is not the Board's practice to approve a capital structure for a pipeline for the life of a project, as proposed by ICP. Under the Board's complaint method of regulation for Group 2 companies, a pipeline is free to set its capital structure, subject to any complaints which interested parties may wish to file or a decision by the Board to initiate a review. In this case, the company and its only firm shipper have agreed on a capital structure. The Board finds the agreed upon capital structure to be acceptable.

7.3.2.2 Rate of Return on Common Equity

The Precedent Agreement between the parties provides for ICP's rate of return on common equity ("ROE") to be set at a level relative to the rate approved by the Board for TransCanada as of the start of each calendar year. ICP proposed that, for the first three years of operation, it would set its rate of return on equity at 50 basis points above the TransCanada approved rate, and thereafter at the same rate as that approved by the Board for TransCanada.

TransCanada argued that although ICP made no case, on a comparative basis or otherwise, as to the level of its business risk, it was TransCanada's opinion that the level of risk faced by ICP would be less than that faced by TransCanada. TransCanada's position was that the proposal to utilize TransCanada's rate of return on equity as a benchmark had the potential for negative precedential consequences in future TransCanada rate proceedings before the Board. ICP explained that the

reference to TransCanada's rate of return was by way of explanation of how the parties came to their agreement, and that it was not applying for approval of a rate of return benchmarked to another pipeline company's rate of return.

Ontario advised the Board that it supported the agreement between ICP and Consumers' Gas with respect to the rate of return on common equity. It pointed out that its support was based on the advice of its financial expert, Dr. Cannon, a professor at Queen's University.

Views of the Board

As explained above with respect to capital structure, under the Board's complaint method of regulation a pipeline is free to set its rate of return, subject to any complaints which interested parties may wish to file or a decision by the Board to initiate a review. The Board finds the proposed level of rate of return on common equity agreed upon among the parties to be acceptable.

7.3.2.3 Cost of Debt

ICP proposed that 65 percent of its capital structure would be financed with debt. Initially, ICP intended to utilize short term debt by establishing a 3 to 5 year revolving bank facility to provide the necessary funds for construction of the pipeline. ICP stated that short term financing would be replaced at a future date with long term debt after construction was completed. However, it stated that the 3 to 5 year term of the initial bank loan would give the company timing flexibility if financial market conditions were not appropriate for raising long term debt, or if the company wished to continue with short term funding in the event that it expected the market to be relatively flat and stable. During the hearing ICP's financial witness, Mr. B.T. Vaasjo, updated his forecast of the cost of short and long term debt to 5.5 and 8.0 percent.

Views of the Board

The Board finds ICP's proposed financing plans to be acceptable.

7.3.3 Cost of Service Issues

Consistent with the Board's approach to the regulation of Group 2 companies in considering the key elements of ICP's proposed tariff and toll methodology, the Board has given significant weight to the agreement set out in the Precedent Agreement between the principal parties to this project.

7.3.3.1 Depreciation Methodology

ICP proposed depreciating its pipeline over a 20-year period using a Reverse Sum of the Years Digits ("RSYD") depreciation methodology. Under this methodology, the depreciation charge increases every year by the amount of the first year depreciation charge. For example, in the first year the depreciation charge would be calculated as 1 divided by the sum of the years 1 through 20 (ie: 210). This calculation results in first year depreciation charges equal to slightly less than 1/2 of 1 percent; rising to approximately 9 1/2 percent in the twentieth year. ICP's Precedent Agreement with Consumers' Gas indicates that the RSYD depreciation methodology was chosen to mitigate the initial toll impact and to provide toll stability. ICP explained that traditional toll design utilizing straight line depreciation techniques did not provide competitive tolls in the initial years and, therefore, the parties agreed to a form of toll levelling using the RSYD method of depreciation. ICP stated that it has discussed the

financing of this project with two investment banking firms and has received indications that there should be no problem with financing the project with the RSYD depreciation methodology.

North Canadian argued that this depreciation methodology would inappropriately shift costs from current users to future system users. In addition to the inter-generational equity concerns, North Canadian argued that this depreciation methodology would provide ICP with an unfair competitive advantage.

Views of the Board

Innovative depreciation methodologies such as the RSYD method have in the past been resisted by financial institutions and pipeline investors because they do not generally match the using up of the depreciable assets' value with the recovery of costs. Rather they tend to shift the recovery of costs to future years. In this case, the pipeline's investors have expressed a willingness to accept the risks associated with this depreciation methodology.

The Board agrees with the view of North Canadian that the RSYD method can result in the shifting of costs to future tollpayers. However, the Board finds that the toll levelling aspects of this methodology somewhat offset this concern. In the circumstances of this case, where the pipeline and its only firm shipper have agreed on the use of the RSYD method, and the pipeline's shareholders are prepared to accept the financial risks associated with the shifting of the recovery of depreciation costs to future years, the Board finds the proposed depreciation methodology acceptable.

7.3.3.2 Direct Operating Expense Deferral Account

ICP proposed that the difference between the actual and approved direct operating expenses, together with carrying charges at the NEB approved allowance for funds used during construction rate, would be an adjustment to the following year's cost of service forecast. Direct operating expenses would include maintenance, NEB cost recovery, legal and insurance expenses. ICP subsequently indicated that the need for the deferral account would be reviewed on an ongoing basis. North Canadian took exception to the proposed deferral account on the basis that no justification had been put forward to support ICP's claim that it would be unable to forecast these expenses. North Canadian argued that a deferral account should not be granted to cover normal forecasting risks.

Views of the Board

The Board notes that there are many examples of deferral accounts utilized by the pipelines that it regulates. It is the Board's view that the use of such deferral accounts by a Group 2 company is acceptable when agreed upon by the parties. ICP should note that, in the absence of a complaint, the Board would not normally approve a specific rate for the allowance for funds used during construction for a Group 2 company.

7.3.3.3 Flow-Through Income Taxes

ICP proposed to account for income taxes using the flow-through method rather than the normalized method. Under this methodology, the company's actual anticipated income tax expense for the year is provided for in the tolls. Under the normalized methodology, income taxes are provided for based on the pipeline's accounting income.

The application of specific income tax rules normally results in a difference between the income tax provided for on the normalized basis and the actual income taxes payable. The timing difference is recorded as deferred income taxes. Due to the fact that the CCA rates allowed under the *Income Tax Act* are usually higher than the pipeline's approved depreciation rates and are calculated on a declining balance basis, normalized taxes are usually higher than flow-through taxes in the early years of a pipeline project. As a pipeline ages, a crossover point will be reached after which the actual income taxes payable will be greater than the amount provided for on the normalized basis. Under the C, normalized methodology, a balance of deferred income taxes is recorded in the early years of a project. Capital additions to a pipeline can postpone into the future the need to drawdown deferred tax balances.

Views of the Board

As the pipeline and its only firm shipper have agreed on the use of the flow-through method of accounting for income taxes, the Board finds the proposed methodology acceptable.

7.3.4 Terms of Access

7.3.4.1 Open Access

Consumers' Gas would initially be the only shipper on InterCoastal but ICP's tariff has provisions for the acceptance of new requests for service from other shippers as per the Service Schedules in its Tariff. If ICP receives firm service requests without having sufficient system capacity, ICP would establish a queue for new firm service requests on a non-discriminatory first come first served basis. If ICP receives interruptible service ("IS") requests without having sufficient system capacity, ICP would establish a queue for initial nominations in descending order from the highest to the lowest IS toll. Should two or more IS requests have the same toll, requests would be placed in descending order of the date of the Service Agreement from the earliest to the most recent.

Gaz Métropolitain noted and accepted ICP's confirmation during the hearing that ICP would operate as an open access pipeline system.

North Canadian argued that it was unlikely that other potential shippers would have the opportunity to have access to the InterCoastal system in the foreseeable future. Since InterCoastal is fully contracted, excluding years 1 and 3, North Canadian noted that ICP stated that shippers requesting interruptible service would likely only have access to capacity in the summertime, when demand for natural gas IS low. North Canadian submitted that access to interruptible transportation would be limited, since capacity from the international border to the Tecumseh Storage facilities would be at a 100 percent load factor.

North Canadian explained that ICP's statement of being an open access pipeline was not substantiated by facts and that its concern was based on the fact that other potential shippers were not given the opportunity to participate in the InterCoastal project from its inception on the same terms and conditions as were afforded to Consumers' Gas. North Canadian recommended that the ICP tariff should reflect equitable open access terms and conditions to all shippers.

In its reply argument, ICP stated that North Canadian was mistaken, and that the reference to moving gas at 100 percent load factor was related to the ANR Pipeline system and not to InterCoastal. In

response to several interested parties, ICP reiterated that InterCoastal will be an open access pipeline system.

Views of the Board

The Board is satisfied that the proposed tariff provisions would ensure the establishment of a queue for services on a non-discriminatory basis and that ICP would be operating as an open access pipeline. Further, the Board was not persuaded that any shipper was excluded from participation in the ICP project.

7.3.4.2 Minimum Contract Term

To receive firm service on the InterCoastal pipeline, a shipper would be required to execute a service agreement for a minimum term of 15 years. Likewise to receive interruptible service, a shipper would be required to execute a service agreement having a minimum term of one month.

ICP stated that its set minimum contract term requirement for FS was determined as a result of the negotiation process with Consumers' Gas when formulating the Precedent Agreement. ICP noted that its requirement for long term contracts for FS was therefore justified by the fact that it fulfils the needs and objectives of both Consumers' Gas, the shipper, and ICP, the transporter, for a new proposed gas pipeline.

Petro-Canada questioned ICP's willingness to amend its tariff in the event that there was sufficient demand for FS on less than a 15-year term. ICP indicated that it would amend its tariff to take into consideration requests for firm service on a one-year basis for the uncontracted capacity in years 1 and 3.

Petro-Canada argued that ICP's minimum contract term of 15 years for firm service transportation was too restrictive in a marketplace shifting toward shorter term contractual arrangements. Petro-Canada noted that the FS contract term requirement in TransCanada's tariff is only for one year. As a result, Petro-Canada recommended that the 15-year minimum term for FS transportation be reduced.

Views of the Board

The Board finds that imposing a minimum term of 15 years for firm service could impede ICP's effort in contracting for uncontracted capacity on the system, especially in years 1 and 3. However, the Board notes ICP's willingness to revise its tariff provisions in the event that requests for firm service on shorter term basis were received for years 1 and 3. Since capacity on the InterCoastal pipeline system is fully contracted with exception of years 1 and 3 and the imposed 15-year term would be for expansion purposes, the Board is of the view that the contract term as provided for in ICP's tariff is reasonable.

7.3.4.3 Renewal Rights

Renewal rights within ICP's firm service schedule stipulate that a shipper can extend its existing service termination date for a period of five contract years while maintaining or reducing its existing maximum daily volumes. To exercise the renewal option, a shipper would be required to provide 18 months notice before its existing service termination date. A FS shipper would also be required to provide evidence satisfactory to ICP that it would meet certain availability provisions set out in the tariff with respect to Renewal Provisions prior to the start date of the renewal term.

Petro-Canada argued that ICP's proposed contract renewal rights for FS shippers of five years was as restrictive as the minimum contract term for firm service. Petro-Canada noted that the renewal option was not comparable to TransCanada's one year term. Petro-Canada proposed that ICP's renewal contract term be similar to TransCanada's.

Views of the Board

The Board notes that since Consumers' Gas has contracted for most of the available capacity on the InterCoastal pipeline for 15 years, ICP would not likely face this issue for some time. The Board is of the view that the issue of the appropriate renewal term period should be deferred for future consideration.

7.3.5 Toll Design

7.3.5.1 Firm Service

ICP's proposed toll design is based on a full fixed variable toll methodology whereby FS shippers are charged a demand toll to recover fixed costs and a commodity toll to recover variable costs. Initially there are no variable costs forecasted for firm service shippers. ICP has currently only one FS shipper, Consumers' Gas, who has essentially contracted for all of the space on the pipeline for 15 years with a renewal option for a further 5 years. ICP has uncontracted capacity available in years 1 and 3.

ICP proposed calculating its FS toll on the basis of design capacity, rather than the normal practice of calculating tolls on the basis of contracted capacity. ICP stated that to the extent that there is uncontracted capacity, the under-recovery of its costs would fall to the shareholders. North Canadian argued that this toll design could inhibit expansion because ICP has stated that it would not undertake an expansion unless the additional capacity was fully contracted.

Views of the Board

While the normal practice is to calculate tolls on the basis of contracted capacity, the Board has no objection to ICP's proposal to calculate its tolls on the basis of system capacity. The Board notes that this methodology gives the pipeline a strong incentive to market all available space on the pipeline. The Board is of the view that this methodology is acceptable in the circumstances of the proposed project.

7.3.5.2 Interruptible Service Deferral Account

ICP proposed that the toll for interruptible service would be based on a bidding process whereby shippers would nominate tolls within a range, such that the maximum IS toll would be equal to the 100 percent load factor firm service toll and the minimum toll would be set at a level to provide a positive revenue contribution. ICP noted that, initially, uncontracted capacity is only anticipated to be available in the first and third years of operation and that only a small margin of excess capacity is forecast to be available for IS.

ICP proposed that any revenues from the sale of IS in excess of the costs for providing the service, including income taxes, should be accumulated in a deferral account. ICP proposed that the amounts deferred should be credited monthly to ICP until any capital expenditures in excess of \$45.6 million, including carrying charges, have been recovered by the company. Carrying charges would be based on ICP's short term cost of debt. ICP proposed that any net IS revenues, net of marketing costs, would be shared evenly between ICP and the FS shippers, once the excess capital costs, or "overage" was fully

recovered. ICP acknowledged that this represented a risk-sharing scheme whereby ICP would receive 50 percent of the net IS revenues, in return for accepting the financial risk of any cost overruns.

Petro-Canada argued that the proposed IS toll design and deferral account mechanism would not minimize transportation costs. It suggested that the proposed capital costs in excess of the original cost estimates of \$45.6 million should be capitalized to the rate base, subject to the Board finding that the costs were prudently incurred. In Petro-Canada's view all IS revenues should be credited to the cost of service.

North Canadian also argued that the IS proposal was inappropriate. In its view this proposal resulted from ICP's requirement that the project have a competitive toll. North Canadian considered ICP's proposal for recovering the overage to be a voluntary decision on the part of ICP, and suggested that these costs should appropriately be borne by ICP's shareholders.

Views of the Board

The Board finds ICP's proposal to allow shippers to bid for available interruptible capacity within a range to be acceptable.

The Board notes that this proposal puts ICP's shareholders at risk for the recovery of cost overruns. To the extent that ICP's shareholders would be prepared to accept this risk, the Board finds this arrangement to be acceptable. However, the Board finds the proposal to split the IS revenues after the overage has been recovered to be unacceptable, as it is inconsistent with the principle that tolls should be cost based.

Chapter 8

Abandonment of Line 8

IPL has applied to abandon Line 8, part of its Older system, which would then be sold to ICP and converted to natural gas transportation service. Subsection 53(2) of the *Onshore Pipeline Regulations* requires that:

“The Board shall approve the deactivation ... if the deactivation provides for a level of safety at least equivalent to the level of safety Generally provided for by CSA standards and the deactivation is in the public interest.”

Section 55 of the Regulations requires that:

“Where a company leaves an abandoned pipeline in place, the company shall

- (a) disconnect the abandoned pipeline from any pipeline that continues to operate;
- (b) fill the abandoned pipeline with a medium approved by the Board pursuant to an application for leave to abandon;
- (c) seal the abandoned pipeline;
- (d) empty any storage tanks of the abandoned pipeline and purge them of any hazardous vapours; and
- (e) maintain the cathodic protection of the abandoned pipeline.”

In its RH-2-91 Reasons for Decision concerning tolls on the Interprovincial Pipe Line Inc. system, the Board stated:

“IPL is directed to prepare an Optimization Study prior to changing the configuration of the Montreal Extension and the Older System. IPL is further directed to include this study as part of any application regarding proposed changes to the configuration of the Older System and the Montreal Extension.”

IPL filed an Optimization Study as evidence in its section 74 Leave to Abandon application, which was heard as part of this proceeding. The Optimization Study examined IPL’s three pipelines that run east from Sarnia, Ontario, namely, Lines 7, 8 and 9. At the time the Optimization Study was compiled, the three lines were shipping petroleum to markets in Montreal, Buffalo and Ontario. The combined capacity of the three lines is in excess of the current and predicted demands. The Optimization Study determined that one of the 20 inch pipelines, either Line 7 or Line 8, should be idled.

Although Line 7 is older than Line 8, IPL stated that the pipelines were in similar condition. Line 8 was selected to be idled because IPL was of the view that this line would require higher maintenance if it were kept in operation.

Views of the Board

The Board is of the view that IPL has complied with the Board’s requirement for submitting an Optimization Study for the changes contemplated by this section 74 Leave to Abandon application. The Board notes that no parties objected to the abandonment of IPL’s Line 8 during the proceeding.

The Board reminds IPL that it would be required to abide by the abandonment provisions of the Regulations for all sections of Line 8 that will not be converted to gas service such as those within IPL's pump stations and the Milton to Bronte section.

Should the Line 8 not be sold to ICP and converted to gas service, the Board reminds IPL that it would be required to abide by the abandonment provisions of the above-noted Regulations.

In the event that the Board were to grant approval of ICP's application, it would also approve IPL's application for the abandonment of Line 8.

Chapter 9

Economic Feasibility

The Board has assessed the economic feasibility of the proposed project with regard to the likelihood that the facilities would be used and useful over their economic life. To assist in its determination, the Board has examined the supply and markets connected to the pipeline, the long term contracts between the pipeline and its shipper, and the relative competitiveness of the tolls proposed for the system.

Consumers' Gas, serving customers and affiliates in Ontario and western Quebec, is currently the only firm service shipper on the proposed ICP system. Consumers' Gas submitted evidence that it could acquire supplies of gas from both Canadian and U.S. sources. During the summer, gas sourced from both Canada and the U.S. would be stored in the Tecumseh Gas Storage facility, which would be connected to the ICP system. During the winter, it would ship both U.S. sourced gas and gas withdrawn from storage on the ICP system.

ICP stated that this project could serve markets in eastern Canada and the northeastern United States. Consumers' Gas stated that the long term gas demand in the market served by this project would grow by 2.3 percent annually from 1991/92 to 1998/99.

ICP filed a 15-year firm service contract between itself and Consumers' Gas for 83 percent of the pipeline's capacity in year one, 100 percent of the capacity in year two, 86 percent of the capacity in year three and 100 percent of the capacity of the pipeline for each year thereafter until the end of the contract. Consumers' Gas has the right to renew this contract for a further 5 years. ICP stated that it was seeking out other shippers for the capacity that remains uncontracted. ICP also stated that the existence of this long term firm service contract for the capacity of the pipeline illustrates the need for the project.

During the hearing, ICP stated that if the capital costs of the project were to increase significantly, the economic viability of the project could be jeopardized. ICP noted that significant increases in the capital cost of the project could be caused by certificate conditions, changes to the project design or other reasons. ICP stated that it would re-examine the economics of the project if and when these potential circumstances occur and determine whether or not the project should continue.

Views of the Board

The Board finds that there is a strong likelihood that the facilities would be used at a reasonable level over their economic life and that the associated demand charges would be paid. Thus, the Board is satisfied that the project meets the criteria for determining economic feasibility. The Board notes, however, ICP's views that any significant capital cost increase may lead ICP to determine that the project is no longer economically feasible.

Chapter 10

Decision

The InterCoastal pipeline is part of an international project that would bring U.S. and Canadian gas to a growing domestic market. The Board agrees with the Applicant and its supporters that the project would have significant benefits for eastern Canadian gas consumers. It would enhance security of supply through diversifying supply sources and transportation options, and it would also provide the benefits of increased competition in eastern markets. The Board also agrees with Ontario that the conversion of an otherwise idle pipeline makes good public policy and good economic sense. The cost to construct a new pipeline of the same length as the proposed converted line was estimated to be in the order of \$150 million. The conversion itself is currently projected to cost in the neighbourhood of \$15 million.

The Board recognizes that InterCoastal is entering an established market and needs to attract customers who have other existing alternatives. From a commercial perspective, this required the derivation of a tolling arrangement that would be competitive with other transportation systems serving the market. Consumers' Gas was interested in the proposal but required some protection in the event that the project did not proceed and it would be left short of pipeline capacity to serve its market. InterCoastal provided this backstopping through the Alternative Transportation Agreement, and argued that the associated costs were valid for inclusion in its rate base. Other unique aspects of InterCoastal's proposed toll design aimed at making the project more attractive to a shipper included cost overrun protection, techniques to levelize the toll and cost allocation based on actual capacity rather than transportation contracts. In return, InterCoastal proposed that any interruptible service revenues be used, first to pay off cost overruns, and, thereafter be split equally among shareholders and shippers. InterCoastal's capital structure and allowed rate of return on equity were settled prior to the hearing. With one exception, the Board finds these innovations to be acceptable under the Act, and appropriate in the circumstances of this case. The exception involves the sharing of interruptible revenue after cost overruns have been paid.

With respect to gas supply and gas market considerations, the Board is confident that, if the line were built, it would be used at a reasonable level and that transportation demand charges would be paid.

A major and difficult issue in the hearing involved the safety, and the criteria the Board should use to assess the safety, of the conversion of Line 8 to high pressure gas service. Only one other federally regulated line has been converted from oil to natural gas service. That project was not difficult because of the low gas pressures involved. The Gas Pipeline Systems Code, CSA Z184, that would normally apply to gas pipeline design, construction and operation, does not explicitly address conversion. The approach taken by InterCoastal was to use the code as a guide and, where explicit requirements do not exist or cannot practically be applied, to conduct engineering assessments to ensure a level of safety at least equivalent to that contemplated by the code. The Board accepts this as a reasonable approach. InterCoastal supported its case with expert evidence as to the development of the code, the properties and integrity of steel pipe in natural gas service, anticipated soil and pipe temperatures, and the integrity of Line 8 under the proposed operating conditions. This evidence addressed issues which are central to the proposed conversion and the evidence has been of great assistance to the Board. While the Board is satisfied with many aspects of the proposal, the Board has concerns with several aspects

of the detailed design. These include the integrity of the existing pipe, localized depth of cover problems, design temperature, hazard assessment, and setback requirements.

It is the Board's view that InterCoastal should have conducted sufficient assessments of the existing pipe prior to its application to enable the Board to exercise its judgment as to whether the pipe had sufficient integrity to warrant conversion. Instead, InterCoastal committed to do additional work on the integrity of the line following receipt of Board approval for the conversion. This program is viewed by the Board to be inadequate, at least in respect of ruling out the presence of stress corrosion cracking. InterCoastal also committed to evaluate 19 localized sites where depth of cover was known to be insufficient. Again, the Board would have preferred to have seen specific mitigation plans during the hearing.

InterCoastal established 0°C as its design temperature. Canadian pipelines typically use -5°C as a minimum design temperature. The Board recognizes that this is conservative. In departing from this common practice and proposing the use of 0°C as the minimum design temperature, InterCoastal had an onus to demonstrate clearly and in a convincing way that pipe wall temperatures along its route would not drop below 0°C. This is especially important in the context of the present application because of the impact of small decreases in design temperature on the proportion of pipe which has sufficient inherent toughness to arrest a propagating fracture. A lower design temperature results in less pipe with the desired toughness. In supporting its design temperature, InterCoastal provided the results of soil temperature modelling, actual soil temperature data from five climate stations, and a review of flowing gas temperatures in existing gas pipelines. Although extensive, the Board has reservations about the conclusions drawn from the data mainly because of InterCoastal's failure to properly link this data to soil types and micro climate conditions along the existing pipeline route. Accordingly, the Board is not persuaded that a 0°C design temperature is sufficiently conservative.

Even with a 0°C design temperature, InterCoastal concluded that two loops of pipe, comprising in total some 31 km, would not have sufficient toughness to arrest a fracture. To address this problem, InterCoastal proposed the installation of crack arrestors on the two loops at various spacings up to 350 metres. The methodology employed to determine this spacing is based on an assessment of the hazard associated with a natural gas pipeline rupture. InterCoastal developed a hazard assessment based on a literature survey but did not provide an expert on hazard assessment. The use of crack arrestors is novel and, while acceptable to the Board in principle, the Board would require expert evidence to assist it in determining the appropriate specific use and spacing of crack arrestors.

Finally concerning the Existing Segment, the Board agrees with the position of Ontario that the Applicants should be required to comply with the Fuel Safety Branch Guidelines of the Ministry of Consumer and Commercial Relations at each of the eight locations where structures are located within 20 metres of the existing pipeline.

It is not necessary in this Decision to deal with the safety of converting Line 8 where it crosses the Confederation School property in Lambton County. InterCoastal withdrew this aspect of its proposal during the hearing and stated its intention to apply later for a route which would bypass the school.

The Board is generally satisfied with InterCoastal's proposal for the construction of the new segments of pipe, with one notable exception. That exception concerns the proposed routing along Moore Road 8. During the early public notification process, InterCoastal advised residents of Moore Township that the new line would follow a cross-country route, parallel to and south of Road 8.

InterCoastal subsequently changed its plans and moved the line north adjacent to the road allowance. This came as a surprise to people who were not involved in the earlier public process but who should have been brought into the process when InterCoastal identified Road 8 as a possible or preferred route. The Board was not satisfied that the rationale put forward by InterCoastal for moving from a cross-country route would result in Moore Road 8 being the preferred route. The Board also notes that there appears to have been an unusually large number of incidents of efforts and misunderstandings between landowners and InterCoastal regarding routing and land acquisition matters, suggesting considerable scope for improvement in InterCoastal's practices.

Soil preservation, restoration and related environmental matters commanded considerable attention during the hearing. Many of the concerns of landowners were resolved through compromise among parties and the Board is satisfied that with additional conditions to address unresolved issues the project could be constructed and operated in an environmentally acceptable manner.

In discharging its responsibilities under section 52 of the Act, the Board must consider all factors that to it appear relevant. Of the many considerations which must be weighed in determining the public interest, public safety, having regard to the available technology, is primary. InterCoastal has put forward its proposal in recognition of the primacy of public safety and in the belief that it achieved a design which is suitable and safe. InterCoastal's proposal raised complex and difficult issues. On many issues the Board has been persuaded by the evidence marshalled by InterCoastal. However, on several key issues the Board has not been persuaded by InterCoastal's evidence. The applications to convert the Existing Segment to natural ,as service and to construct new facilities, which includes the segment along Moore Road 8, are therefore denied. As these applications are central to the project, the Board will not deal with the associated applications of InterCoastal and IPL. Further, since these rejected applications have no potential to create adverse environmental effects, the Board has not performed a screening under the EARP Guidelines Order.

The Board is cognizant of ICP's evidence suggesting that revisions to its design could jeopardize the economic viability of the project. The foregone benefits are not matters the Board has taken lightly in arriving at its decision. However, the Board has a responsibility which is primary, and that is to satisfy itself that the safety of the public is ensured.

C. Bélanger
Presiding Member

A. Côté-Verhaaf
Member

K.W. Vollman
Member

Calgary, Alberta
April 1994