



## Trans Mountain Pipeline ULC



# Trans Mountain Expansion Project

An Application Pursuant to Section 52 of the National Energy Board Act

December 2013

Volume



Project Design & Execution -  
Operations & Maintenance

**NATIONAL ENERGY BOARD**

**IN THE MATTER OF**

**the *National Energy Board Act*,  
R.S.C. 1985, c. N-7, as amended, (“*NEB Act*”)  
and the Regulations made thereunder;**

**AND IN THE MATTER OF**

**the *Canadian Environmental Assessment Act, 2012*,  
S.C. 2012, c. 37, as amended,  
and the Regulations made thereunder;**

**AND IN THE MATTER OF**

**an application by Trans Mountain Pipeline ULC  
as General Partner of Trans Mountain Pipeline L.P.  
(collectively “Trans Mountain”)  
for a Certificate of Public Convenience and Necessity and  
other related approvals pursuant to Part III of the *NEB Act***

**APPLICATION BY TRANS MOUNTAIN FOR APPROVAL OF  
THE TRANS MOUNTAIN EXPANSION PROJECT**

**December 2013**

**To: The Secretary  
The National Energy Board  
444 — 7th Avenue SW  
Calgary, AB T2P 0X8**

# Trans Mountain Expansion Project

## Application Pursuant to Section 52 of the *National Energy Board Act*

### Guide to the Application

Application	
Transmittal - Letter to the National Energy Board	
Volume 1	Summary
Volume 2	Project Overview, Economics and General Information
Volume 3A	Public Consultation
Volume 3B	Aboriginal Engagement
Volume 3C	Landowner Relations
Volume 4A	Project Design and Execution – Engineering
Volume 4B	Project Design and Execution – Construction
<b>Volume 4C</b>	<b>Project Design and Execution – Operations and Maintenance</b>
Volume 5A	Environmental and Socio-Economic Assessment – Biophysical
Volume 5B	Environmental and Socio-Economic Assessment – Socio-Economic
Volume 5C	Environmental and Socio-Economic Assessment – Biophysical Technical Reports
Volume 5D	Environmental and Socio-Economic Assessment – Socio-Economic Technical Reports
Volume 6A	Environmental Compliance
Volume 6B	Pipeline Environmental Protection Plan
Volume 6C	Facilities Environmental Protection Plan
Volume 6D	Westridge Marine Terminal Environmental Protection Plan
Volume 6E	Environmental Alignment Sheets
Volume 7	Risk Assessment and Management of Pipeline and Facility Spills
Volume 8A	Marine Transportation
Volume 8B	Marine Environmental and Socio-Economic Technical Reports
Volume 8C	TERMPOL Reports

#### This volume contains:

Volume 4C			
<b>Section 1.0</b>	Introduction	<b>Appendix A</b>	Project Configuration Map
<b>Section 2.0</b>	Operations and Maintenance	<b>Appendix B</b>	Kinder Morgan Code of Business Conduct and Ethics
<b>Section 3.0</b>	Operating Standards and Documentation		
<b>Section 4.0</b>	Operations and Maintenance Staffing and Training		
<b>Section 5.0</b>	Operating and Maintenance Procedures		
<b>Section 6.0</b>	Routine Inspection and Maintenance Activities		
<b>Section 7.0</b>	System Operations, Control, and Leak Detection		
<b>Section 8.0</b>	Systems Integrity Management		
<b>Section 9.0</b>	Environment, Health and Safety Management		
<b>Section 10.0</b>	Emergency Preparedness and Response		
<b>Section 11.0</b>	Security Management Program		
<b>Section 12.0</b>	Preliminary Abandonment Plan		
<b>Section 13.0</b>	References		
<b>Section 14.0</b>	Appendices		

## TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION.....	1
1.1 Project Overview.....	1
1.2 Purpose of Volume 4C.....	2
2.0 OPERATIONS AND MAINTENANCE.....	3
2.1 Integrated Safety and Loss Management System.....	3
2.2 System Operations.....	3
2.3 System Maintenance.....	3
2.4 Environment Policy.....	3
2.5 Kinder Morgan Code of Business Conduct and Ethics.....	6
3.0 OPERATING STANDARDS AND DOCUMENTATION.....	7
3.1 Government Regulatory Requirements.....	7
3.1.1 National Energy Board.....	7
3.1.2 Westridge Marine Terminal.....	7
4.0 OPERATIONS AND MAINTENANCE STAFFING AND TRAINING.....	8
4.1 Field Staffing and Locations.....	8
4.2 Training of Field Personnel.....	8
4.3 Training of Control Centre Operators.....	8
5.0 OPERATING AND MAINTENANCE PROCEDURES.....	10
5.1 Pipelines and Remote Mainline Block Valves Sites.....	10
5.2 Pump Stations and Ancillary Facilities.....	11
5.3 Terminals.....	12
5.3.1 General Operating and Maintenance Procedures.....	12
5.3.2 Specific Operating Manuals and Maintenance Procedures.....	13
5.3.3 Special Operating Manuals and Maintenance Procedures for Westridge Marine Terminal.....	14
6.0 ROUTINE INSPECTION AND MAINTENANCE ACTIVITIES.....	15
6.1 Pipeline Surveillance.....	15
6.2 Pipeline Maintenance.....	15
6.3 Pump Station and Terminal Surveillance.....	15
6.4 Pump Station and Terminal Maintenance.....	16
6.4.1 Westridge Marine Terminal Maintenance.....	16
7.0 SYSTEM OPERATIONS, CONTROL, AND LEAK DETECTION.....	17
7.1 Centralized Monitoring and Control.....	17
7.1.1 Control Centres.....	17
7.1.2 Control Centre Procedures.....	17
7.1.3 Supervisory Control and Data Acquisition System.....	17
7.1.4 Supervisory Control and Data Acquisition System Redundancy.....	18
7.1.5 Emergency Shut Down System and Procedures.....	18
7.1.6 Supervisory Control and Data Acquisition Communications.....	19
7.1.7 Operations Schedule.....	19
7.1.8 Batching.....	19

7.1.9	Pump Stations .....	20
7.1.10	Westridge Marine Terminal.....	20
7.1.11	Leak Prevention, Detection, and Response to Probable Leaks .....	22
8.0	SYSTEMS INTEGRITY MANAGEMENT .....	25
8.1	Pipeline Integrity Management Program .....	25
8.1.1	General .....	25
8.1.2	Baseline Risk Assessment .....	26
8.1.3	Annual Risk Assessments .....	26
8.1.4	In-line Inspection Program.....	26
8.1.5	Prevention Programs.....	28
8.1.6	Monitoring Programs .....	28
8.1.7	Mitigation Programs .....	29
8.2	Facility Integrity Management .....	29
8.2.1	Baseline Risk Assessment .....	29
8.2.2	Periodic Risk Assessments .....	30
8.2.3	Inspection.....	30
8.2.4	Prevention Programs.....	30
8.2.5	Monitoring Programs .....	30
8.2.6	Mitigation Programs .....	31
9.0	ENVIRONMENT, HEALTH AND SAFETY MANAGEMENT .....	32
9.1	Environment, Health and Safety Management System .....	32
9.1.1	Policy and Commitment.....	32
9.1.2	Planning .....	32
9.1.3	Implementation.....	33
9.1.4	Checking and Corrective Action .....	33
9.1.5	Management Review.....	33
10.0	EMERGENCY PREPAREDNESS AND RESPONSE .....	34
10.1	General.....	34
10.2	Emergency Management Program .....	35
10.2.1	Incident Command System.....	36
10.2.2	Emergency Response Manuals and Reference Material .....	38
10.2.3	Spill Response Resources .....	40
10.2.4	Training and Exercise Programs .....	42
10.2.5	Community Awareness and Emergency Preparedness .....	42
10.2.6	Planning and Improvements .....	44
11.0	SECURITY MANAGEMENT PROGRAM.....	47
12.0	PRELIMINARY ABANDONMENT PLAN .....	48
12.1	Introduction .....	48
12.2	Background.....	48
12.2.1	RH-2-2008.....	48
12.2.2	MH-001-2012 .....	48
12.2.3	Ongoing Technical Research .....	48
12.2.4	Filing Requirements .....	49
12.3	Preliminary Abandonment Plan.....	49
12.3.1	Abandonment Methodology.....	50

12.3.2	Post-abandonment Reclamation Objectives .....	51
12.3.3	Abandonment Consultation .....	51
12.3.4	Preliminary Abandonment Cost Estimate .....	51
13.0	REFERENCES .....	53
13.1	Literature Cited .....	53
14.0	APPENDICES .....	54

### LIST OF APPENDICES

Appendix A	Project Configuration Map
Appendix B	Kinder Morgan Code of Business Conduct and Ethics

### LIST OF FIGURES

Figure 2.4.1	KMC Environment, Health and Safety Policy .....	5
Figure 10.1.1	KMC ISLMS, EHS Management System, and the Emergency Management Program .....	34
Figure 10.2.1	ICS Organizational Structure .....	37

### LIST OF TABLES

Table 10.2.1	Three-Tiered Response Structure .....	38
Table 10.2.2	Location of Internal Response Equipment.....	40

## ABBREVIATIONS AND ACRONYMS

This is a list of the abbreviations and acronyms used in this volume of the application.

Term	Meaning
AB	Alberta
API	American Petroleum Institute
bbl/d	barrels per day
BC	British Columbia
CCO	Control Centre Operations
CCTP	Control Centre Training Program
CEA	Canadian Environmental Assessment
CMMS	Computerized Maintenance Management System
CP	cathodic protection
CPCN	Certificate of Public Convenience and Necessity
CPM	Computational Pipeline Monitoring
CSA	Canadian Standards Association
CST	Crisis Support Team
DNV	Det Norske Veritas
DOT	Department of Transportation
EHS	Environment, Health and Safety
ERP	Emergency Response Plan
ESD	emergency shut down
FIMP	Facility Integrity Management Program
HAZOP	hazards and operability
HCA	High Consequence Area
HMI	human-machine interface
ICS	Incident Command System
ILI	In-line Inspection
IMP	Integrity Management Program
ISGOTT	International Safety Guide for Oil Tankers and Terminals
ISLMS	Integrated Safety and Loss Management System
KEEP	Knowledge and Experience Enhancement Program
KMC	Kinder Morgan Canada Inc.
KMC OFSP	KMC Operations Facility Security Plan
LMCI	Land Matters Consultation Initiative
NEB	National Energy Board
<i>NEB Act</i>	<i>National Energy Board Act</i>
OPR	Onshore Pipeline Regulations
OPS	Office of Pipeline Safety
OQ	Operator Qualification
OSCAR	Oil Spill Containment and Recovery
PCC	Primary Control Centre
PLC	Programmable Logic Controller
PMV	Port Metro Vancouver
RMLBVs	remote mainline block valves
SCADA	Supervisory Control and Data Acquisition
SCC	Secondary Control Centre
TERA	TERA Environmental Consultants
the Code	the Kinder Morgan Code of Business Conduct and Ethics

<b>Term</b>	<b>Meaning</b>
TMEP	Trans Mountain Expansion Project
TMPL	Trans Mountain Pipeline
Trans Mountain	Trans Mountain Pipeline ULC
VCU	vapour combustion unit
VHF	Very High Frequency
VRU	vapour recover unit
WCSS	Western Canada Spill Services
WCMRC	Western Canada Marine Spill Response Corporation



## NEB FILING MANUAL CHECKLIST

### CHAPTER 3 – COMMON INFORMATION REQUIREMENTS

Filing #	Filing Requirement	In Application? References	Not in Application? Explanation
<b>3.1 Action Sought by Applicant</b>			
1.	Requirements of s.15 of the Rules.	Volume 1 Section 1.1	---
<b>3.2 Application or Project Purpose</b>			
1.	Purpose of the proposed project.	Volume 2 Section 1.1	---
<b>3.4 Consultation</b>			
		Volumes 3A, 3B, 3C; Volumes 5A, 5B Section 3; Volume 8A Section 3	--
<b>3.4.1 Principles and Goals of Consultation</b>			
1.	The corporate policy or vision.	Volume 3A Section 1.2.1 Volume 3B Section 1.2.1	--
2.	The principles and goals of consultation for the project.	Volume 3A Section 1.2.2 Volume 3B Section 1.2.2 Volume 5A Section 3.2.1 Volume 5B Section 3.2.1	--
3.	A copy of the Aboriginal protocol and copies of policies and principles for collecting traditional use information, if available.	Volume 3B Section 1.3.5	--
<b>3.4.2 Design of Consultation Program</b>			
1.	The design of the consultation program and the factors that influenced the design.	Volume 3A Section 1.3 Volume 3B Section 1.3 Volume 5A Section 3.1.1, 3.2.2 Volume 5B Section 3.1.1, 3.2.2	--
<b>3.4.3 Implementing a Consultation Program</b>			
1.	The outcomes of the consultation program for the project.	Volume 3A Section 1.7 Volume 3B Section 1.5 Table 1.5.1 Volume 5A Section 3.1.5, 3.2.4 Volume 5B Section 3.1.5, 3.2.4	--
<b>3.4.4 Justification for Not Undertaking a Consultation Program</b>			
2.	The application provides justification for why the applicant has determined that a consultation program is not required for the project.	N/A	N/A
<b>3.5 Notification of Commercial Third Parties</b>			
1.	Confirm that third parties were notified.	Volume 2 Section 3.2.2	--
2.	Details regarding the concerns of third parties.	Volume 2 Section 3.2.2	--
3.	List the self-identified interested third parties and confirm they have been notified.	N/A	N/A
4.	If notification of third parties is considered unnecessary, an explanation to this effect.	N/A	N/A

## CHAPTER 4 – SECTIONS 4.1 AND 4.2: COMMON REQUIREMENTS FOR PHYSICAL PROJECTS

Filing #	Filing Requirement	In Application? References	Not in Application? Explanation
<b>4.1 Description of the Project</b>			
1.	The project components, activities and related undertakings.	Volume 2 Section 2.0; Volume 4A	--
2.	The project location and criteria used to determine the route or site.	Volume 2 Section 4.0; Volume 4A	--
3.	How and when the project will be carried out.	Volume 2 Section 2.3; Volume 4B Section 2	--
4.	Description of any facilities, to be constructed by others, required to accommodate the proposed facilities.	N/A	N/A
5.	An estimate of the total capital costs and incremental operating costs, and changes to abandonment cost estimates.	Volume 2 Section 2.9	--
6.	The expected in-service date.	Volume 2 Section 1.1; Volume 4B Section 2.1	--
<b>4.2 Economic Feasibility, Alternatives and Justification</b>			
<b>4.2.1 Economic Feasibility</b>			
1.	Describe the economic feasibility of the project.	Volume 2 Section 3.5	--
<b>4.2.2 Alternatives</b>			
1.	Describe the need for the project, other economically-feasible alternatives to the project examined, along with the rationale for selecting the applied for project over these other possible options.	Volume 2 Section .3.0; Volume 8A Section 2.2	--
2.	Describe and justify the selection of the proposed route and site including a comparison of the options evaluated using appropriate selection criteria.	Volume 2 Section 4.0; Volume 8A Section 2.2	--
3.	Describe the rationale for the chosen design and construction methods. Where appropriate, describe any alternative designs and methods evaluated and explain why these other options were eliminated.	Volume 2 Section 4.0; Volume 8A Section 2.2	--
<b>4.2.3 Justification</b>			
1.	Provide a justification for the proposed project	Volume 2 Section 3.4	--

## GUIDE A – A.1 ENGINEERING

Filing #	Filing Requirement	In Application? References	Not in Application? Explanation
<b>A.1.1 Engineering Design Details</b>			
1.	Fluid type and chemical composition.	Volume 4A Section 3.1.1	--
2.	Line pipe specifications.	Volume 4A Section 3.2.8	--
3.	Pigging facilities specifications.	Volume 4A Section 3.3.1, 3.3.2	--
4.	Compressor or pump facilities specifications.	Volume 4A Section 3.4	--
5.	Pressure regulating or metering facilities specifications.	Volume 4A Section 3.5	--
6.	Liquid tank specifications, or other commodity storage facilities.	Volume 4A Section 3.4	--
7.	New control system facilities specifications.	Volume 4A Section 3.3	--
8.	Gas processing, sulphur or LNG plant facilities specifications.	N/A	N/A
9.	Technical description of other facilities not mentioned above.	N/A	N/A
10.	Building dimensions and uses.	Volume 4A Section 3.3, 3.4, 3.5	--
11.	If project is a new system that is a critical source of energy supply, a description of the impact to the new system capabilities following loss of critical component.	N/A	N/A
<b>A.1.2 Engineering Design Principles</b>			
1.	Confirmation project activities will follow the requirements of the latest version of CSA Z662.	Volume 4A Section 2.2	--
2.	Provide a statement indicating which Annex is being used and for what purpose	Volume 4A Section 2.3	--
3.	Statement confirming compliance with OPR or PPR.	Volume 4A Section 2.1	--
4.	Listing of all primary codes and standards, including version and date of issue.	Volume 4A Section 2, Table 5.1.1	--
5.	Confirmation that the project will comply with company manuals and confirm manuals comply with OPR/PPR and codes and standards.	Volume 4A Section 2.6, Table 5.1.2	--
6.	Any portion of the project a non-hydrocarbon commodity pipeline system? Provide a QA program to ensure the materials are appropriate for their intended service.	N/A – all hydrocarbons	N/A
7.	If facility subject to conditions not addressed in CSA Z662: <ul style="list-style-type: none"> <li>• Written statement by qualified professional engineer</li> <li>• Description of the designs and measures required to safeguard the pipeline</li> </ul>	Volume 4A Section 2.9	--
8.	If directional drilling involved: <ul style="list-style-type: none"> <li>• Preliminary feasibility report</li> <li>• Description of the contingency plan</li> </ul>	Volume 4A Section 2.12	--
9.	If the proposed project involves the reuse of materials, provide an engineering assessment in accordance with CSA Z662 that indicates its suitability for the intended service.	Volume 4A, Section 2.7	--
10.	If new materials are involved, provide material supply chain information, in tabular format.	Volume 4A Section 2.7	
11.	If reuse of material is involved, provide an engineering assessment in accordance with CSA Z662 that indicates its suitability for the intended service.	Volume 4A, Section 2.7	--
<b>A.1.3 Onshore Pipeline Regulations</b>			
1.	Designs, specifications programs, manuals, procedures, measures or plans for which no standard is set out in the OPR or PPR.	--	Existing standards will be followed
2.	A quality assurance program if project non-routine or incorporates unique challenges due to geographical location.	--	No unique challenges
3.	If welding performed on a liquid-filled pipeline that has a carbon equivalent of 0.50% or greater and is a permanent installation: <ul style="list-style-type: none"> <li>• Welding specifications and procedures</li> <li>• Results of procedure qualification tests</li> </ul>	--	Welding on liquid filled pipe will not be conducted

## GUIDE A – A.2 ENVIRONMENTAL AND SOCIO-ECONOMIC ASSESSMENT

The following table identifies where information requested in the National Energy Board (NEB) Filing Manual Guide A – A.2 Environmental and Socio-economic Assessment checklist may be found in the various volumes of the Application for the Trans Mountain Expansion Project.

Filing #	Filing Requirement	In Application? References	Applicable Marine Transportation Elements	Not in Application? Explanation?
<b>A.2.5 Description of the Environmental and Socio-Economic Setting</b>				
1.	Identify and describe the current biophysical and socio-economic setting of each element ( <i>i.e.</i> , baseline information) in the area where the project is to be carried out.	Volume 5A: ESA - Biophysical <ul style="list-style-type: none"> <li>• Sections 5.0 and 6.0</li> </ul> Volume 5B: ESA - Socio-Economic <ul style="list-style-type: none"> <li>• Sections 5.0 and 6.0</li> </ul> Volume 5C: ESA - Biophysical Technical Reports Volume 5D: ESA - Socio-Economic Technical Reports	Volume 8A: Marine Transportation <ul style="list-style-type: none"> <li>• Section 4.2</li> </ul> Volume 8B: Technical Reports	---
2.	Describe which biophysical or socio-economic elements in the study area are of ecological, economic, or human importance and require more detailed analysis taking into account the results of consultation (see Table A-1 for examples). Where circumstances require more detailed information in an ESA see: i. Table A-2 – Filing Requirements for Biophysical Elements; or ii. Table A-3 – Filing Requirements for Socio-economic Elements.	Volume 5A: ESA - Biophysical <ul style="list-style-type: none"> <li>• Sections 5.0 and 6.0</li> </ul> Volume 5B: ESA - Socio-Economic <ul style="list-style-type: none"> <li>• Sections 5.0 and 6.0</li> </ul> Volume 5C: ESA - Biophysical Technical Reports Volume 5D: ESA - Socio-Economic Technical Reports	Volume 8A: Marine Transportation <ul style="list-style-type: none"> <li>• Section 4.2</li> </ul> Volume 8B: Technical Reports	---
3.	Provide supporting evidence ( <i>e.g.</i> , references to scientific literature, field studies, local and traditional knowledge, previous environmental assessment and monitoring reports) for: <ul style="list-style-type: none"> <li>• information and data collected;</li> <li>• analysis completed;</li> <li>• conclusions reached; and</li> <li>• the extent of professional judgment or experience relied upon in meeting these information requirements, and the rationale for that extent of reliance.</li> </ul>	Volume 5A: ESA - Biophysical <ul style="list-style-type: none"> <li>• Sections 5.0 and 6.0</li> </ul> Volume 5B: ESA - Socio-Economic <ul style="list-style-type: none"> <li>• Sections 5.0 and 6.0</li> </ul> Volume 5C: ESA - Biophysical Technical Reports Volume 5D: ESA - Socio-Economic Technical Reports	Volume 8A: Marine Transportation <ul style="list-style-type: none"> <li>• Section 4.2</li> </ul> Volume 8B: Technical Reports	---
4.	Describe and substantiate the methods used for any surveys, such as those pertaining to wildlife, fisheries, plants, species at risk or species of special status, soils, heritage resources or traditional land use, and for establishing the baseline setting for the atmospheric and acoustic environment.	Volume 5A: ESA - Biophysical <ul style="list-style-type: none"> <li>• Sections 5.0 and 6.0</li> </ul> Volume 5B: ESA - Socio-Economic <ul style="list-style-type: none"> <li>• Sections 5.0 and 6.0</li> </ul> Volume 5C: ESA - Biophysical Technical Reports Volume 5D: ESA - Socio-Economic Technical Reports	Volume 8A: Marine Transportation <ul style="list-style-type: none"> <li>• Section 4.2</li> </ul> Volume 8B: Technical Reports	---
5.	Applicants must consult with other expert federal, provincial or territorial departments and other relevant authorities on requirements for baseline information and methods.	Volume 5A: ESA - Biophysical <ul style="list-style-type: none"> <li>• Sections 3.0, 5.0 and 6.0</li> </ul> Volume 5B: ESA - Socio-Economic <ul style="list-style-type: none"> <li>• Sections 3.0, 5.0 and 6.0</li> </ul> Volume 5C: ESA - Biophysical Technical Reports Volume 5D: ESA - Socio-Economic Technical Reports	Volume 8A: Marine Transportation <ul style="list-style-type: none"> <li>• Sections 3.0 and 4.2</li> </ul> Volume 8B: Technical Reports	---

Filing #	Filing Requirement	In Application? References	Applicable Marine Transportation Elements	Not in Application? Explanation
<b>A.2.6 Effects Assessment</b>				
Identification and Analysis of Effects				
1.	Describe the methods used to predict the effects of the project on the biophysical and socio-economic elements, and the effects of the environment on the project ( <i>i.e.</i> , changes to the Project caused by the environment).	Volume 5A: ESA - Biophysical • Section 7.0 Volume 5B: ESA - Socio-Economic • Section 7.0 Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 6.0, 7.0 and 8.0 • Technical Reports	Volume 8A: Marine Transportation • Sections 4.3, 5.5 and 5.6	---
2.	Predict the effects associated with the proposed project, including those that could be caused by construction, operations, decommissioning or abandonment, as well as accidents and malfunctions. Also include effects the environment could have on the project. For those biophysical and socio-economic elements or their valued components that require further analysis (see Table A-1), provide the detailed information outlined in Tables A-2 and A-3.	Volume 5A: ESA - Biophysical • Section 7.0 Volume 5B: ESA - Socio-Economic • Section 7.0 Volume 5C: ESA - Biophysical Technical Reports Volume 5D: ESA - Socio-Economic Technical Reports Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 6.0, 7.0 and 8.0 • Technical Reports	Volume 8A: Marine Transportation • Sections 4.3, 5.6 and 5.7 Volume 8B: Technical Reports	---
Mitigation Measures for Effects				
1.	Describe the standard and project specific mitigation measures and their adequacy for addressing the project effects, or clearly reference specific sections of company manuals that provide mitigation measures. Ensure that referenced manuals are current and filed with the NEB.	Volume 5A: ESA - Biophysical • Section 7.0 Volume 5B: ESA - Socio-Economic • Section 7.0 Volume 5C: ESA - Biophysical Technical Reports Volume 5D: ESA - Socio-Economic Technical Reports Volume 6B: Pipeline Environmental Protection Plan (EPP) Volume 6C: Facilities EPP Volume 6D: Westridge Marine Terminal EPP Volume 6E: Environmental Alignment Sheets Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 2.0, 3.0, 4.0, 6.0, 7.0, and 8.0 • Technical Reports	Volume 8A: Marine Transportation • Sections 4.3, 5.1, 5.3, 5.6 and 5.7 Volume 8B: Technical Reports	---
2.	Ensure that commitments about mitigative measures will be communicated to field staff for implementation through an Environmental Protection Plan.	Volume 5A: ESA - Biophysical • Section 7.0 Volume 5B: ESA - Socio-Economic • Section 7.0 Volume 6A: Environmental Compliance Volume 6B: Pipeline EPP Volume 6C: Facilities EPP Volume 6D: Westridge Marine Terminal EPP Volume 6E: Environmental Alignment Sheets Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 2.0, 3.0, 4.0, 6.0, 7.0 and 8.0	Volume 8A: Marine Transportation • Sections 4.3, 5.1, 5.3, 5.6 and 5.7	---

Filing #	Filing Requirement	In Application? References	Applicable Marine Transportation Elements	Not in Application? Explanation
3.	Describe plans and measures to address potential effects of accidents and malfunctions during construction and operation of the project.	Volume 5A: ESA - Biophysical • Section 7.0 Volume 5B: ESA - Socio-Economic • Section 7.0 Volume 6B: Pipeline EPP Volume 6C: Facilities EPP Volume 6D: Westridge Marine Terminal EPP Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 2.0, 4.0, 6.0, 7.0 and 8.0	Volume 8A: Marine Transportation • Sections 4.3, 5.1, 5.3, 5.6 and 5.7	---
<b>Evaluation of Significance</b>				
1.	After taking into account any appropriate mitigation measures, identify any remaining residual effects from the project.	Volume 5A: ESA - Biophysical • Section 7.0 Volume 5B: ESA - Socio-Economic • Section 7.0	Volume 8A: Marine Transportation • Section 4.3	---
2.	Describe the methods and criteria used to determine the significance of remaining adverse effects, including defining the point at which any particular effect on a valued component is considered "significant".	Volume 5A: ESA - Biophysical • Section 7.0 Volume 5B: ESA - Socio-Economic • Section 7.0	Volume 8A: Marine Transportation • Section 4.3	---
3.	Evaluate significance of residual adverse environmental and socio-economic effects against the defined criteria.	Volume 5A: ESA - Biophysical • Section 7.0 Volume 5B: ESA - Socio-Economic • Section 7.0	Volume 8A: Marine Transportation • Section 4.3	---
4.	Evaluate the likelihood of significant, residual adverse environmental and socio-economic effects occurring and substantiate the conclusions made.	Volume 5A: ESA - Biophysical • Section 7.0 Volume 5B: ESA - Socio-Economic • Section 7.0	Volume 8A: Marine Transportation • Section 4.3	---
<b>A.2.7 Cumulative Effects Assessment</b>				
<b>Scoping and Analysis of Cumulative Effects</b>				
1.	Identify the valued components for which residual effects are predicted, and describe and justify the methods used to predict any residual results.	Volume 5A: ESA - Biophysical • Section 8.0 Volume 5B: ESA - Socio-Economic • Section 8.0	Volume 8A: Marine Transportation • Section 4.4	---
2.	For each valued component where residual effects have been identified, describe and justify the spatial and temporal boundaries used to assess the potential cumulative effects.	Volume 5A: ESA - Biophysical • Section 8.0 Volume 5B: ESA - Socio-Economic • Section 8.0	Volume 8A: Marine Transportation • Section 4.4	---
3.	Identify other physical works or activities that have been or will be carried out within the identified spatial and temporal boundaries for the cumulative effects assessment.	Volume 5A: ESA - Biophysical • Section 8.0 Volume 5B: ESA - Socio-Economic • Section 8.0	Volume 8A: Marine Transportation • Section 4.4	---
4.	Identify whether the effects of those physical works or activities that have been or will be carried out would be likely to produce effects on the valued components within the identified spatial and temporal boundaries.	Volume 5A: ESA - Biophysical • Section 8.0 Volume 5B: ESA - Socio-Economic • Section 8.0	Volume 8A: Marine Transportation • Section 4.4	---

Filing #	Filing Requirement	In Application? References	Applicable Marine Transportation Elements	Not in Application? Explanation
5.	Where other physical works or activities may affect the valued components for which residual effects from the applicant's proposed project are predicted, continue the cumulative effects assessment, as follows: <ul style="list-style-type: none"> <li>consider the various components, phases and activities associated with the applicant's project that could interact with other physical work or activities;</li> <li>provide a description of the extent of the cumulative effects on valued components; and</li> <li>where professional knowledge or experience is cited, explain the extent to which professional knowledge or experience was relied upon and justify how the resulting conclusions or decisions were reached.</li> </ul>	Volume 5A: ESA - Biophysical <ul style="list-style-type: none"> <li>Section 8.0</li> </ul> Volume 5B: ESA - Socio-Economic <ul style="list-style-type: none"> <li>Section 8.0</li> </ul>	Volume 8A: Marine Transportation <ul style="list-style-type: none"> <li>Section 4.4</li> </ul>	---
<b>Mitigation Measures for Cumulative Effects</b>				
1.	Describe the general and specific mitigation measures, beyond project-specific mitigation already considered, that are technically and economically feasible to address any cumulative effects.	Volume 5A: ESA - Biophysical <ul style="list-style-type: none"> <li>Section 8.0</li> </ul> Volume 5B: ESA - Socio-Economic <ul style="list-style-type: none"> <li>Section 8.0</li> </ul>	Volume 8A: Marine Transportation <ul style="list-style-type: none"> <li>Section 4.4</li> </ul>	---
<b>Applicant's Evaluation of Significance of Cumulative Effects</b>				
1.	After taking into account any appropriate mitigation measures for cumulative effects, identify any remaining residual cumulative effects.	Volume 5A: ESA - Biophysical <ul style="list-style-type: none"> <li>Section 8.0</li> </ul> Volume 5B: ESA - Socio-Economic <ul style="list-style-type: none"> <li>Section 8.0</li> </ul>	Volume 8A: Marine Transportation <ul style="list-style-type: none"> <li>Section 4.4</li> </ul>	---
2.	Describe the methods and criteria used to determine the significance of remaining adverse cumulative effects, including defining the point at which each identified cumulative effect on a valued component is considered "significant".	Volume 5A: ESA - Biophysical <ul style="list-style-type: none"> <li>Section 8.0</li> </ul> Volume 5B: ESA - Socio-Economic <ul style="list-style-type: none"> <li>Section 8.0</li> </ul>	Volume 8A: Marine Transportation <ul style="list-style-type: none"> <li>Section 4.4</li> </ul>	---
3.	Evaluate the significance of adverse residual cumulative effects against the defined criteria.	Volume 5A: ESA - Biophysical <ul style="list-style-type: none"> <li>Section 8.0</li> </ul> Volume 5B: ESA - Socio-Economic <ul style="list-style-type: none"> <li>Section 8.0</li> </ul>	Volume 8A: Marine Transportation <ul style="list-style-type: none"> <li>Section 4.4</li> </ul>	---
4.	Evaluate the likelihood of significant, residual adverse cumulative environmental and socio-economic effects occurring and substantiate the conclusions made.	Volume 5A: ESA - Biophysical <ul style="list-style-type: none"> <li>Section 8.0</li> </ul> Volume 5B: ESA - Socio-Economic <ul style="list-style-type: none"> <li>Section 8.0</li> </ul>	Volume 8A: Marine Transportation <ul style="list-style-type: none"> <li>Section 4.4</li> </ul>	---
<b>A.2.8 Inspection, Monitoring and Follow-up</b>				
1.	Describe inspection plans to ensure compliance with biophysical and socio-economic commitments, consistent with Sections 48, 53 and 54 of the <i>NEB Onshore Pipeline Regulations (OPR)</i> .	Volume 5A: ESA - Biophysical <ul style="list-style-type: none"> <li>Section 7.0</li> </ul> Volume 5B: ESA - Socio-Economic <ul style="list-style-type: none"> <li>Section 7.0</li> </ul> Volume 6A: Environmental Compliance Volume 6B: Pipeline EPP Volume 6C: Facilities EPP Volume 6D: Westridge Marine Terminal EPP	Volume 8A: Marine Transportation <ul style="list-style-type: none"> <li>Section 4.3</li> </ul>	---

Filing #	Filing Requirement	In Application? References	Applicable Marine Transportation Elements	Not in Application? Explanation
2.	Describe the surveillance and monitoring program for the protection of the pipeline, the public and the environment, as required by Section 39 of the <i>NEB OPR</i> .	Volume 5A: ESA - Biophysical • Section 7.0 Volume 5B: ESA - Socio-Economic • Section 7.0 Volume 6A: Environmental Compliance Volume 6B: Pipeline EPP Volume 6C: Facilities EPP Volume 6D: Westridge Marine Terminal EPP	Volume 8A: Marine Transportation • Section 4.3	---
3.	Consider any particular elements in the Application that are of greater concern and evaluate the need for a more in-depth monitoring program for those elements.	Volume 5A: ESA - Biophysical • Sections 9.0 and 10.0 Volume 5B: ESA - Socio-Economic • Sections 9.0 and 10.0 Volume 6A: Environmental Compliance Volume 6B: Pipeline EPP (Socio-Economic Management Plan of Appendix C)	Volume 8A: Marine Transportation • Section 4.5	---
4.	For <i>Canadian Environmental Assessment (CEA) Act, 2012</i> designated projects, identify which elements and monitoring procedures would constitute follow-up under the <i>CEA Act, 2012</i> .	Volume 5A: ESA - Biophysical • Section 10.0 Volume 5B: ESA - Socio-economic • Section 10.0	N/A	---



Filing #	Filing Requirement	In Application? References	Applicable Marine Transportation Elements	Not in Application? Explanation
<b>Table A-1 Circumstances and Interactions Requiring Detailed Biophysical and Socio-Economic Information</b>				
	Physical and meteorological environment	Volume 5A: ESA - Biophysical <ul style="list-style-type: none"> <li>Sections 5.0, 6.0 and 7.0</li> </ul>	N/A	---
	Soil and soil productivity	Volume 5A: ESA - Biophysical <ul style="list-style-type: none"> <li>Sections 5.0, 6.0, 7.0 and 8.0</li> </ul> Volume 5C: ESA - Biophysical Technical Reports <ul style="list-style-type: none"> <li>Soil Assessment Technical Report</li> </ul> Volume 7: Risk Assessment and Management of Pipeline and Facility Spills <ul style="list-style-type: none"> <li>Section 5.3, 6.0 and 7.0</li> </ul>	N/A	---
	Water quality and quantity (onshore and marine)	Volume 5A: ESA - Biophysical <ul style="list-style-type: none"> <li>Sections 5.0, 6.0, 7.0 and 8.0</li> </ul> Volume 5C: ESA - Biophysical Technical Reports <ul style="list-style-type: none"> <li>Groundwater Technical Report</li> <li>Fisheries (Alberta) Technical Report</li> <li>Fisheries (British Columbia) Technical Report</li> <li>Wetland Evaluation Technical Report</li> <li>Marine Sediment and Water Quality – Westridge Marine Terminal Technical Report</li> </ul> Volume 7: Risk Assessment and Management of Pipeline and Facility Spills <ul style="list-style-type: none"> <li>Section 7.0</li> <li>Quality Ecological Risk Assessment of Pipeline Spills Technical Report</li> </ul>	Volume 8A: Marine Transportation <ul style="list-style-type: none"> <li>Sections 4.2, 4.3, 4.4, 5.6 and 5.7</li> </ul> Volume 8B: Technical Reports <ul style="list-style-type: none"> <li>Ecological Risk Assessment of Marine Transportation Spills Technical Report</li> </ul>	---
	Air emissions (onshore and marine)	Volume 5A: ESA - Biophysical <ul style="list-style-type: none"> <li>Sections 5.0, 6.0, 7.0 and 8.0</li> </ul> Volume 5C: ESA - Biophysical Technical Reports <ul style="list-style-type: none"> <li>Marine Air Quality and Greenhouse Gas – Marine Transportation Technical Report</li> <li>Air Quality and Greenhouse Gas Emissions Technical Report</li> </ul> Volume 7: Risk Assessment and Management of Pipeline and Facility Spills <ul style="list-style-type: none"> <li>Section 7.0</li> </ul>	Volume 8A: Marine Transportation <ul style="list-style-type: none"> <li>Sections 4.2, 4.3, 4.4, 5.6 and 5.7</li> </ul> Volume 8B: Technical Reports <ul style="list-style-type: none"> <li>Marine Air Quality and Greenhouse Gas Emissions</li> </ul>	---
	Greenhouse gas emissions (onshore and marine)	Volume 5A: ESA - Biophysical <ul style="list-style-type: none"> <li>Sections 5.0, 6.0 and 7.0</li> </ul> Volume 5C: ESA - Biophysical Technical Reports <ul style="list-style-type: none"> <li>Air Quality and Greenhouse Gas Emissions Technical Report</li> </ul>	Volume 8A: Marine Transportation <ul style="list-style-type: none"> <li>Sections 4.2 and 4.3</li> </ul> Volume 8B: Technical Reports <ul style="list-style-type: none"> <li>Marine Air Quality and Greenhouse Gas Emissions</li> </ul>	---
	Acoustic environment (onshore and marine)	Volume 5A: ESA - Biophysical <ul style="list-style-type: none"> <li>Sections 5.0, 6.0, 7.0, and 8.0</li> </ul> Volume 5C: ESA - Biophysical Technical Reports <ul style="list-style-type: none"> <li>Acoustic Environment Technical Report</li> </ul>	Volume 8A: Marine Transportation <ul style="list-style-type: none"> <li>Sections 4.2, 4.3 and 4.4</li> </ul> Volume 8B: Technical Reports <ul style="list-style-type: none"> <li>Marine Noise (Atmospheric)</li> </ul>	---
	Fish and fish habitat (onshore and marine), including any fish habitat compensation required	Volume 5A: ESA - Biophysical <ul style="list-style-type: none"> <li>Sections 5.0, 6.0, 7.0 and 8.0</li> </ul> Volume 5C: ESA - Biophysical Technical Reports <ul style="list-style-type: none"> <li>Fisheries (Alberta) Technical Report</li> <li>Fisheries (British Columbia) Technical Report</li> <li>Marine Resources - Westridge Marine Terminal Technical Report</li> </ul> Volume 7: Risk Assessment and Management of Pipeline and Facility Spills <ul style="list-style-type: none"> <li>Sections 6.0, 7.0 and 8.0</li> <li>Qualitative Ecological Risk Assessment of Pipeline Spills Technical Report</li> </ul>	Volume 8A: Marine Transportation <ul style="list-style-type: none"> <li>Sections 4.2, 4.3, 4.4, 5.6 and 5.7</li> </ul> Volume 8B: Technical Reports <ul style="list-style-type: none"> <li>Marine Resources – Marine Transportation Technical Report</li> <li>Ecological Risk Assessment of Westridge Marine Terminal Spills</li> </ul>	---

Filing #	Filing Requirement	In Application? References	Applicable Marine Transportation Elements	Not in Application? Explanation
	Wetlands	Volume 5A: ESA - Biophysical • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5C: ESA - Biophysical Technical Reports • Wetland Evaluation Technical Report Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 7.0 and 8.0 • Qualitative Ecological Risk Assessment of Pipeline Spills Technical Report	N/A	---
	Vegetation	Volume 5A: ESA - Biophysical • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5C: ESA - Biophysical Technical Reports • Vegetation Technical Report Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 7.0 and 8.0 • Qualitative Ecological Risk Assessment of Pipeline Spills Technical Report	N/A	---
	Wildlife and wildlife habitat (onshore and marine)	Volume 5A: ESA - Biophysical • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5C: ESA - Biophysical Technical Reports • Wildlife and Wildlife Habitat Technical Report • Wildlife Modeling and Species Accounts Report • Marine Resources –Westridge Marine Terminal Technical Report • Marine Birds – Westridge Marine Terminal Technical Report Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 6.0, 7.0 and 8.0 • Qualitative Ecological Risk Assessment of Pipeline Spills Technical Report	Volume 8A: Marine Transportation • Sections 4.2, 4.3, 4.4, 5.6 and 5.7 Volume 8B: Technical Reports • Marine Resources – Marine Transportation Technical Report • Marine Birds – Marine Transportation Technical Report • Ecological Risk Assessment of Westridge Marine Terminal Spills	---
	Species at Risk or Species of Special Status and related habitat (onshore and marine)	Volume 5A: ESA - Biophysical • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5C: ESA - Biophysical Technical Reports • Fisheries (Alberta) Technical Report • Fisheries (British Columbia) Technical Report • Vegetation Technical Report • Wildlife and Wildlife Habitat Technical Report • Wildlife Modeling and Species Accounts Report • Marine Resources –Westridge Marine Terminal Technical Report • Marine Birds – Westridge Marine Terminal Technical Report Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 6.0, 7.0 and 8.0 • Qualitative Ecological Risk Assessment of Pipeline Spills Technical Report	Volume 8A: Marine Transportation • Sections 4.2, 4.3, 4.4, 5.6 and 5.7 Volume 8B: Technical Reports • Marine Resources – Marine Transportation Technical Report • Marine Birds – Marine Transportation Technical Report • Marine Transportation Spills Ecological Risk Assessment Technical Report	---

Filing #	Filing Requirement	In Application? References	Applicable Marine Transportation Elements	Not in Application? Explanation
	Human occupancy and resource use (onshore and marine)	Volume 5B: ESA - Socio-Economic <ul style="list-style-type: none"> <li>• Sections 5.0, 6.0, 7.0 and 8.0</li> </ul> Volume 5D: ESA - Socio-Economic Technical Reports <ul style="list-style-type: none"> <li>• Socio-Economic Technical Report</li> <li>• Managed Forest Areas Technical Report</li> <li>• Agricultural Assessment Technical Report</li> </ul> Volume 7: Risk Assessment and Management of Pipeline and Facility Spills <ul style="list-style-type: none"> <li>• Sections 6.0, 7.0 and 8.0</li> </ul>	Volume 8A: Marine Transportation <ul style="list-style-type: none"> <li>• Sections 4.2, 4.3, 4.4, 5.6 and 5.7</li> </ul> Volume 8B: Technical Reports <ul style="list-style-type: none"> <li>• Marine Commercial, Recreational and Tourism Use – Marine Transportation Technical Report</li> </ul>	---
	Heritage resources	Volume 5B: ESA - Socio-Economic <ul style="list-style-type: none"> <li>• Sections 5.0, 6.0 and 7.0</li> </ul> Volume 7: Risk Assessment and Management of Pipeline and Facility Spills <ul style="list-style-type: none"> <li>• Section 6.3.3</li> </ul>	N/A	---
	Navigation and navigation safety	Volume 5B: ESA - Socio-Economic <ul style="list-style-type: none"> <li>• Sections 5.0, 6.0 and 7.0</li> </ul> Volume 5D: ESA - Socio-Economic Technical Reports <ul style="list-style-type: none"> <li>• Socio-Economic Technical Report</li> </ul>	Volume 8A: Marine Transportation <ul style="list-style-type: none"> <li>• Section 5.2</li> </ul>	---
	Traditional land and resource use	Volume 5B: ESA - Socio-Economic <ul style="list-style-type: none"> <li>• Sections 5.0, 6.0, 7.0 and 8.0</li> </ul> Volume 5D: ESA - Socio-Economic Technical Reports <ul style="list-style-type: none"> <li>• Traditional Land and Resource Use Report</li> <li>• Pipeline and Facilities Human Health Risk Assessment Technical Report</li> </ul> Volume 7: Risk Assessment and Management of Pipeline and Facility Spills <ul style="list-style-type: none"> <li>• Sections 6.0, 7.0 and 8.0</li> <li>• Qualitative Ecological Risk Assessment of Pipeline Spills Technical Report</li> </ul>	Volume 8A: Marine Transportation <ul style="list-style-type: none"> <li>• Sections 4.2, 4.3, 4.4, 5.6 and 5.7</li> </ul> Volume 8B: Technical Reports <ul style="list-style-type: none"> <li>• Traditional Marine Use Report for Marine Transportation</li> <li>• Marine Transportation Human Health Risk Assessment Technical Report</li> </ul>	---
	Social and cultural well-being	Volume 5B: ESA - Socio-Economic <ul style="list-style-type: none"> <li>• Sections 5.0, 6.0, 7.0 and 8.0</li> </ul> Volume 5D: ESA - Socio-Economic Technical Reports <ul style="list-style-type: none"> <li>• Socio-Economic Technical Report</li> </ul> Volume 7: Risk Assessment and Management of Pipeline and Facility Spills <ul style="list-style-type: none"> <li>• Sections 6.0, 7.0 and 8.0</li> </ul>	N/A	---
	Human health and aesthetics	Volume 5B: ESA - Socio-Economic <ul style="list-style-type: none"> <li>• Sections 5.0, 6.0, 7.0 and 8.0</li> </ul> Volume 5D: ESA - Socio-Economic Technical Reports <ul style="list-style-type: none"> <li>• Socio-Economic Technical Report</li> <li>• Community Health Technical Report</li> <li>• Viewshed Modelling Analysis Technical Report</li> <li>• Pipeline and Facilities Human Health Risk Assessment Technical Report</li> </ul> Volume 7 Risk Assessment and Management of Pipeline and Facility Spills <ul style="list-style-type: none"> <li>• Sections 6.0, 7.0 and 8.0</li> <li>• Qualitative Ecological Risk Assessment of Pipeline Spills Technical Report</li> </ul>	Volume 7: Risk Assessment and Management of Pipeline and Facility Spills <ul style="list-style-type: none"> <li>• Qualitative Human Health Risk Assessment of Westridge Marine Terminal Technical Report</li> </ul> Volume 8A: Marine Transportation <ul style="list-style-type: none"> <li>• Sections 4.2, 4.3, 4.4, 5.6 and 5.7</li> </ul> Volume 8B: Technical Reports <ul style="list-style-type: none"> <li>• Marine Transportation Human Health Risk Assessment Technical Report</li> <li>• Marine Transportation Spills Human Health Risk Assessment Technical Report</li> </ul>	---

Filing #	Filing Requirement	In Application? References	Applicable Marine Transportation Elements	Not in Application? Explanation
	Infrastructure and services	Volume 5B: ESA - Socio-Economic • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5D: ESA - Socio-Economic Technical Reports • Socio-Economic Technical Report • Community Health Technical Report Volume 7: Risk Assessment and Management of Pipeline and Facility Spills • Sections 6.0, 7.0 and 8.0	Volume 8A: Marine Transportation • Sections 4.2, 4.3, 4.4, 5.6 and 5.7 Volume 8B: Technical Reports • Marine Commercial, Recreational and Tourism Use – Marine Transportation Technical Report	---
	Employment and economy	Volume 5B: ESA - Socio-Economic • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5D: ESA - Socio-Economic Technical Reports • Socio-Economic Technical Report • Worker Expenditures Analysis Technical Report	N/A	---

**GUIDE A – A.3 ECONOMICS**

Filing #	Filing Requirement	In Application? References	Not in Application? Explanation
<b>A.3.1 Supply</b>			
1.	A description of each commodity.	Volume 2 Section 3.1.1	--
2.	A discussion of all potential supply sources.	Volume 2 Section 3.3.2	--
3.	Forecast of productive capacity over the economic life of the facility.	Volume 2 Sections 3.3.1, 3.4.1	
4.	For pipelines with contracted capacity, a discussion of the contractual arrangements underpinning supply.	Volume 2 Section 3.3.2	--
<b>A.3.2 Transportation Matters</b>			
<b>Pipeline Capacity</b>			
1.	In the case of expansion provide: <ul style="list-style-type: none"> <li>• Pipeline capacity before and after and size of increment</li> <li>• Justification that size of expansion is appropriate</li> </ul>	Volume 2 Sections 1.1, 2.1, 3.5	--
2.	In case of new pipeline, justification that size of expansion is appropriate given available supply.	N/A – expansion	N/A
<b>Throughput</b>			
1.	For pipelines with contracted capacity, information on contractual arrangements.	Volume 2 Section 3.2.1	--
2.	For non-contract carrier pipelines, forecast of annual throughput volumes by commodity type, receipt location and delivery destination over facility life.	N/A	N/A
3.	If project results in an increase in throughput: <ul style="list-style-type: none"> <li>• theoretical and sustainable capabilities of the existing and proposed facilities versus the forecasted requirements</li> <li>• flow formulae and flow calculations used to determine the capabilities of the proposed facilities and the underlying assumptions and parameters</li> </ul>	Volume 2 Section 3.1	--
4.	If more than one type of commodity transported, a discussion pertaining to segregation of commodities including potential contamination issues or cost impacts.	N/A	N/A
<b>A.3.3 Markets</b>			
1.	Provide an analysis of the market in which each commodity is expected to be used or consumed.	Volume 2 Section 3.4.2	--
2.	Provide a discussion of the physical capability of upstream and downstream facilities to accept the incremental volumes that would be received and delivered.	Volume 2 Section 3.4.2	--
<b>A.3.4 Financing</b>			
1.	Evidence that the applicant has the ability to finance the proposed facilities.	Volume 2 Section 3.2.2	--
2.	Estimated toll impact for the first full year that facilities are expected to be in service.	Volume 2 Section 3.2.1	--
3.	Confirmation that shippers have been apprised of the project and toll impact, their concerns and plans to address them.	Volume 2 Section 3.2.1	--
4.	Additional toll details for applications with significant toll impacts.	Volume 2 Section 3.2.1	
<b>A.3.5 Non-NEB Regulatory Approvals</b>			
1.	Confirm that all non-NEB regulatory approvals required to allow the applicant to meet its construction schedule, planned in-service date and to allow the facilities to be used and useful are or will be in place.	Volume 2 Section 1.5	--
2.	If any of the approvals referred to in #1 may be delayed, describe the status of those approval(s) and provide an estimation of when the approval is anticipated.	Volume 2 Section 1.5	--

## GUIDE A – A.4 LANDS INFORMATION

Filing #	Filing Requirement	In Application? References	Not in Application? Explanation
<b>A.4.1 Land Areas</b>			
1.	<ul style="list-style-type: none"> <li>• Width of right-of-way and locations of any changes to width</li> <li>• Locations and dimensions of known temporary work space and drawings of typical dimensions</li> <li>• Locations and dimensions of any new lands for facilities</li> </ul>	Volume 2 Section 5.2	--
<b>A.4.2 Land Rights</b>			
1.	The type of lands rights proposed to be acquired for the project.	Volume 2 Section 5.3	--
2.	The relative proportions of land ownership along the route of the project.	Volume 2 Section 5.3.2	--
3.	Any existing land rights that will be required for the project.	Volume 2 Section 5.4	--
<b>A.4.3 Lands Acquisition Process</b>			
1.	The process for acquiring lands.	Volume 2 Section 5.4.1, 5.4.2	--
2.	The timing of acquisition and current status.	Volume 2 Section 5.4.3	--
3.	The status of service of section 87(1) notices.	Volume 2 Section 5.4.4	--
<b>A.4.4 Land Acquisition Agreements</b>			
1.	A sample copy of each form of agreement proposed to be used pursuant to section 86(2) of the NEB Act.	Volume 2 Section 5.4.2	--
2.	A sample copy of any proposed fee simple, work space, access or other land agreement.	Volume 2 Section 5.5.2	--
<b>A.4.5 Section 87 Notices</b>			
1.	A sample copy of the notice proposed to be served on all landowners pursuant to section 87(1) of the NEB Act.	Volume 2 Section 5.4.4, Appendix D	--
2.	Confirmation that all notices include a copy of Pipeline Regulation in Canada: A Guide for Landowners and the Public.	Volume 2 Section 5.4.4	--
<b>A.4.6 Section 58 Application to Address a Complaint</b>			
1.	The details of the complaint and describe how the proposed work will address the complaint.	N/A	N/A

**CONCORDANCE TABLE WITH THE CEA ACT, 2012**

CEA Act, 2012 Requirement	Section in CEA Act, 2012	Application Volume and Section
The environmental effects of the designated project, including:		
the environmental effects of malfunctions or accidents that may occur in connection with the designated project;	s.19.1(a)	Volume 5A ESA - Biophysical: <ul style="list-style-type: none"> <li>• Section 7.0</li> </ul> Volume 5B ESA - Socio-economic: <ul style="list-style-type: none"> <li>• Section 7.0</li> </ul> Volume 7 Risk Assessment and Management of Pipeline and Facility Spills Volume 8A Marine Transportation: <ul style="list-style-type: none"> <li>• Sections 4.3 and 5.0</li> </ul>
any cumulative environmental effects that are likely to result from the designated project in combination with other physical activities that have been or will be carried out;	s.19.1(a)	Volume 5A ESA - Biophysical: <ul style="list-style-type: none"> <li>• Section 8.0</li> </ul> Volume 5B ESA - Socio-economic: <ul style="list-style-type: none"> <li>• Section 8.0</li> </ul> Volume 8A Marine Transportation: <ul style="list-style-type: none"> <li>• Section 4.4</li> </ul>
the significance of the effects referred to in paragraph (a);	s.19.1(b)	Volume 5A ESA - Biophysical: <ul style="list-style-type: none"> <li>• Sections 7.0 and 8.0</li> </ul> Volume 5B ESA - Socio-economic: <ul style="list-style-type: none"> <li>• Sections 7.0 and 8.0</li> </ul> Volume 8A Marine Transportation: <ul style="list-style-type: none"> <li>• Sections 4.3 and 4.4</li> </ul>
comments from the public – or, with respect to a designated project that requires that a certificate be issued in accordance with an order made under section 54 of the <i>National Energy Board Act</i> , any interested party – that are received in accordance with this <i>act</i> ;	s.19.1(c)	Volume 3A Public Consultation Volume 3B Aboriginal Engagement Volume 3C Landowner Relations Volume 5A ESA - Biophysical: <ul style="list-style-type: none"> <li>• Section 3.0</li> </ul> Volume 5B ESA - Socio-economic: <ul style="list-style-type: none"> <li>• Section 3.0</li> </ul> Volume 8A Marine Transportation: <ul style="list-style-type: none"> <li>• Section 3.0</li> </ul>
mitigation measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the designated project;	s.19.1(d)	Volume 5A ESA - Biophysical: <ul style="list-style-type: none"> <li>• Sections 7.0 and 8.0</li> </ul> Volume 5B ESA - Socio-economic: <ul style="list-style-type: none"> <li>• Sections 7.0 and 8.0</li> </ul> Volume 5C ESA – Biophysical Technical Reports Volume 5D ESA - Socio-economic Technical Reports Volume 6B Pipeline Environmental Protection Plan Volume 6C Facilities Environmental Protection Plan Volume 6D Westridge Marine Terminal Environmental Protection Plan Volume 6E Environmental Alignment Sheets Volume 8A Marine Transportation: <ul style="list-style-type: none"> <li>• Sections 4.3, 4.4 and 5.0</li> </ul> Volume 8B Technical Reports
the requirements of the follow-up program in respect of the designated project;	s.19.1(e)	Volume 5A ESA - Biophysical: <ul style="list-style-type: none"> <li>• Section 10.0</li> </ul> Volume 5B ESA - Socio-economic: <ul style="list-style-type: none"> <li>• Section 10.0</li> </ul>
the purpose of the designated project;	s.19.1(f)	Volume 5A ESA - Biophysical: <ul style="list-style-type: none"> <li>• Section 2.0</li> </ul> Volume 5B ESA - Socio-economic: <ul style="list-style-type: none"> <li>• Section 2.0</li> </ul> Volume 8A Marine Transportation: <ul style="list-style-type: none"> <li>• Section 1.1</li> </ul>

**CONCORDANCE TABLE WITH THE CEA ACT, 2012**

CEA Act, 2012 Requirement	Section in CEA Act, 2012	Application Volume and Section
alternative means of carrying out the designated project that are technically and economically feasible and the environmental effects of any such alternative means;	s.19.1(g)	Volume 5A ESA - Biophysical: • Sections 2.0 and 4.0 Volume 5B ESA - Socio-economic: • Sections 2.0 and 4.0 Volume 8A Marine Transportation: • Section 2.2
any change to the designated project that may be caused by the environment;	s.19.1(h)	Volume 5A ESA - Biophysical: • Section 7.10 Volume 8A Marine Transportation: • Section 4.3
the results of any relevant study conducted by a committee established under section 73 or 74; and	s.19.1(i)	N/A
any other matter relevant to the environmental assessment that the responsible authority, or, – if the environmental assessment is referred to a review panel – the Minister, requires to be taken into account.	s.19.1(j)	Volume 8A Marine Transportation Volume 8B Technical Reports Volume 8C TERMPOL Reports These volumes take into consideration the <i>Filing Requirements Related to the Potential Environmental and Socio-Economic Effects of Increased Marine Shipping Activities, Trans Mountain Expansion Project</i> (September 10, 2013) (NEB 2013)
The environmental assessment of a designated project may take into account community knowledge and Aboriginal traditional knowledge.	s 19.3	Volume 5A ESA - Biophysical: • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5B ESA - Socio-economic: • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5C ESA - Biophysical Technical Reports Volume 5D ESA - Socio-economic Technical Reports Volume 8A Marine Transportation: • Sections 4.2, 4.3 and 4.4 Volume 8B Technical Reports
Subsection 5(1) of <i>CEA Act, 2012</i> defines environmental effects as a change that may be caused to the following components of the environment that are within the legislative authority of Parliament:		
fish as defined in section 2 of the <i>Fisheries Act</i> and fish habitat as defined in subsection 34(1) of that <i>Act</i> ;	s.5(1)(a)(i)	Volume 5A ESA - Biophysical: • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5C ESA - Biophysical Technical Reports Volume 8A Marine Transportation: • Sections 4.2, 4.3, 4.4 and 5.0 Volume 8B Technical Reports
aquatic species as defined in subsection 2(1) of the <i>Species at Risk Act</i> ;	s.5(1)(a)(ii)	Volume 5A ESA - Biophysical: • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5C ESA - Biophysical Technical Reports Volume 8A Marine Transportation: • Sections 4.2, 4.3, 4.4 and 5.0 Volume 8B Technical Reports
migratory birds as defined in subsection 2(1) of the <i>Migratory Birds Convention Act, 1994</i> , and	s.5(1)(a)(iii)	Volume 5A ESA - Biophysical: • Sections 5.0, 6.0, 7.0 and 8.0 Volume 5C ESA - Biophysical Technical Reports Volume 8A Marine Transportation: • Sections 4.2, 4.3, 4.4 and 5.0 Volume 8B Technical Reports
any other component of the environment that is set out in Schedule 2.	s.5(1)(a)(iv)	N/A
Subsection 5(1) of the <i>CEA Act, 2012</i> defines environmental effects as (b) a change that may be caused to the environment that would occur		
on federal lands,	s.5(1)(b)(i)	Volume 5A ESA - Biophysical: • Section 7.0 Volume 5B ESA - Socio-economic: • Section 7.0



**CONCORDANCE TABLE WITH THE CEA ACT, 2012**

<i>CEA Act, 2012</i> Requirement	Section in <i>CEA Act, 2012</i>	Application Volume and Section
in a province other than the one in which the <i>act</i> or thing is done or where the physical activity, the designated project or the project is being carried out, or	s.5(1)(b)(ii)	N/A No changes are anticipated in provinces other than Alberta and BC in relation to the ESA.
outside Canada.	s.5(1)(b)(iii)	Volume 8A Marine Transportation: <ul style="list-style-type: none"> <li>• Sections 4.3, 4.4 and 5.0</li> </ul>
Subsection 5(1) of the <i>CEA Act, 2012</i> defines environmental effects as (c) with respect to aboriginal peoples, an effect occurring in Canada of any change that may be caused to the environment on:		
health and socio-economic conditions;	s.5(1)(c)(i)	Volume 5B ESA - Socio-economic: <ul style="list-style-type: none"> <li>• Sections 5.0, 6.0, 7.0 and 8.0</li> </ul> Volume 5D ESA - Socio-economic Technical Reports Volume 8A Marine Transportation: <ul style="list-style-type: none"> <li>• Sections 4.3 and 4.4</li> </ul> Volume 8B Technical Reports
physical and cultural heritage;	s.5(1)(c)(ii)	Volume 5B ESA - Socio-economic: <ul style="list-style-type: none"> <li>• Sections 5.0, 6.0 and 7.0</li> </ul>
the current use of lands and resources for traditional purposes; or	s.5(1)(c)(iii)	Volume 5B ESA - Socio-economic: <ul style="list-style-type: none"> <li>• Sections 5.0, 6.0, 7.0 and 8.0</li> </ul> Volume 5D ESA - Socio-economic Technical Reports Volume 8A Marine Transportation: <ul style="list-style-type: none"> <li>• Sections 4.3 and 4.4</li> </ul> Volume 8B Technical Reports
any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.	s.5(1)(c)(iv)	Volume 5B ESA - Socio-economic: <ul style="list-style-type: none"> <li>• Sections 5.0, 6.0 and 7.0</li> </ul>

## 1.0 INTRODUCTION

### 1.1 Project Overview

Trans Mountain Pipeline ULC (Trans Mountain) is a Canadian corporation with its head office located in Calgary, Alberta (AB). Trans Mountain is a general partner of Trans Mountain Pipeline L.P., which is operated by Kinder Morgan Canada Inc. (KMC), and is fully owned by Kinder Morgan Energy Partners, L.P. Trans Mountain is the holder of the National Energy Board (NEB) certificates for the Trans Mountain pipeline system (TMPL system).

The TMPL system commenced operations 60 years ago and now transports a range of crude oil and petroleum products from Western Canada to locations in central and southwestern British Columbia (BC), Washington State and offshore. The TMPL system currently supplies much of the crude oil and refined products used in BC. The TMPL system is operated and maintained by staff located at Trans Mountain's regional and local offices in Alberta (Edmonton, Edson, and Jasper) and BC (Clearwater, Kamloops, Hope, Abbotsford, and Burnaby).

The TMPL system has an operating capacity of approximately 47,690 m<sup>3</sup>/d (300,000 bbl/d) using 23 active pump stations and 40 petroleum storage tanks. The expansion will increase the capacity to 141,500 m<sup>3</sup>/d (890,000 bbl/d).

The proposed expansion will comprise the following:

- Pipeline segments that complete a twinning (or "looping") of the pipeline in Alberta and BC with about 987 km of new buried pipeline.
- New and modified facilities, including pump stations and tanks.
- Three new berths at the Westridge Marine Terminal in Burnaby, BC, each capable of handling Aframax class vessels.

The expansion has been developed in response to requests for service from Western Canadian oil producers and West Coast refiners for increased pipeline capacity in support of growing oil production and access to growing West Coast and offshore markets. NEB decision RH-001-2012 reinforces market support for the expansion and provides Trans Mountain the necessary economic conditions to proceed with design, consultation, and regulatory applications.

Application is being made pursuant to Section 52 of the *National Energy Board Act (NEB Act)* for the proposed Trans Mountain Expansion Project (referred to as "TMEP" or "the Project"). The NEB will undertake a detailed review and hold a Public Hearing to determine if it is in the public interest to recommend a Certificate of Public Convenience and Necessity (CPCN) for construction and operation of the Project. Subject to the outcome of the NEB Hearing process, Trans Mountain plans to begin construction in 2015/2016 and go into service in 2017.

Trans Mountain has embarked on an extensive program to engage Aboriginal communities and to consult with landowners, government agencies (e.g., regulators and municipalities), stakeholders, and the general public. Information on the Project is also available at [www.transmountain.com](http://www.transmountain.com).

A Configuration Map of the proposed TMPL system post-expansion is provided in Appendix A.

## **1.2 Purpose of Volume 4C**

Trans Mountain is making application to the NEB under Section 52 of the *NEB Act*, for a CPCN for TMEP. Volume 4C provides an overview of KMC operations and maintenance policies, systems, programs, procedures, practices, and activities that are currently in place for the existing TMPL system and that will be enhanced and implemented for the expanded TMPL system. The volume includes all information required by the NEB Filing Manual (NEB 2013a), NEB Onshore Pipeline Regulations (OPR) (NEB 1999) and amendments and Canadian Standards Association (CSA) Z662-11 Oil and Gas Pipeline Systems (CSA 2011), as illustrated in the preceding concordance table, page 4C-xx.

## **2.0 OPERATIONS AND MAINTENANCE**

### **2.1 Integrated Safety and Loss Management System**

The *NEB Act* provides the NEB with the authority to make regulations governing pipeline design, construction, operation, and abandonment for the protection of people, property, and the environment.

Pursuant to the NEB OPR, a company must have a management system that outlines the policies, processes and procedures for the planning and execution of the core business of the organization in a manner that provides for the protection of people, property, and the environment. The management system must also apply to the key program areas for which companies are responsible; safety, pipeline integrity, security, emergency management, and environmental protection. These programs must each follow management system processes to anticipate, prevent, manage, and mitigate conditions that have the potential to harm people, property or the environment throughout the lifecycle of a pipeline system.

The expanded TMPL system (which will include Line 1, comprised of existing active and inactive pipeline segments that will be reactivated, Line 2, comprised of existing active and new pipeline segments, and all associated pump stations, terminals, and ancillary facilities) will be operated and maintained in accordance with the KMC Integrated Safety and Loss Management System (ISLMS). The ISLMS has been developed in response to the 2013 amendments to the OPR, and applies to all activities involving the design, construction, operation, and abandonment of the TMPL system.

### **2.2 System Operations**

The expanded TMPL system, like the existing TMPL system, will be operated from the existing Primary Control Centre (PCC) located in Sherwood Park, AB. The expanded TMPL system will be continuously monitored by KMC Control Centre Operators (CCOs) 24 hours per day using a Supervisory Control and Data Acquisition (SCADA) system. Field operations will be performed by qualified personnel located at terminals and along the pipeline system at existing operations bases. KMC CCOs and field operating personnel are qualified using a comprehensive, procedure-based training program.

### **2.3 System Maintenance**

KMC has a fully developed preventative maintenance program in place for the existing TMPL system pipelines and rights-of-way, pump stations, terminals, and ancillary facilities. The program will be enhanced to fully integrate the TMEP pipelines and facilities sufficiently in advance of the start-up of the expanded TMPL system to allow for implementation and appropriate training to take place.

Preventative maintenance will be managed in accordance with the existing KMC Maintenance Management Program. The existing KMC Pipeline Integrity Management Program (IMP) will be enhanced and applied to all reactivated and new pipeline segments. The existing KMC Facility Integrity Management Program (FIMP) will be enhanced and applied to all modified and new facilities.

### **2.4 Environment Policy**

KMC is committed to operating in a manner which minimizes environmental impacts and ensures that the operation of the TMPL system complies with all environmental regulations,

applicable permit conditions, and the requirements of the appropriate regulatory authorities. Environmental requirements are incorporated into all business decisions and operational activities. KMC has fully implemented the KMC Environment, Health and Safety (EHS) Policy (Figure 2.4.1) and will amend the policy as necessary to include all assets, personnel, and processes, constructed, added, or developed as part of TMEP.



## Environment, Health and Safety Policy

Every employee is expected to share Kinder Morgan's commitment to pursue the goal of not harming people, protecting the environment, using material and energy efficiently and promoting best practices, thereby earning the confidence of customers, security holders and society at large, being a good neighbor and contributing to sustainable development. Kinder Morgan's policy is to comply with all health, safety, security and environmental laws, rules and regulations, not just because it is legally required but also because we believe it is the responsible way to conduct our business. Kinder Morgan has systems in place that prepare for emergencies and procedures that coordinate our response plans with emergency response organizations in the communities where we operate. Kinder Morgan has a systematic approach to health, safety, security and environmental management designed to ensure compliance with the law, to train employees to be aware of and meet their responsibility for protection of health, safety and the environment, and to achieve continuous performance improvement. In addition to the Kinder Morgan commitment, contractors are required and joint ventures under Kinder Morgan's operational control are expected to apply this policy. Employees, supervisors or operational managers who knowingly engage in or condone environmental health or safety violations are subject to disciplinary action including suspension or termination.

A handwritten signature in black ink, appearing to read 'I. Anderson'.

Ian D. Anderson

President

Kinder Morgan Canada

A Member of the Kinder Morgan Group of Companies

**Figure 2.4.1** KMC Environment, Health and Safety Policy

## **2.5 Kinder Morgan Code of Business Conduct and Ethics**

Kinder Morgan mandates that KMC and all of its employees comply with the Code. The Code sets out the detailed actions and practices that all employees must follow to contribute to the delivery of the company commitment to honesty, integrity, and respect in all its business dealings. The company communicates the Code to all employees annually, requires employees to formally acknowledge compliance with the Code, and provides a number of different confidential means for employees to report suspected non-compliances of the Code. The Code is included in Appendix B.

### **3.0 OPERATING STANDARDS AND DOCUMENTATION**

#### **3.1 Government Regulatory Requirements**

##### **3.1.1 *National Energy Board***

The pipelines and facilities to be constructed as part of TMEP will be operated and maintained in accordance with the most recent NEB legislation including the NEB OPR, which references CSA Z662-11, Oil & Gas Pipeline Systems.

The NEB OPR and CSA Z662-11 also reference other standards and publications, the applicable elements of which were incorporated into the existing KMC management systems, and operations and maintenance systems, programs, and procedures.

##### **3.1.2 *Westridge Marine Terminal***

In addition to the NEB OPR and CSA Z662-11 requirements, Westridge Marine Terminal will be operated in accordance with relevant portions of the *Canada Shipping Act, 2001*, *International Safety Guide for Tankers and Terminals (ISGOTT) Fifth Edition, 2006*, applicable Port Metro Vancouver (PMV) regulations and directives and the Metro Vancouver Air Quality Regulatory Program.



## **4.0 OPERATIONS AND MAINTENANCE STAFFING AND TRAINING**

### **4.1 Field Staffing and Locations**

A significant number of additional tradespeople, terminal operations personnel and other technical and supervisory staff, relative to current levels, will be directly employed to operate and maintain the expanded TMPL system. There will also be a requirement for additional field staff to be employed for various operations and maintenance support roles ranging from engineering to administrative. It is anticipated that 20 to 25 operations and maintenance personnel will be required at field locations in Alberta and 40 to 45 operations and maintenance personnel will be required at field locations in BC. An additional 12 CCOs will be required in Sherwood Park, AB. The additional field operations and maintenance staff and CCOs will be recruited sufficiently in advance of the start-up of the expanded TMPL system to allow for appropriate training to take place.

Existing district maintenance facilities will be improved as necessary to support the additional field staff required to operate and maintain the expanded TMPL system.

### **4.2 Training of Field Personnel**

Training of all KMC field personnel will be achieved utilizing the existing KMC Knowledge and Experience Enhancement Program (KEEP) for Canada, a competency-based qualifications and training management program for KMC's Canadian and Washington State field operations staff based in part on the American Society of Mechanical Engineers B31Q Pipeline Personnel Qualification standard. The KEEP will be enhanced to address any new procedures, inspections, testing, and training required for the operations and maintenance of the pipelines and facilities to be constructed as part of TMEP. The enhanced KEEP will be implemented sufficiently in advance of the start-up of the expanded TMPL system to allow for appropriate training to take place.

The KEEP provides a formal training curriculum and sequences the training by establishing prerequisites and by providing a structured progression. The major goal of the training program is to ensure the qualification and competence of all employees to undertake their respective jobs. Training requirements are spelled out in legislation and in Company policies and procedures. The regulatory requirements, along with input from subject matter experts, have been expressed as competencies within KEEP. The knowledge and skills required to perform each competency are developed, evaluated, tracked, and monitored.

The training program is integrated with the requirements of other company systems and departments such as Human Resources and EHS.

### **4.3 Training of Control Centre Operators**

CCOs are qualified in accordance with the Control Centre Training Program (CCTP), which includes the applicable operator qualification (OQ) requirements for all systems. The CCTP, including all training records, is managed by the Control Centre training supervisor.

The CCTP is competency-based. The program's purpose is to ensure CCOs are qualified, competent, and confident, which will enable them to operate the TMPL system in a safe and efficient manner. The CCTP incorporates the requirements of KMC's OQ Program which was developed to comply with the Office of Pipeline Safety (OPS) of the United States Department of Transportation's (DOT's) Qualification of Pipeline Personnel Regulation (49 Code of Federal Regulations Part 195 Subpart G) for liquid pipelines. Compliance with the DOT OPS legislation

is required as KMC also operates the Trans Mountain Puget Sound Pipeline in Washington State.

Fundamentals of the CCTP include orientation, core training and procedures for specific and general system operations, control, and emergency response tasks. The training includes a significant period of directly supervised operation and control of the elements of the TMPL system that the CCO is training to be certified for. CCOs must successfully complete the requirements of the CCTP before they are permitted to work without direct supervision at a Control Centre operations desk. Successful completion of the training requirements is formally verified by demonstration of the necessary knowledge and skills.

## **5.0 OPERATING AND MAINTENANCE PROCEDURES**

The expanded TMPL system will be operated and maintained in accordance with detailed procedures which are in place for the existing TMPL system and which will be enhanced and implemented for the expanded TMPL system prior to the commencement of operations. KMC operational policies, practices, and activities prioritize employee and public safety and the protection of the environment. The operating and maintenance procedures have been developed with those priorities in mind while being designed to ensure the highest levels of system reliability. All inspections, maintenance, and testing required to ensure the safety of employees and the public, protection of the environment, and reliability will be procedurally based and managed through the existing computerized maintenance management system (CMMS). Control Centre operating procedures are discussed in Section 7.1.2.

### **5.1 Pipelines and Remote Mainline Block Valves Sites**

Comprehensive operating and maintenance procedures are in place for the existing TMPL system pipeline and will be enhanced and implemented to include the Line 2 pipeline segments and the reactivated Line 1 pipeline segments, including the RMLBVs. The structure and content of the operating and maintenance procedures will be very similar to the existing operating and maintenance procedures, which have proven to be effective resources for operations and maintenance staff. The procedures will be available to operations and maintenance personnel sufficiently in advance of the start-up of the expanded TMPL system to allow for appropriate training to take place. The operating and maintenance procedures and necessary references will be accessible by operations and maintenance personnel from any pump station or terminal location in the system via the KMC Intranet. Examples of topics addressed by the existing pipeline operating and maintenance procedures include:

- contractor supervision;
- pipeline protection and excavation;
- alternating current voltage checks;
- hot-taps using T101 Tapping Machine;
- mainline drain-downs;
- nitrogen purges and blow-downs;
- venting while filling pipeline segments;
- mud plug installation;
- cathodic protection (CP) potential reading;
- thermite welding;
- test station maintenance and installation;
- exposed pipe condition evaluation;
- Plidco sleeve installation;

- RMLBV maintenance;
- RMLBV control systems;
- pipeline marking and signage requirements;
- right-of-way maintenance, including vegetation management;
- pipeline and valve site maintenance;
- water crossing inspection and monitoring;
- right-of-way erosion control;
- blasting; and
- helicopter patrol report response.

Each operating and maintenance procedure may also include information related to safety, work planning and preparation, and documentation.

## **5.2 Pump Stations and Ancillary Facilities**

Operating manuals and maintenance procedures are in place for the existing TMPL system pump stations and ancillary facilities and will be enhanced and implemented for each pump station and ancillary facility added or modified as part of TMEP. The structure and content of the operating manuals and maintenance procedures will be very similar to the existing operating manuals and maintenance procedures, which have proven to be effective resources for operations and maintenance staff. The manuals and procedures will be completed and accessible to operations personnel sufficiently in advance of the start-up of the expanded TMPL system to allow for appropriate training to take place. The operating manuals and maintenance procedures and necessary references will be accessible by operations and maintenance personnel from any pump station or terminal location in the system via the KMC Intranet.

A typical operating manual for an existing pump station includes:

- a table of contents;
- a revision record;
- the history of the station from original construction, including any modifications or expansions that have occurred;
- station layout drawings or schematics, with corresponding descriptions of components and systems;
- comprehensive operating procedures for station systems including manifolds, mainline pumps, meters, waste oil tanks and systems, secondary containment, and storm water drainage systems;
- comprehensive operating procedures for the station including all operating modes and flow paths;

- station operation in both remote and local control modes;
- protective devices and their functions;
- control and SCADA system overview;
- communications and loss of communications procedures;
- station and pump unit alarm descriptions and actions;
- emergency response procedures and guidelines;
- station security measures and arrival/departure procedures; and
- routine operations and maintenance checklists.

General operating and maintenance procedures may also include information related to safety, work planning and preparation, and documentation.

Most maintenance procedures will apply to more than one facility; therefore, KMC will continue with its current practice of organizing them by work function or subject area rather than by facility.

## **5.3 Terminals**

Both general and specific operating manuals and maintenance procedures are in place for the existing TMPL system terminals and will be enhanced and implemented for the terminals and terminal infrastructure to be added or modified as part of TMEP. The structure and content of the operating manuals and maintenance procedures will be very similar to the existing operating manuals and maintenance procedures, which have proven to be effective resources for operations and maintenance staff. The manuals and procedures will be completed and accessible to operations personnel sufficiently in advance of the start-up of the expanded TMPL system to allow for appropriate training to take place. The operating manuals and maintenance procedures and necessary references will be accessible by operations and maintenance personnel from any pump station or terminal location in the system via the KMC Intranet.

### **5.3.1 General Operating and Maintenance Procedures**

Existing general operating and maintenance procedures for terminals include:

- general arrival and departure procedures;
- launching and receiving pipeline cleaning and inspection tools;
- raising/lowering support legs on tank floating roofs;
- piping drain-down and re-fill;
- water removal from tank external floating roofs;
- winterization of external floating roof drains;
- routine operations and maintenance inspections (complete with checklists);

- monthly tank inspections (complete with a checklist);
- annual tank inspections (complete with a checklist);
- above-ground piping inspections (complete a with a checklist); and
- recognizing and responding to abnormal operating conditions.

General operating and maintenance procedures may also include information related to safety, work planning and preparation, and documentation.

Most maintenance procedures will apply to more than one terminal; therefore, KMC will continue with its current practice of organizing them by work function or subject area rather than by facility.

### **5.3.2 Specific Operating Manuals and Maintenance Procedures**

Existing specific operating manuals and maintenance procedures for each terminal include, as applicable:

- a table of contents;
- a revision record;
- the history of the terminal from original construction, including any modifications or expansions that have occurred;
- details of the crude oils and refined products received or shipped;
- terminal layout drawings or schematics, with corresponding descriptions of components and systems, including storage tanks, manifolds, booster pumps, metering and meter proving systems, waste oil tanks and systems, secondary containment and storm water drainage systems, and fire protection systems;
- comprehensive operating procedures for terminal systems including all operating modes and flow paths;
- terminal operation in both remote and local control modes;
- petroleum testing and measurement procedures to confirm quality and custody transfer accuracy;
- tank isolation and inspection procedures;
- protective devices and their functions;
- control and SCADA system overview;
- communications and loss of communications procedures;
- alarm descriptions and actions;
- emergency response procedures and guidelines;

- fire suppression system components and procedures;
- specific security measures and arrival/departure procedures; and
- technician maintenance and inspection, operator terminal checklists.

Specific operating and maintenance procedures may also include information related to safety, work planning and preparation, and documentation.

### **5.3.3 Special Operating Manuals and Maintenance Procedures for Westridge Marine Terminal**

In addition to the general and specific terminal operating and maintenance procedures identified in the previous section, most of which will apply to the expanded Westridge Marine Terminal, the operating and maintenance procedures for Westridge Marine Terminal have additional marine related elements and will also be enhanced to reflect the three new berths and the expanded vapour recovery systems.

The Westridge Marine Terminal operating and maintenance manual and procedures also include or will also include:

- the role of the KMC loading master;
- pre-arrival inspections by the KMC loading master;
- vessel documentation;
- vessel berthing/un-berthing limits;
- dock layout drawings or schematics, with corresponding descriptions of components and systems, including berthing assist systems, mooring systems, gangway systems, cranes, loading/unloading arms, vapour recover units (VRUs) and the vapour combustion unit (VCU); and
- comprehensive operating procedures for special Westridge Marine Terminal systems including vessel mooring/un-mooring, gangway operations, crane operation, loading arm connection/disconnection, loading/un-loading, and vapour recovery and combustion, with all operating modes and flow paths.

## **6.0 ROUTINE INSPECTION AND MAINTENANCE ACTIVITIES**

Routine inspection and maintenance activities on the expanded TMPL system will be conducted in accordance with the enhanced procedures described in Section 6.0. Regularly scheduled inspections (for safety, integrity, or other purposes) and maintenance activities will be documented. Preventative maintenance activities at all locations will be managed with the existing CMMS, enhanced to include the expanded TMPL system. As is the current practice on the existing TMPL system, operations staff will communicate with CCOs prior to performing any work on equipment that could be required for operation of the expanded TMPL system.

### **6.1 Pipeline Surveillance**

As is the case for the existing TMPL system, operational activities along the expanded TMPL system pipeline rights-of-way will include regular aerial and surface surveillance patrols to identify encroachments, excavations or other ground disturbances, and natural occurrences such as slope failures, snow slides and stream erosion.

### **6.2 Pipeline Maintenance**

As is the case for the existing TMPL system, right-of-way maintenance for the expanded TMPL system will be undertaken on an as-required basis to maintain clear right-of-way identification for aerial and ground patrols and to allow access in the event of necessary integrity work or emergency response. Right-of-way maintenance activities will include:

- clearing, brushing, and other vegetation control;
- signage replacement;
- investigation and removal of encroachments; and
- monitoring natural hazard areas, including areas with slope movement or weak soils and watercourse crossings.

As is the case for the existing TMPL system, other pipeline maintenance activities for the expanded TMPL system will include:

- monitoring of the CP system for correct function and correction of any faults;
- pipeline integrity surveys, internal inspections and maintenance and repair excavations; and
- valve inspection, repair and testing.

As is the case for the existing TMPL system, scheduled runs of in-line inspection (ILI) tools will be undertaken to assess the integrity of the expanded TMPL system pipelines in accordance with the KMC IMP. Details of the ILI program are included in Section 8.1.4.

Excavation and assessment of ILI indications will be undertaken by qualified personnel.

### **6.3 Pump Station and Terminal Surveillance**

As is the case for the existing TMPL system, all remote pump stations and ancillary facilities (those pump stations and ancillary facilities not located at maintenance bases) in the expanded TMPL system will be visited by operations personnel on a regular basis, with the frequency



determined by subjective and quantitative risk assessments and from operating experience. Similar to the existing TMPL system, the expanded terminals, with the exception of Sumas Terminal will be staffed 24 hours per day, seven days per week and the operations personnel will conduct daily surveillances.

## **6.4 Pump Station and Terminal Maintenance**

As is the case for the existing TMPL system, ongoing maintenance activities for pump stations and terminals in the expanded TMPL system will include, as applicable:

- inspection of storage tanks in accordance with American Petroleum Institute (API) 653 - Tank Inspection, Repair, Alteration and Reconstruction, including in-service and out-of-service inspections which assess the condition of safety systems, coatings, various other components, and overall integrity;
- inspection of waste oil tanks;
- inspection of above-ground and buried piping and equipment for corrosion, physical damage or leakage;
- inspection and testing of rotating equipment (*i.e.*, pumps and motors);
- inspection and testing of valves;
- inspection and testing of storm water drainage systems and hydrocarbon detection equipment in secondary containment areas;
- inspection and testing of CP systems;
- inspection and testing of access, security, and emergency warning systems; and
- inspection and testing of fire suppression systems.

The frequency of inspection and maintenance activities will be determined by manufacturers' recommendations, by subjective and quantitative risk assessments, and from operating experience.

### **6.4.1 Westridge Marine Terminal Maintenance**

As occurs at Westridge Marine Terminal currently, specialized marine related elements, such as underwater structures, dock equipment, and VRU and VCU equipment will be inspected and maintained on a regular cycle. The frequency of inspection and maintenance activities will be determined by manufacturers' recommendations, by subjective and quantitative risk assessments, and from operating experience.

## **7.0 SYSTEM OPERATIONS, CONTROL, AND LEAK DETECTION**

### **7.1 Centralized Monitoring and Control**

As is the case for the existing TMPL system, the expanded TMPL system will normally be monitored and operated from the KMC PCC in Sherwood Park, AB. Westridge Marine Terminal will be monitored and operated from the Westridge Marine Terminal Control Centre, with continuous redundant monitoring at the PCC.

All pump stations and terminals in the expanded TMPL system will include emergency shut down (ESD) systems that will operate automatically in some abnormal operating conditions and can also be activated remotely from the PCC or locally by field operations.

System status data will be made available to maintenance bases and to third-parties as necessary, as defined by operational protocols.

#### **7.1.1 Control Centres**

The PCC will be the normal location for the monitoring and control of the expanded TMPL system. In addition to the CCOs, the PCC is staffed by supervisory and other support personnel including training, SCADA, and leak detection specialists that are on call 24 hours per day. A Secondary Control Centre (SCC), located in south Edmonton, will be available for use in situations when, for any reason, the PCC is unavailable. The SCC is maintained as a 'hot' standby site with the same functionality as the PCC to allow seamless transition of the monitoring and control of the TMPL system. A scheduled full transition of monitoring and control from the PCC to SCC is conducted once per quarter to ensure readiness of the SCC.

#### **7.1.2 Control Centre Procedures**

The existing TMPL system is operated using comprehensive Control Centre Procedures which will be enhanced and implemented sufficiently in advance of start-up of the expanded TMPL system to allow for appropriate training to take place. The Control Centre operating procedures include step by step instructions and guidelines for normal operating modes, abnormal conditions, and emergencies.

#### **7.1.3 Supervisory Control and Data Acquisition System**

The SCADA system will collect information about fluid parameters (flow rates, pressures, temperatures, densities, and viscosities), as well as the position of valves, the status of pump units, and the status of many other devices and safety systems to enable the effective monitoring and control of the expanded TMPL system.

The CCOs will utilize the SCADA system to transmit commands for the positioning of valves, the starting and stopping of pumps, and other actions required for the operation and control of the system, both for routine operations and for abnormal conditions, including the ESD of facilities when necessary. The SCADA system will also collect data for the computational pipeline monitoring (CPM) system, which will be the primary approach to continuous leak detection. The existing SCADA system will be thoroughly assessed and upgraded as necessary to ensure that it can successfully be used to monitor and control the expanded TMPL system.

SCADA programs and displays for the expanded TMPL system will be developed and tested sufficiently in advance of the start-up of the expanded TMPL system to allow for appropriate training. As is the case for the existing TMPL system, the displays will be configured to provide

CCOs with clear and concise operating information, including alarms that will identify any abnormal operating conditions, and facilitate the efficient initiation of control commands.

#### **7.1.4 Supervisory Control and Data Acquisition System Redundancy**

The existing TMPL SCADA system is configured with fully redundant servers that are independently capable of performing all required SCADA functions. The redundant servers are at different locations and have independent and redundant power feeds. In the event of a failure of the server designated as the primary, switch-over to the server designated as the back-up will occur immediately and automatically. The redundancy philosophy will be applied to the expanded TMPL SCADA system.

#### **7.1.5 Emergency Shut Down System and Procedures**

As is the case on the existing TMPL system, facilities on the expanded TMPL system will have ESD systems, which will initiate automatically in the case of certain abnormal conditions. For example, at pump stations, an automated ESD may be initiated by combustible gas or fire detectors, sump tank high level switches, hydrocarbon detectors, or pressure transmitters. Initiation of an ESD at a pump station will result in the immediate and automatic stopping of all running pump units, the closing of the station suction and discharge valves, the closing of the pump unit suction and discharge valves (if utility power is available), and the shutdown of waste oil sump lift/injection pumps. Initiation of an ESD at a terminal will result in similar actions, in some cases isolated to the specific area of the terminal in which the detector, switch, or transmitter was activated or measured the abnormal condition.

The selection and location of protective devices and the function of ESD systems are determined by legislative requirements and operating experience and are verified in formalized hazards and operability (HAZOP) reviews. In addition, ESD systems are carefully designed so that the automatic shut-down actions they take do not increase the risk of further abnormal conditions occurring. Additional information on protective devices and ESD systems at pump stations and terminals is included in Volume 4A, Sections 3.3 and 3.4.

The operational limits of various operating parameters and the settings of protective devices are documented in the TMPL Operating Limits and Protective Device Settings manual, a key document used by CCOs and field operations and maintenance staff.

As is the case on the existing TMPL system, in addition to automated ESD systems, CCOs will be able to use the expanded TMPL SCADA system to shut down mainline pumps and booster pumps, close pump station and terminals valves and close remotely operable RMLBVs. When an alarm is received from the leak detection system, a pump station, a terminal, or an ancillary facility, the CCO will take whatever immediate action is required by the Control Centre Procedures, including issuing step by step shut-down and isolation commands using the SCADA system and dispatching field staff to investigate and initiate further emergency response measures, as appropriate.

Should the SCADA system become partially or fully inoperative, the CCOs will follow the steps in the Control Centre Procedures to appropriately respond. The PCC procedures will ensure that pipeline monitoring and control are maintained and appropriate investigations and actions are initiated.

### **7.1.6 Supervisory Control and Data Acquisition Communications**

The existing SCADA communications system will be enhanced to include the expanded TMPL system. Two redundant and independent data communication circuits will be provided at each pump station and terminal to reduce the likelihood of communication outages and to ensure the highest level of operating reliability.

Communications between the PCC and each pump station or terminal will be continuously monitored. In the event that the communication link with a pump station is lost, the CCO will initiate a transfer to the back-up communications system for that facility only. The local human-machine interface (HMI) will log all alarms and analog process variables. The programmable logic controller (PLC) will take any local action required. All ESD systems will remain active. Alarm status will be displayed in the HMI and will be archived locally as well as at the PCC.

If a complete SCADA communication system loss occurs at a pump station, the PLC logic will shut down one pump unit at a time, until no units are running. The CCO will initiate a review of hydraulic conditions in the segments of pipeline upstream and downstream of the outage location. Where hydraulic instability is found to exist, the CCO may initiate a sequence to shut down additional pump stations, segments of the pipeline, or the entire pipeline system. In some cases segments of the pipeline may be isolated. Operations staff may then be dispatched to the site to control the pump station that lost communications as directed by the CCO. If a complete SCADA communications system loss occurs at a terminal, the terminal supervisor or on-shift terminal operator may control the terminal as directed by the CCO. Operations staff will be able to manually restore normal operation, manipulating valves and starting the pump units as necessary using the local HMI. All protection systems will remain operational during local operation.

The existing very high frequency (VHF) radio system will be expanded to cover all new locations. The VHF radio system ensures a reliable communications pathway to local operations staff in the event that cellular or land-line service is not available.

Westridge Marine Terminal will be designed with backup voice, as well as data communications to assist in complying with Canadian Marine Transport Security requirements in terms of security equipment testing and record keeping.

### **7.1.7 Operations Schedule**

As is the case for the existing TMPL system, the expanded TMPL system will operate continuously, except for rare occasions where the pipelines may be shut down for logistical (petroleum availability or deliverability) reasons or for aggregated maintenance. The PCC, Edmonton Terminal, Burnaby Terminal, and Westridge Marine Terminal will be staffed 24 hours per day, seven days per week. Regional or district operations and maintenance positions will typically be day shift, weekdays only with coverage provided for more complex maintenance projects or abnormal operating conditions on an as-needed basis. District standby rosters ensure that personnel are available to respond to abnormal operating conditions 24 hours per day, seven days per week.

### **7.1.8 Batching**

The TMPL Line 1 and Line 2 pipelines will have distinct batches of crude oils or refined products moving through them at any given time. As is the case on the existing TMPL system, comprehensive integrated procedures will ensure that batches are reliably injected and

delivered in accordance with pumping instructions issued to the CCOs by the Shipper Services Department. KMC has three decades of experience in batched pipeline operations and will be able to continue to conduct the batching operations on the expanded TMPL system safely and efficiently.

### **7.1.9 Pump Stations**

All pump stations installed as part of the TMEP project will be designed for remote control, operation, and monitoring from the PCC. As a safety and reliability feature, special control logic will be used to prevent pressure surges during pipeline system start-ups and shut-downs, keeping line pressures within specified operational limits. Most of the existing pump stations and each new station are or will be equipped with one or more variable frequency drives to ensure smooth starting and rotational speed control of the pump unit motors. Additional information on the pump stations is included in Volume 4A, Section 3.3.

### **7.1.10 Westridge Marine Terminal**

#### **7.1.10.1 General**

Westridge Marine Terminal will be expanded by the addition of three berths, each capable of serving Aframax-class vessels, the largest size currently allowed by PMV to transit the Second Narrows, and the decommissioning and demolition of the existing berth. Each berth will be designed to load vessels to 13.5 m draft, approximately 90% of the typical maximum design draft of an Aframax-class vessel and approximately 95% of the typical maximum design draft of a Panamax-class vessel. 13.5 m is expected to be the deepest draft allowed in the Second Narrows by PMV rules at the time the expanded TMPL system commences service. Additional information on the design of the expanded Westridge Marine Terminal is included in Volume 4A, Section 3.4.4.

Vessel and Westridge Marine Terminal operations will follow the recommendations of the latest version of the ISGOTT, all applicable legislative requirements, and the KMC operating procedures for Westridge Marine Terminal. Additional information on the legislation and procedures governing vessel certification and operations in Canadian, BC, and PMV waters and at Westridge Marine Terminal is included in Volume 8A.

The following sections provide an overview of vessel operations at Westridge Marine Terminal. Aside from the additional berths and the revised berth arrangements, vessel operations at Westridge Marine Terminal will not be materially different as a result of TMEP.

#### **7.1.10.2 Pre-arrival**

All vessels nominated to call at Westridge Marine Terminal must comply with a variety of legislated requirements and undergo a pre-arrival vetting process to ensure that they are crewed, equipped, maintained, and operated appropriately to ensure that they can safely and efficiently be loaded or unloaded. Shippers are informed in writing of the KMC vetting requirements and protocols. Only if the vetting information provided is acceptable and verified by inspection will the KMC loading master allow loading or unloading.

#### **7.1.10.3 Berthing**

Vessels arriving at Westridge Marine Terminal are assisted by tugs. To assist in berthing operations, each new berth will be equipped with a docking assistance system that will monitor and display the vessel's distance, speed, and angle of approach. The vessel crew is responsible

for preparing the vessel manifold connections to ensure compatibility with loading arm flange size.

Once at the berth, the vessel's mooring lines will be secured by KMC personnel and properly tensioned by the vessel's crew. The Westridge Marine Terminal gangway and containment boom will be deployed. The containment boom will remain in place throughout loading/unloading operations including loading/unloading arm connection/disconnection.

#### *7.1.10.4 Pre-loading*

A mandatory pre-loading conference will be held, attended by the Westridge Marine Terminal operations representative, the KMC loading master, and the vessel's master or chief officer. After safety, operational, communications and security procedures have been reviewed using the ISGOTT-based Ship Shore Safety checklist, the loading master and a third-party surveyor will check the cargo tanks to confirm that they are either empty or to record the quantity of product present in each. In addition, empty cargo tanks will be checked to confirm that they contain an inert gas mixture (generated by the vessel) and that oxygen levels are approximately 5 per cent (and no higher than 8 per cent). Communication links will be verified between the vessel and Westridge Marine Terminal operations personnel by the loading master. Any deficiencies will be addressed before loading will begin. The loading ESD procedure will be discussed and agreed upon by the loading master and the vessel's cargo officer.

After the pre-loading meeting and cargo tank inspections, the loading arms and vapour recovery system will be connected to the vessel by Westridge Marine Terminal operations personnel in close coordination with the cargo officer.

#### *7.1.10.5 Cargo Transfer*

Transfer flow rates will initially be set at a low level to confirm the valve configurations and to ensure that oil is being directed to the correct cargo tank. The full transfer flow rate will be agreed upon through consultation between the loading master and the cargo officer. After TMEP, Westridge Marine Terminal will be designed to load at a rate of up to 4,637 m<sup>3</sup>/hr (29,170 bbl/h). The vessel will have the ability to initiate an ESD of the loading operation using the predetermined procedure, but will otherwise be prohibited from closing valves against the flow.

The loading master, who will also act as the KMC pollution prevention officer, will remain aboard the vessel during loading and maintain a continuous liaison with Westridge Marine Terminal (via radio) and the vessel.

Crude oil tanker loading operations currently take between 18 and 32 hours depending on the vessel size, the cargo volume and the loading rate. When TMEP is complete, loading operations are expected to take less than 24 hours, given the increase in the maximum loading rate.

Typically throughout loading, the vessel will discharge clean segregated ballast water into the sea. All vessels using the Westridge Marine Terminal will follow the Transport Canada Ballast Water Control and Management Regulations, which currently state that tankers will have only segregated ballast water that has been exchanged not less than 200 nautical miles from shore. In this context, it is expected that by late 2017 a large proportion of the world-wide tanker fleet will be fitted with ballast water treatment systems.

Each of the three vessel loading berths to be in place after TMEP will be equipped with a control system that will allow Westridge Marine Terminal operations personnel and CCOs to

continuously monitor and adjust the loading flow rate from the Westridge Marine Terminal control building and from the PCC. The CCOs will operate the Burnaby Terminal tank and manifold valves and the booster pumps which feed Westridge Marine Terminal via the delivery pipelines. During the early and late stages of loading, Westridge Marine Terminal operations personnel will operate the control valves at Westridge Marine Terminal. During the middle stages of loading, when flows are stable, the CCOs will monitor and adjust the control valves. The control system, in combination with real time video display of the active berths will also allow Westridge Marine Terminal operations personnel to continuously monitor weather information, mooring line forces, and other safety parameters.

As the loading approaches completion, the flow rate will be reduced in a controlled manner by Westridge Marine Terminal operations personnel as directed by the loading master in consultation with the cargo officer. The loading master and cargo officer will continuously monitor the remote level instrumentation for the cargo tanks and will reconcile the total of these volumes with those measured by Westridge Marine Terminal. As an additional safety feature, each vessel cargo tank is equipped with high and high-high level detection, which trigger audio and visual alarms in the vessel control room. After loading operations end, the cargo tanks will be checked by a surveyor and compared with the Westridge Marine Terminal records. Custody transfer documentation will then be completed.

After loading operations are completed, Westridge Marine Terminal personnel will drain and disconnect the loading arms and vapour recovery system in accordance with Westridge Marine Terminal operations procedures.

#### *7.1.10.6 Departure*

Final pre-departure activities and documentation will be completed by the vessel agent, the vessel crew, the loading master, and Westridge Marine Terminal operations personnel. Pilots will then board the vessel, the assisting tugs will move into position, the gangway will be retracted, and the vessel's main propulsion and steering systems will be tested for operational readiness. In coordination with the vessel master and crew, Westridge Marine Terminal operations personnel will release the mooring hooks and the mooring lines will be taken aboard the vessel. The vessel will then either depart directly or shift to anchorage to wait for appropriate tidal conditions in the Second Narrows.

### **7.1.11 Leak Prevention, Detection, and Response to Probable Leaks**

#### *7.1.11.1 Leak Prevention*

During its 60-year history, the existing TMPL pipeline system has been operated with the goal of preventing leaks and the procedures for leak prevention and detection have been continuously evolved and improved.

Several interrelated programs and practices contribute to strong performance in leak prevention including pipeline and facility design practices, construction techniques and operating practices, the KMC IMP and FIMP, CP systems, the KMC Damage Prevention and Public Awareness programs and maintenance programs. The prevention of leaks is a fundamental objective of the KMC IMP and FIMP. These programs form comprehensive, structured, proactive management systems for the prevention of leaks and ruptures and for the mitigation of impacts should a failure occur. These programs and practices have proven effective in minimizing the frequency and severity of pipeline leaks and they will be enhanced and implemented on the expanded TMPL system.

#### 7.1.11.2 *Pipeline Leak Detection System*

The expanded TMPL system will include the implementation of the state-of-the-art, real-time, transient, computational pipeline leak detection system, otherwise known as the CPM system, that is currently in service on the existing TMPL system. KMC has a long and successful history with the implementation of these types of leak detection systems, which are widely viewed as the most effective type of system for liquid petroleum transmission pipelines. To support the acquisition of input data, highly accurate flow meters will be installed at all receipt and delivery locations and at all intermediate pumping stations along the pipeline route. Pressure transmitters and other instrumentation for the measurement of fluid parameters will also be installed along the expanded TMPL system, where appropriate. The leak detection systems for the expanded TMPL system will be in compliance with CSA Z662, Annex E, Recommended Practice for Liquid Hydrocarbon Pipeline System Leak Detection.

KMC is also in the process of reviewing other technologies for leak detection including external methods and an alternative computational method that monitors flow and pressure signals and bases leak detection on a probabilistic analysis of those signals. A final determination on whether to incorporate these technologies into the TMPL leak detection system will be made in the detailed engineering and design phase.

The SCADA system will acquire real time pressure, temperature, flow, and other fluid parameters from the pipelines in the expanded TMPL system, validate the measurements against predefined limits and pass the information on to the CPM system. If the CPM system determines that flow or pressure parameters on one of the pipelines fall outside of the expected tolerances, the leak detection system will issue an alarm in the PCC.

#### 7.1.11.3 *Facilities Leak Detection Systems*

Leak detection systems are an integral part of the design of the pump stations and terminals in the existing TMPL system and will be incorporated into the design of the new and expanded TMPL facilities. Details of leak detection, ESD, and containment systems are included in Section 7.1.5 and in Volume 4A, Sections 3.3 and 3.4. Leak detection systems typically include level transmitters or switches, hydrocarbon detectors, or combustible gas detectors, depending on the facility and area within the facility.

#### 7.1.11.4 *Additional Leak Detection Methods and Programs*

In addition to computer-based systems, other methods to detect leaks, currently utilized on the existing TMPL system will be also utilized on the expanded TMPL system. These include ILI runs using smart ball tools, a highly sensitive acoustic technology which can pinpoint very small pipeline leaks, regularly scheduled aerial and ground patrols of the rights-of-way and facilities, public awareness programs including the engagement of local municipal and emergency response agencies. Signage at all road and watercourse crossings provides emergency contact information in case members of the municipal emergency responders or the general public detect petroleum odors or conditions of concern.

#### 7.1.11.5 *Response to Leak Alarms*

If a leak alarm is triggered by the CPM system, the CCO will then follow a documented procedure, within the Control Centre Procedures, to determine if the alarm is a probable false alarm or a probable leak. If the evaluation leads to a determination of a probable leak, the CCO will use the SCADA system to shut down the pipeline and immediately dispatch field operations personnel to verify if there is a leak or otherwise identify the cause of the alarm.



As discussed in Section 7.1.5, a leak at a facility will typically trigger an alarm by activating a level transmitter or switch, a hydrocarbon detector, or a combustible gas detector. In most cases this will cause an ESD of the facility or the area within the facility where the transmitter or detector was activated. If a leak is not intended to cause an ESD by design and an alarm is triggered in the PCC, the CCO will take appropriate action to shut down and isolate the facility or the area within the facility following the Control Centre Procedures. In the case of an ESD, the CCO may take actions to create additional isolation. In either case, the CCO will dispatch field operations personnel to the facility to investigate the cause of the alarm.

#### 7.1.11.6 Pipeline Restart

In the case of a precautionary pipeline shut down due to a suspected leak or other abnormal occurrence, KMC CCOs, field personnel, and supervisory and management staff strictly and consistently follow a comprehensive and detailed formal investigation protocol, which is included in the Control Centre Procedures, prior to authorizing the restarting of the pipeline. The protocol will apply to the expanded TMPL system. A checklist format is used to ensure that appropriate steps in the protocol have been completed. The following must be confirmed:

- SCADA trends (pressure, temperature, flow, etc.) for the pipeline before and after the shutdown have been reviewed and evaluated;
- SCADA event logs before and after the shutdown have been reviewed and evaluated;
- right-of-way patrol (ground-based if possible, otherwise aerial) of the suspected location of the problem has been completed;
- available integrity data has been reviewed;
- pipeline inspection has been completed (where applicable);
- pipeline repairs have been completed (where applicable);
- all legislative requirements have been met; and
- a formal restart plan has been developed by the appropriate KMC regional director and the Director, Central Region and Control Centre.

Two KMC operations directors are required to review that the steps in the protocol have been completed as well as the results of the reviews and evaluations and the appropriate regional director is required to acknowledge by signature his approval of the restart.

## **8.0 SYSTEMS INTEGRITY MANAGEMENT**

Systems integrity management involves structured risk identification and assessment. Various tools and techniques are currently in use and will be used to generate, assess and evaluate operational risks within the expanded TMPL system. The integrity risk assessment results are and will be used to prioritize maintenance activities and ILI programs. These activities and programs are and will be formalized in the IMP and FIMP.

Each IMP will be composed of the required elements as outlined in CSA Z662-11 Annex N including documented policies, procedures and practices, so that events are accurately documented, roles and responsibilities are adequately defined, process consistency is maintained, consistent change management processes are followed, decisions are consistently justified and communicated, and continuous improvement occurs.

The IMPs will confirm the operational reliability of all system components including the pipeline, pump stations, terminals, remote mainline block valves (RMLBVs), and other facilities. The IMPs will contribute to ensuring compliance with applicable legislative requirements.

### **8.1 Pipeline Integrity Management Program**

#### **8.1.1 General**

The primary goals of the KMC Pipeline IMP, as adopted by Trans Mountain, are to:

- operate an integrated program which promotes the long-term integrity of the Canadian pipelines operated by KMC;
- contribute to the KMC Corporate EHS Policy commitment of “conducting its business in a safe and environmentally responsible manner”;
- ensure compliance with applicable legislation and standards for each pipeline; and
- demonstrate continual improvement through the monitoring of performance measures and through the reduction of risk as determined through a comprehensive and annually reviewed risk assessment program.

The IMP has been developed and improved over a number of years, is currently and successfully applied to the existing TMPL pipelines and will be applied to the expanded TMPL pipeline system. The IMP will be administered by the KMC Technical Services Department and will be implemented with the assistance of the KMC field operations team. The IMP is a key program within KMC’s ISLMS for assuring the safety of people and protection of the environment.

Processes that ensure the effectiveness of the IMP include an annual review of key performance indicators and periodic audits of the program by external specialists. In addition to the continual assessment of existing hazards, the IMP includes a process for the identification, assessment and management of newly identified hazards.

Although the primary focus of the IMP is on the prevention of releases through the identification, assessment, and management of hazards, the IMP also addresses the mitigation of the impacts of releases on people and the environment should they occur. The main methods for mitigating the impact of releases are early detection and reaction to releases, and reduction of potential

release volumes within high consequence areas (HCAs). The IMP includes a process for the identification of HCAs.

### **8.1.2 Baseline Risk Assessment**

A baseline risk assessment will be conducted, during the technical development of the TMEP pipelines, to guide the design to help assure that appropriate factors of safety are implemented and to reduce the risk of unmitigated pipeline threats with the potential to cause an incident. The risk assessment will consider all major pipeline threats including external corrosion, internal corrosion, cracking, third-party damage, material defects, outside forces (geotechnical), and operational error.

### **8.1.3 Annual Risk Assessments**

Proper design, material specification, and systematically applied quality assurance and quality control programs are key inputs to the long-term safe and reliable pipeline operations. Regular risk assessments will ensure that safety and reliability are sustained. The IMP will require an annual risk assessment following start-up of the expanded TMPL system with risk management activities directed toward a fundamental goal of continual improvement.

### **8.1.4 In-line Inspection Program**

As is the case for the existing TMPL system, scheduled runs of ILI tools will be undertaken to assess the integrity of the expanded TMPL system pipelines in accordance with the KMC IMP. ILI tools (sometimes known as smart pigs), are highly sophisticated instruments sent through pipelines, usually while they are in operation. ILI tools include sensors and electronics that collect and store various forms of data during their inspection runs. The data is subsequently analyzed by the ILI service provider and KMC integrity engineers using sophisticated algorithms. The results are used to prioritize anomalies for further investigation.

The type of pipeline integrity information required will dictate the ILI tool technology selected. Commonly used ILI tools gather information on internal or external metal loss, dents or pipe ovality, and cracks. ILI service providers have unique and proprietary technologies to accomplish the inspection services and subsequent data analysis. Some ILI tools may use a combination of technologies.

The types of tools that KMC currently uses for ILI of the existing TMPL system pipelines include:

- Geometry tools - These tools have an array of caliper fingers that track along the internal surface of the pipe and measure any distortion of the pipe wall. They can precisely measure dents, out of roundness, bends, buckles, wrinkles, and diameter changes. They also have an inertial monitoring unit that measures changes in direction and that maps the three dimensional location of the pipeline in GPS coordinates.
- Axial magnetic flux leakage (MFL) tools - These tools use a magnetic field combined with specialized sensors to detect metal loss on the internal or external surface of the pipe. They are used to detect and accurately locate external or internal corrosion or gouging on the pipe surface.
- Circumferential magnetic flux leakage tools - These tools are similar to MFL tools, but the magnetic field is applied circumferentially, which provides

improved detection of axially aligned metal loss features such as gouges, grooves, and slots, and longitudinal seam weld anomalies.

- Ultrasonic crack detection (USCD) tools - These tools use ultrasonic transducers mounted at an angle to the pipe surface that slide along the internal pipe surface to detect cracking in the pipe wall.
- Electromagnetic acoustical transducer tools - These tools use an electromagnetic field to generate an acoustical signal within the pipe wall that reflects back and forth between transducers to detect cracking in the pipe wall. These tools are also capable of detecting the type of coating and the coating condition on the pipe surface.
- Acoustical leak detection tools - These tools use highly sensitive microphones combined with data processing and inertial monitoring to detect small leaks in the pipeline. They have a detection threshold of 0.14 L/m. No leak has ever been detected on a pipeline in the TMPL system using these tools and all of the mainline segments have been inspected.

After the successful completion of each tool run and verification of a complete data set, the ILI service provider will generate a comprehensive inspection report and submit it to KMC for further review. Reports are submitted in the form of tallies, which provide a complete listing of the features detected by the tool in a consistent format for every pipe joint within the inspected section. Integrity engineers review the reports and apply further analysis to determine which anomalies require further inspection. Lists of the selected anomalies are prioritized and submitted to the field operations crews for excavation, non-destructive testing, and possible repair. The results of the field investigations are documented and used to make a final determination as to whether or not a repair is required. Information on mitigation measures is included in Section 8.1.7. The field measurements and characterizations of anomalies are also used to validate the performance of the ILI tools in consultation with the ILI service provider.

Pipe joints are separated by girth welds and each girth weld has a unique identification code that allows KMC engineers to overlay the data sets from all the different tools that have been run in any segment. This allows for checking for the possibility of interacting defects such as metal loss with cracks or dents. The girth weld coding also ensures accurate location of anomalies in the field using GPS.

ILI programs are continual assessment processes. A baseline inspection is first completed on each pipeline for each ILI tool used. The ILI findings and the field investigations are analyzed to confirm that the standard ILI interval of five years is adequate to ensure the integrity of the pipeline system. This is done by taking the population of features identified through the assessment process and simulating the growth of these features using well-established engineering methods. Any anomalies that may be at risk to become an integrity threat before the next scheduled ILI run are either repaired or scheduled to be reassessed with an earlier ILI run.

In addition to the hydrostatic testing of the new Line 2 pipeline segments, a post-construction ILI survey with a caliper tool will be performed to identify any construction damage to the pipe that requires repair. The caliper tool will also provide baseline geometry data. Within one year of the new Line 2 pipeline segments entering service, a baseline ILI survey of pipeline geometry and

metal loss will be undertaken with a high-resolution tool. A high-resolution USCD tool will be run in each of the new Line 2 pipeline segments within the first five years of operation.

The planned ILI program for the reactivation of the existing inactive pipeline segments that will form parts of Line 1 is described in Volume 4A, Section 3.6. In addition, a high-resolution USCD tool will be run in each of the reactivated pipeline segments within the first two years of operation.

### **8.1.5 Prevention Programs**

In addition to the ILI program, other major prevention programs include the Damage Prevention Program which focuses on preventing the accidental damage of the pipeline caused by ground disturbance activities, and the Natural Hazard Program, which identifies and monitors all natural hazards such as steep slopes, water crossings, or unstable soils that could pose a threat to the safe operation of the pipelines in the TMPL system. These programs will be enhanced to include the expanded TMPL system pipelines.

### **8.1.6 Monitoring Programs**

In addition to the ILI program, ongoing monitoring programs are currently in use on the existing TMPL system and will be used on the expanded TMPL system to ensure that the CP system is functioning effectively and that natural hazards will not cause integrity issues. These programs are:

- a CP system monitoring program that includes:
  - close interval pipe to soil surveys, completed on a five year rotating cycle;
  - verification of the proper functioning of rectifiers and ground-beds, completed monthly; and
  - test lead surveys, completed annually;
- a slope stability monitoring and assessment program that:
  - includes identified slopes for potential ground movements;
  - utilizes instrumentation, visual inspection, comparison of successive ILI runs, or a combination of these; and
  - evaluates the potential impacts to pipeline integrity.
- a stream crossing monitoring program to ensure that erosion does not compromise the depth of cover that is required to protect the pipeline against coating damage or unacceptable stresses induced by exposure to rocks and debris in potential combination with side loads induced by hydrodynamic forces; and
- general depth of cover monitoring surveys conducted on a five year rotating cycle.

A baseline close interval survey will also be completed during the first years of operation of the expanded TMPL system to ensure that the CP system is operating effectively to protect the

system from external corrosion and to ensure that current potentials are within acceptable levels to protect the pipeline coatings.

### **8.1.7 Mitigation Programs**

To manage risks posed by pipeline deterioration, anomalies identified through ILI will be analyzed and categorized using comprehensive engineering criteria. Anomalies that fail to meet the requirements to remain unmitigated, thereby posing a threat to the integrity of the pipeline, will be considered defects and repaired in accordance with applicable legislative requirements and KMC protocols, standards and procedures.

After the excavation of the pipeline section that has an anomaly, non-destructive testing of the anomaly is performed to precisely measure its dimensions and characteristics. The results are documented and used to determine whether a repair is required. In most cases defects are repaired using welded steel sleeves, but in some cases the section of pipe containing the defect will need to be cut out and replaced with a new section of pipe. Following final inspection, the pipeline is recoated, using a high performance product, and reburied.

Remediation of slope stability issues or rerouting the affected segment of the pipeline, or both, may be implemented to ensure ongoing integrity.

Remediation of stream crossing issues may include lowering the pipeline to restore required depth of cover and armouring the banks or streambed to prevent further erosion at the crossing location.

## **8.2 Facility Integrity Management**

The safety of the facilities in the expanded TMPL system will be assured through the enhancement and application of the existing KMC FIMP. The FIMP will be administered by the KMC Technical Services Department and will be implemented with the assistance of the KMC field operations team.

Like the IMP, the FIMP has processes for the identification of all integrity hazards that could affect the safe operation of facilities, the assessment for these hazards, and the management of the hazards to prevent and mitigate the impact from releases of petroleum and from petroleum fires.

The FIMP includes a continual assessment process that will ensure the completion of all maintenance and testing activities required for the effective operation of all preventative and consequence reduction systems.

### **8.2.1 Baseline Risk Assessment**

The FIMP uses a qualitative risk assessment process and requires risk management activities to support a goal of continuous improvement. The risk assessment process will be applied to the development of the TMEP facilities early in the design process to ensure that appropriate preventive measures and consequence reduction measures are incorporated. The FIMP risk assessments will be complementary to the HAZOP reviews conducted as part of the design process for all facilities.

### **8.2.2      *Periodic Risk Assessments***

The FIMP requires that risk assessments be completed on three year intervals. The FIMP will also require the periodic monitoring and assessment of facility piping under a formalized risk-based inspection program.

### **8.2.3      *Inspection***

As is the case for the existing TMPL system, periodic inspections of the facilities in the expanded TMPL system will be completed throughout the year as part of requirements of the KMC FIMP. The frequency of inspections will be determined by legislative requirements, risk assessments, operating experience, and manufacturers' recommendations and documented in the CMMS.

Inspection of all pump station and terminal piping will be included as part of scheduled maintenance activities. Aboveground piping will be visually inspected to confirm there is no external corrosion, evidence of leakage or other conditions that would indicate the pipe is not fit for service. Underground piping will be monitored by a combination of ILI, where feasible, and other condition monitoring technologies.

Mechanical equipment, including pumps and valves, electrical equipment, such as transformers and motors, and instrumentation equipment such as meters and transmitters, will be inspected at prescribed intervals. In some cases, equipment will have alarms to indicate any operating parameters that are not within specifications.

Safety systems will be inspected and tested on a regular basis to confirm their correct functioning.

### **8.2.4      *Prevention Programs***

Equipment and systems at all facilities in the expanded TMPL system, as in the current TMPL system, will undergo preventative maintenance so that the facilities meet all applicable legislative and KMC standards and can operate safely and with the highest levels of reliability. The frequency of inspections will be determined by legislative requirements, risk assessments, operating experience, and manufacturers' recommendations and documented in the CMMS. In addition, comprehensive history tracking and analysis of incidents, including leaks, security incidents, near misses, significant equipment malfunctions, and process upset conditions will be used to refine preventative maintenance programs.

Tanks, some piping at terminals and the Westridge Marine Terminal dock structures will also have CP systems installed to prevent corrosion.

### **8.2.5      *Monitoring Programs***

Monitoring programs for facilities in the expanded TMPL system, as in the current TMPL system, will include:

- scheduled pump station and terminal surveillance rounds and visual inspections;
- a site water handling systems and oil detection systems inspection program;

- a tank inspection program, in accordance with API 653 Tank Inspection, Repair, Alteration, and Reconstruction, which includes periodic assessments of wall thickness, settlement, coating condition, rim seal condition, and testing of overfill protective devices;
- a valve inspection and testing program;
- a pressure vessel inspection program;
- an aboveground pipe inspection program;
- a piping integrity program;
- a flange integrity program;
- a coating inspection program;
- a marine structures inspection program;
- an electrical substation breaker thermal inspections program;
- a CP system inspection and testing program;
- a fire-suppression system inspection and testing program;
- a protective devices and alarms inspection and testing program; and
- an air quality monitoring program at Sumas, Burnaby, and Westridge Terminals.

### **8.2.6 Mitigation Programs**

As is the case for the existing TMPL system, integrity issues identified during daily, monthly, or annual inspections or arising from scheduled API 653 inspections will be entered into the CMMS and prioritized for corrective maintenance.

Anomalies detected during integrity inspections of aboveground or underground piping within facilities will be repaired using methods that include installation of repair sleeve or pipe segment replacement.

Issues detected on equipment that cannot be remedied through calibration and adjustment will typically be mitigated through component replacement or refurbishment.



## **9.0 ENVIRONMENT, HEALTH AND SAFETY MANAGEMENT**

### **9.1 Environment, Health and Safety Management System**

In addition to meeting the requirements of Section 6 of the NEB OPR, and other EHS legislation associated with pipeline operations, KMC has implemented an EHS Management System to ensure that risk to employees, contractors, the public, and the environment is minimized. The KMC EHS Management System is being implemented according to the KMC EHS Management System Compliance Guideline.

Kinder Morgan Canada's current EHS Management System was initially developed in 2008 drawing from three management systems: CSA Z1000-06 – Occupational Health and Safety Management (CSA 2006), ISO 14001 Standards - Environmental Management (ISO 2004), and OHSAS 18001 - Occupational Health and Safety Management Systems – Requirements (British Standards Institute 2007). Previous to the current system, KMC had individual management systems for emergency response, security, safety, and environment, which have now been integrated into the current EHS Management System. With the NEB's amendment of the OPR in 2013, KMC's EHS Management System was updated to adhere to the specific requirements as defined in Section 6 of the NEB OPR. The three management system frameworks are periodically consulted for comparison and general information.

The EHS Management System describes how the company operates in a way that minimizes risk. The management system structure emphasizes the importance of EHS impact prevention and continuous performance improvement, rather than reaction and management of loss occurrences. The EHS Management System is divided into the five primary sections described below.

#### **9.1.1 Policy and Commitment**

The EHS Policy is the overarching statement that the EHS Management System and all EHS Programs have been developed in accordance with. The policy statement appears in all emergency response plans (ERPs). A brief discussion about the Policy is included in Section 2.4 and the Policy itself is included in Figure 2.4.1.

#### **9.1.2 Planning**

Kinder Morgan Canada has established, implemented, and maintains a procedure to achieve the following:

- establish objectives and targets, including the designation of responsibility and means, and time-frames in which they will be achieved;
- proactively monitor changes in applicable legislation and legal requirements;
- determine if or how legislative or legal requirements apply to its aspects, hazards, and threats;
- periodically evaluate compliance with these requirements and resolve nonconformities; and
- communicate relevant requirements to interested and responsible personnel within the company.

### **9.1.3 Implementation**

Kinder Morgan Canada has established, implemented, and maintains a procedure to achieve the following:

- communicate information specific to the EHS Policy and the implementation plan to all levels within the company; and
- identify training needs associated with its operations and programs, provide training or take other action to meet these needs, and evaluate the effectiveness of the training; and
- make employees aware of:
  - their roles and responsibilities, and the importance of achieving conformity with the EHS Policy and procedures and the requirements of the EHS Management System;
  - the environmental, health and safety consequences of their work and the benefits of improved personal performance;
  - the training requirements associated with emergency preparedness and response; and
  - the potential consequences of departure from specified procedures.

### **9.1.4 Checking and Corrective Action**

Kinder Morgan Canada has established procedures to monitor and measure performance on a regular basis. These checking and corrective actions include:

- both qualitative and quantitative measures, appropriate to the needs of the organization;
- monitoring such that the objectives and targets identified in the Policy and planning activities are met;
- monitoring the effectiveness of the controls put in place with measures that validate the performance of the system; and
- reporting and investigating incidents to identify root cause(s) and ensure that any preventative and corrective actions are implemented.

### **9.1.5 Management Review**

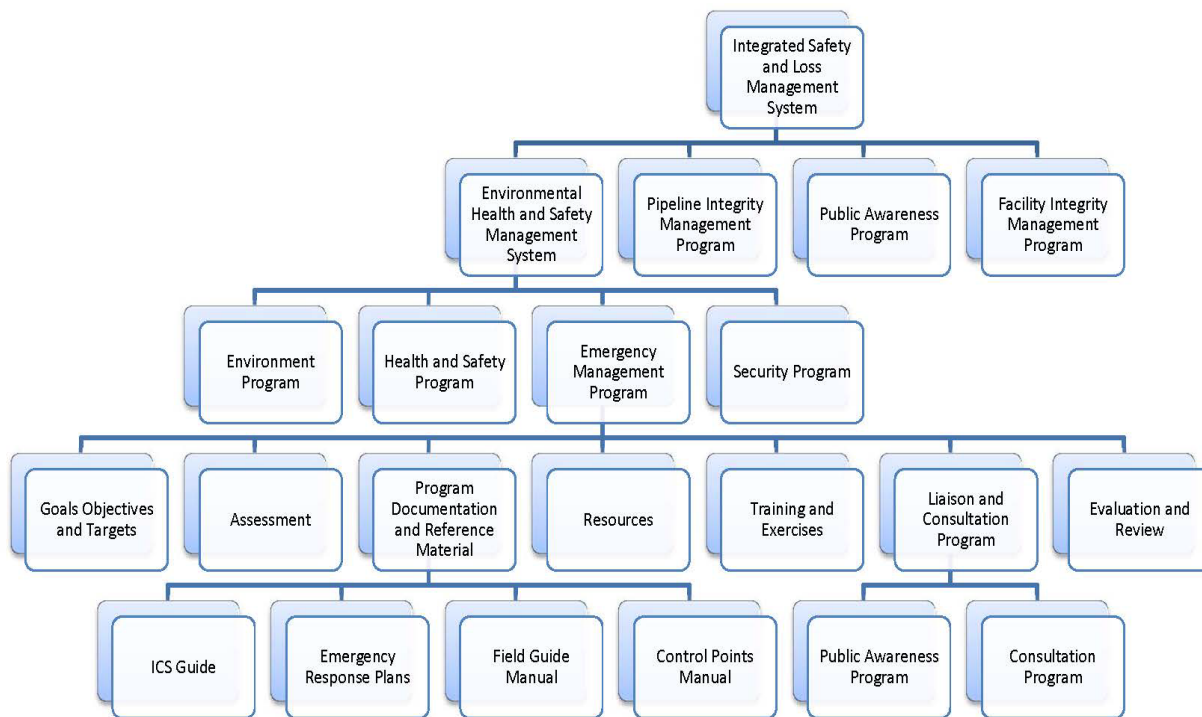
Senior management review the EHS Management System at planned intervals to ensure its continued suitability, adequacy, and effectiveness. The review will include decisions and actions specific to:

- the need for changes to the policy, objectives, and targets;
- improvements in effectiveness;
- the extent to which objectives and targets have been met; and
- recommendations for improvement and time-lines for implementation.

## 10.0 EMERGENCY PREPAREDNESS AND RESPONSE

### 10.1 General

As is more fully described in Section 4 in Volume 7, KMC has a mature Emergency Management Program, which is based on a combination of legislative compliance, operational need, industry best practice, and lessons learned through regular exercises and actual incidents. The Emergency Management Program is embedded within the management system framework provided by the ISLMS and the EHS Management System as shown in Figure 10.1.1. The Program will be enhanced and applied to the expanded TMPL system.



**Figure 10.1.1 KMC ISLMS, EHS Management System, and the Emergency Management Program**

Key elements of the program include long-standing ERPs, response equipment, and regular desktop training and field deployment exercises, which contribute to a highly trained response staff and response readiness within the organization.

Legislative compliance and enforcement of the Program for the existing TMPL system and expanded TMPL system is provided through multiple federal jurisdictions and cooperation with provincial regulators:

- the NEB enforces the OPR and is responsible for monitoring and auditing the Emergency Management Program requirements for the pipelines and associated facilities, including the Westridge Marine Terminal; and

- Transport Canada enforces the *Canada Shipping Act* and monitors water based facilities and marine transportation.

In addition to the legislative requirements the Program has been established based on the guidance provided by existing standards:

- CAN/CSA-Z731-03 - Emergency Preparedness and Response (CSA 2003);
- BC Emergency Response Management System Standards (BCERMS) 1001 and 1002 (BCERMS 2000);
- BC Guidelines for Industrial Emergency Plans (BC MOE 1992);
- Emergency Preparedness and Response Requirements for the Upstream Petroleum Industry (formerly Guide 71) (Alberta Energy and Utilities Board 2003)

In compliance with requirements and recognized best practices KMC has developed an integrated approach to emergency management, which includes:

- a documented EHS Management System, as described in Section 9; and
- a comprehensive Emergency Management Program, which includes:
  - emergency vulnerability identification;
  - goals, objectives and targets;
  - an Incident Command System (ICS) guide;
  - ERPs;
  - control point manuals;
  - field guide manuals;
  - a training/exercise program;
  - post event evaluations; and
  - continuing education and consultation with first responders, municipalities, and the public who are adjacent to the TMPL system.

## **10.2 Emergency Management Program**

The Emergency Management Program is central to KMC's response to an emergency. The program provides the key elements of a skilled and trained workforce, strategically located spill response equipment and resources, and pre-defined tactics for expedient and effective response to a pipeline emergency. As part of the Emergency Management Program, an ICS is used to provide a structured and consistent approach. The Emergency Response Program has been developed and enhanced through a combination of learnings from table-top and field deployment spill exercises, and through experience gained through response to actual incidents. The Emergency Management Program is subject to audit through the NEB, with findings addressed internally through a Corrective Action Plan.

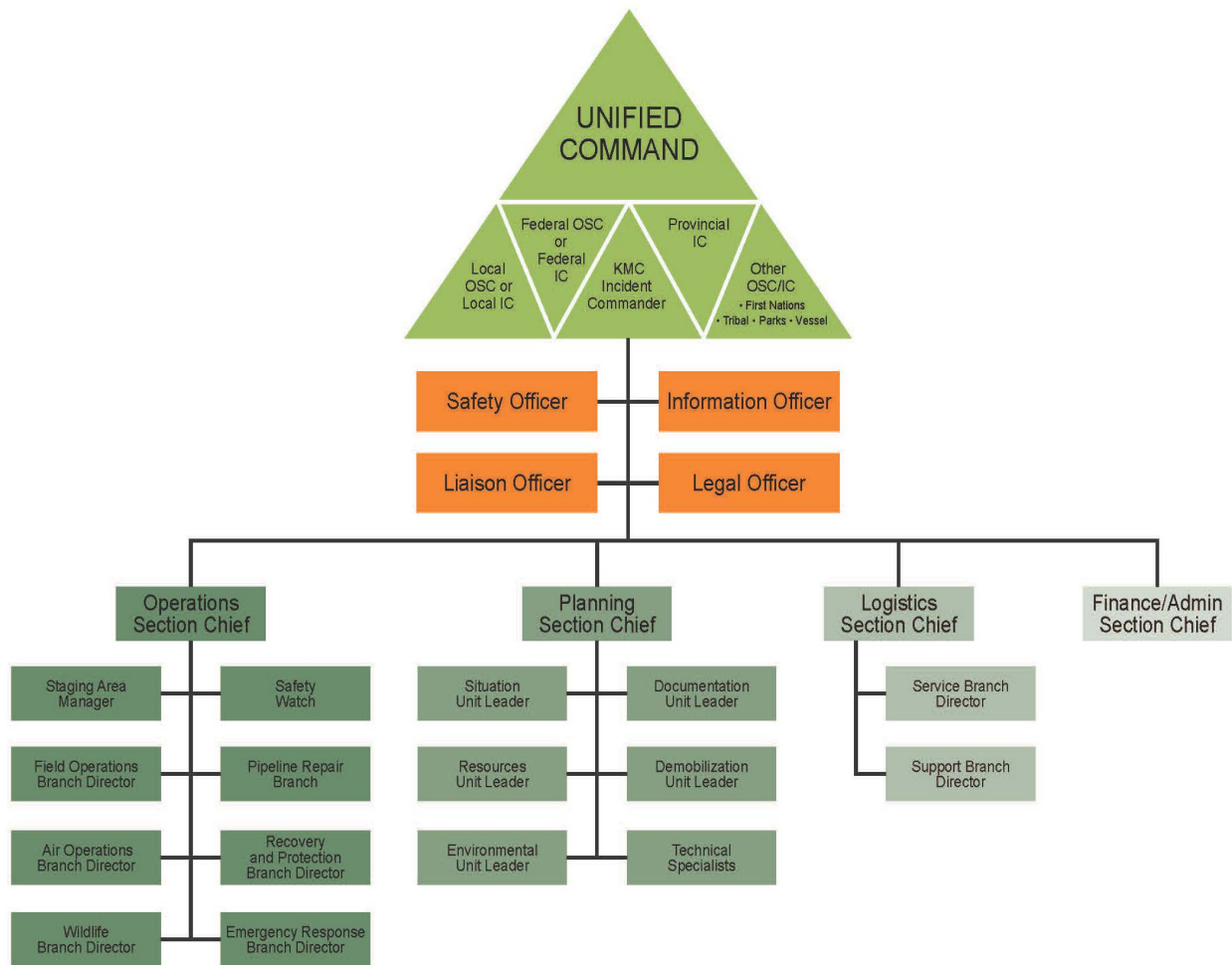
### **10.2.1 Incident Command System**

The original ICS was developed in the 1970's in California by the FIRESCOPE program to approach the problem of managing rapidly moving fires, with requirement for coordination over multi-jurisdictions. In 1980, the FIRESCOPE program was transitioned into the National Interagency Incident Management System (NIIMS). At the time, ICS became the backbone of a broader system for all US federal agencies with wild-land fire management responsibilities. Today law enforcement, fire departments and municipalities use a form of ICS in their incident management systems.

The ICS is designed to enable effective, efficient incident management through integration of facilities, equipment, personnel, procedures, and communications within a common organizational structure. The ICS provides a standard format, with the purpose of enabling incident managers to identify the key concerns associated with the incident, often under urgent conditions, without sacrificing attention to any component of the response. It represents organizational best practices and, as an element of the Command and Management Component of NIIMS, has become the world-wide standard for emergency management. The ICS was also designed to be flexible in application to size of incident, to enable rapid integration of agencies and personnel into a common management structure, and to minimize duplication of effort.

Kinder Morgan Canada was an early adopter of the ICS for emergency response, with introduction of the system in the early 1990s.

The ICS structure outlines clear roles and responsibilities with respect to emergency response and includes a unified command structure for co-ordination with the multiple levels of government; federal, provincial, municipal, and Aboriginal communities, along the TMPL system. Figure 10.2.1 provides the organizational structure employed within the ICS framework.



**Figure 10.2.1 ICS Organizational Structure**

The KMC Emergency Response Program and response organization is based on a three-tiered response structure as shown in Table 10.2.1, based on the categorization of incidents. Each tier is managed by an escalating level of management seniority and authority, and assistance from outside the initial response organization. The standardization of the ICS Structure and Incident Management Process provides the flexibility to tailor the size of the response organization to the specifics of the incident and allows for rapid adjustments as an incident evolves. Where appropriate, the KMC incident commander will invite the participation of federal, provincial, and local agencies to form a unified command.

**TABLE 10.2.1**

**THREE-TIERED RESPONSE STRUCTURE**

<b>Level</b>	<b>Definition</b>	<b>Examples</b>
<b>I</b>	The Company has the capability to manage and control a Level I emergency using company resources available within the area. The District Supervisor will assume the Incident Commander position.	<ul style="list-style-type: none"> <li>• oil spills confined to company property (pipeline pump station, terminal, or ancillary facility)</li> <li>• public, contractor, or employee safety not endangered</li> <li>• public property not endangered</li> <li>• local response handled by District personnel</li> <li>• notification may not be required to regulatory authorities</li> <li>• little or no media interest</li> </ul>
<b>II</b>	The Company has the capability to manage and control a Level II emergency using company resources and expertise, with some assistance from local contractors. The Region Director or designate may assume the Incident Commander position.	<ul style="list-style-type: none"> <li>• oil has migrated beyond company property, but not into a waterway</li> <li>• emergency services may be required (e.g., fire, police, ambulance)</li> <li>• public, contractor, or employee safety and/or property may be endangered</li> <li>• notification required to regulatory authorities</li> <li>• may use a unified command organizational structure in the emergency</li> <li>• local media interest</li> </ul>
<b>III</b>	The Company may request assistance from other Industry, Municipal, or State Agency personnel to support the response to the incident. The Region Director will assume the Incident Commander position.	<ul style="list-style-type: none"> <li>• major emergency condition such as:                             <ul style="list-style-type: none"> <li>- uncontrolled leak</li> <li>- spill on a watercourse</li> <li>- large fire at an operating facility or office building</li> <li>- fatality or serious injury to an employee, contractor, or the public</li> <li>- spill of hazardous substances</li> </ul> </li> <li>• major off-site environmental impact has occurred</li> <li>• public, contractor, or employee safety and/ or property is endangered</li> <li>• emergency services are required (e.g., police, fire, ambulance)</li> <li>• notification required to regulatory authorities</li> <li>• use of a Unified Command organizational structure in the emergency, as required, to facilitate coordination of company, government and other agency response to the emergency.</li> <li>• local, Provincial/State, and/or National Media interest.</li> </ul>

**10.2.2 Emergency Response Manuals and Reference Material**

**10.2.2.1 Emergency Response Plans**

Emergency Response Plans have been developed for the existing TMPL system and will be enhanced and implemented on the expanded TMPL system. These plans detail prescriptive procedures, activities, and checklists to ensure consistent response to incidents with the common objective of protecting company personnel and contractors, the public and public property, and the environment.

The overall ERP provides a generic response to an incident at any location along the TMPL system, whereas the ERPs for terminals are location-specific. All plans have a common structure and format, and address key elements, including:

- responder health and safety;
- internal and external notifications;
- spill/site assessments;
- spill containment and recovery;
- protection of sensitive areas; and
- multiple hazards.

Each of the plans also includes detailed information on the ICS, legislative background, and documents the approach to training and exercises. The plans provide comprehensive information and are a ready resource for a safe, consistent, and timely response to an emergency or spill. All ERPs also address general requirements for non-spill incidents such as explosions and fires, and include a detailed air monitoring plan that is applied in the event of a spill.

#### *10.2.2.2 ERP Reference Material*

The ERPs are utilized in coordination with the Control Point Manual and Field Guides, which provide complementary information specific to spill locations, including predetermined control point and response tactics.

The Field Guides are supplementary to the ERPs and are intended as a single source reference readily available in vehicles assigned to KMC operations personnel. The Field Guides provide reference information consistent with the ERPs, and include detailed route maps complete with control points and facility plot plans.

Other reference material available to supplement the response to an emergency includes the ICS guide, shoreline clean-up and assessment technique procedures manual (marine and freshwater), and facility fire-fighting plans.

These plans are regularly exercised and tested, and have been used in actual incidents. Where required, the plans are updated based on lessons learned from incidents and training exercises.

#### *10.2.2.3 Corporate Crisis Support Plan*

Kinder Morgan maintains a Crisis Support Plan, which establishes a framework and procedures for all KM business units to access additional resources and other support for field operations during an operating crisis. The Crisis Support Plan is designed to build upon the business unit ERPs and to facilitate an integrated KM corporate response.

The crisis support plan is implemented by the KM Crisis Support Team (CST). The functions of the CST are as follows:

- support the field incident command to protect life, property, and the environment;



- support operations in safely returning facilities back to service;
- provide a focal point for specific activities such as business continuation, major media response and investor relations activities; and
- assist in providing for humanitarian needs.

The CST may be formally convened to respond to incidents by decision of the incident commander or business unit management.

### 10.2.3 Spill Response Resources

Kinder Morgan Canada maintains a network of response resources, which includes internal and external equipment and personnel.

#### 10.2.3.1 Internal Response Equipment

There are seven Oil Spill Containment and Recovery (OSCAR) response units placed strategically along the existing TMPL route, at a spacing of approximately two to three hours of road driving distance. All units are equipped to a standard level, which includes a minimum of 229 m of containment boom, skimmers, sorbents, pumps, temporary storage, tools, and personal protective gear. Some units have additional specialized equipment to meet the specific needs of the local area. To maintain a base level of readiness, the inventories are taken and the units are restocked annually or when needed following deployment for a spill exercise or a spill. After any response or training with the equipment, a needs assessment is done to identify if there are newer technologies or additional equipment that would be useful in the event of an actual incident. Table 10.2.2 indicates the general location of the OSCAR units and a basic overview of the equipment at each location.

**TABLE 10.2.2**

#### **LOCATION OF INTERNAL RESPONSE EQUIPMENT**

<b>Location</b>	<b>Type of Equipment</b>
Burnaby, BC	Response Boats (one moored at Westridge Marine Terminal, one on a trailer) OSCAR Trailer with a total of 2,050 ft. (625 m) of containment boom, skimmers, sorbents, pumps, temporary storage, tools, personal protective gear, 10,500 gal (39,700 L) of foam, fire-fighting trailer, and a foam cannon.
Hope, BC	Response Boat OSCAR Trailer with a total of 750 ft. (229 m) of containment boom, skimmers, sorbents, pumps, temporary storage, tools, and personal protective gear.
Kamloops, BC	Response Boat OSCAR Trailer with a total of 5,250 ft. (1,600 m) of containment boom, skimmers, sorbents, pumps, temporary storage, tools, personal protective gear, cold weather equipment, 2,100 gal (7,900 L) of foam, and fire-fighting equipment.
Blue River, BC	Response Boat OSCAR Trailer with a total of 1,200 ft. (366 m) of containment boom, skimmers, sorbents, pumps, temporary storage, tools, personal protective gear, and ice response equipment.

**TABLE 10.2.2**

**LOCATION OF INTERNAL RESPONSE EQUIPMENT (continued)**

Location	Type of Equipment
Jasper, AB	Response Boat OSCAR Trailer with a total of 900 ft. (274 m) of containment boom, skimmers, sorbents, pumps, temporary storage, tools, personal protective gear, and ice response equipment. This unit is rated for helicopter deployment.
Stony Plain, AB	Response Boat OSCAR Trailer with a total of 1,200 ft. (366 m) of containment boom, skimmers, sorbents, pumps, temporary storage, tools, personal protective gear, and ice response equipment.
Edmonton, AB	Sorbents, pumps, temporary storage, tools personal protective gear, cold weather response equipment, 15,000 gal (5,700 L) of foam, a fire-fighting trailer, and a foam cannon.

In addition to the mobile units, all facilities and operations vehicles are equipped with standard spill kits for response to minor spills.

*10.2.3.2 External Response Equipment and Personnel*

Kinder Morgan Canada belongs to a number of response organizations and participates in mutual aid exercises to supplement the company's self-reliant response capability. There are two main spill response organizations from which KMC, as a shareholder and member, can source equipment and manpower as outlined in the mutual aid agreements.

Transport Canada-certified Western Canada Marine Spill Response Corporation (WCMRC) is based in Burnaby, BC, and locates a response vessel at Westridge Marine Terminal for rapid deployment. KMC is a founding shareholder and member of WCMRC and sits on the Board of Directors. WCMRC's mandate is to ensure there is a state of preparedness in place and to mitigate the impact when an oil spill occurs. This includes the protection of wildlife, economic and environmental sensitivities, and the safety of both the responders and the public. More information on WCMRC can be found at <http://wcmrc.com/>.

The second major, established response organization is Western Canada Spill Services (WCSS), of which KMC is a shareholder and sits on the Board of Directors. The mandate of the WCSS is to ensure the provision of cost-effective, integrated, emergency response capabilities and to continually improve and communicate to their customers, stakeholders, and regulators all aspects of their business. This includes planning, preparedness, response, and research and development for the petroleum industry. To ensure that industry is capable of safe, effective oil spill response, WCSS focuses its efforts on communication initiatives with government and stakeholders, research and development, contingency planning, equipment readiness and training to ensure skilled personnel are prepared to react quickly and thoroughly. More information on WCSS can be found at <http://www.wcss.ab.ca/>. Although the scope of WCSS is generally limited to Alberta and north east BC cooperative areas, WCSS has confirmed that it is capable of and willing to deploy resources into BC and has done so in the past. KMC is a member of the cooperative areas that the TMPL system traverses within Alberta.

## **10.2.4 Training and Exercise Programs**

Kinder Morgan Canada has a rigorous training and response exercise program that ranges from detailed equipment deployment drills to full ICS management and organization training and deployment. Training is provided to operations and head office staff, and at locations along the TMPL system.

### **10.2.4.1 Training**

The goal of the emergency response training program is to ensure that employees receive the training necessary to perform their designated emergency responsibilities and protect themselves, the public, public property, and the environment during a spill or other emergency. Formal training is reinforced by a program of regular emergency response exercises. For specific training or exercises, efforts are made to coordinate with regulators and external emergency response agencies.

### **10.2.4.2 Exercises**

The objective of response exercises is to practice the knowledge and skills received in training, identify areas of future training priority, identify areas to improve current emergency procedures or equipment, engage with local responders, and share exercise learnings all to ensure a smooth response in the event of an incident. KMC conducts, on average, 20 to 25 training, table-top, and deployment exercises at locations along the TMPL system each year. Many of the exercises involve Aboriginal communities, regulatory agencies, stakeholders, and contract emergency response support companies.

Kinder Morgan Canada personnel at company facilities, such as terminals, participate in exercises each year that are relevant to their site-specific operations. At a minimum, each terminal will participate in a fire response exercise using tactical equipment and interact with the local first response organization. Additionally, personnel at each terminal will participate in a security exercise each year. These exercises will involve the local operating group only and may be table-top, tactical, or a combination of both. Exercises are often preceded by a full day of refreshment training which may include ICS, tactics and equipment specifics. Local response organizations and government agencies are invited to participate in both table-top exercises and field deployments. Incident debriefings are conducted after every exercise and every actual emergency response deployment.

## **10.2.5 Community Awareness and Emergency Preparedness**

Kinder Morgan Canada's Public Awareness Program is an integral component of the organization's Damage Prevention Program. Public awareness serves to alert the public to the presence of pipelines in the community as well as provide safety and damage prevention information to those who live or work near the TMPL system or who may be called upon to respond in the event of a pipeline emergency. The program includes two main subprograms, continuing education and consultation. This program is conducted in English with documents translated into other languages as deemed necessary. For example, the Working near Pipelines brochure is translated into Punjabi, Korean, Tagalog, and Chinese Traditional.

#### 10.2.5.1 *Continuing Education Program*

The primary contact method for emergency responders, including provincial emergency programs in communities along the TMPL system, is direct mail once every three years. The direct mail campaign addresses:

- how to participate in KMC emergency response drills, table-top exercises, or equipment deployments;
- how to notify KMC in the event of a suspected pipeline emergency;
- where to get information on oil characteristics and recommended equipment for responding to a pipeline emergency; and
- information about KMC ERPs specific to their local municipality, county, or regional district.

In addition to the mailings, continuing education is provided through Community Awareness and Emergency Response presentations. These training programs are delivered by KMC operations staff in consultation with other training providers, as required. In addition to table-top exercises and joint field deployment exercises, other topics presented and discussed include:

- the pipeline route(s);
- the types of petroleum products transported;
- how pipelines are identified by above ground signage;
- pipeline safety features;
- petroleum product hazard awareness;
- KMC and first responder emergency response procedures and respective roles and responsibilities;
- fire-fighting equipment; and
- KMC emergency response exercises.

#### 10.2.5.2 *Consultation Program*

When conducting a major update to an ERP, KMC makes contact with agencies that could reasonably be expected to participate in an incident response for input on the procedures that could be used. In years where a major update is not being conducted on an ERP, KMC verifies the contact information for responding agencies. In any year, consultation may occur by e-mail, telephone or through direct meetings.

In addition to the formal review of roles and contact information, KMC invites outside responding agencies to participate in training, deployment and table-top exercises to determine the working relationships of the organizations. Based on a review of these events, further refinements to ERPs are made to reflect changes in conditions and processes. KMC also participates in external agency trainings and table-top exercises to further develop the working relationships with local authorities and integration of emergency operations centres.

## **10.2.6 Planning and Improvements**

Although the Emergency Management Program is comprehensive, it will be fully reviewed and enhanced to address the needs of the expanded TMPL system. TMEP coincides with a heightened public awareness of the hazards associated with transportation of petroleum products.

Kinder Morgan Canada's ISLMS and EHS Management System provide a structured framework for the continuous improvement of the Emergency Management Program. The ICS also provides the management structure for emergency response. These systems are effective and flexible and it is anticipated that they will not require fundamental changes.

### *10.2.6.1 External Emergency Management Plans and Improvements*

Reviews of emergency preparedness and response by the Canadian and BC governments are currently in progress. To the extent possible, KMC is either participating in or providing input to these reviews, either directly or through the Canadian Energy Pipeline Association. Three recent and ongoing initiatives are discussed in Volume 7, including:

- BC Land Based Spill Preparedness and Response Initiative.
- Government of Canada's Commitment to Pipeline Safety:
  - recently amended OPR;
  - NEB administrative monetary penalties; and
  - Strengthening Canada's Pipeline Safety System.
- Industry Initiatives:
  - Canadian Energy Pipeline Association Mutual Emergency Assistance Agreement;
  - WCSS; and
  - WCMRC.

### *10.2.6.2 Emergency Response Plans and Improvements*

#### **10.2.6.2.1 Emergency Response Plan Review and Update**

As part of a regular process, a review and update of all current KMC ERPs, and the ICS Guide was completed in 2013. The existing plans and guides will be further enhanced to include the pipeline and facilities to be added for TMEP, the increased volumes to be transported through the TMPL system, any new control points, and any new response equipment or bases. The updated plans will also reflect the recent Canadian Energy Pipeline Association Mutual Emergency Assistance Agreement, finalized plans with WCSS, and any new additions as a result of the BC land-based spill initiative. The underlying basis for the review will include performance standards for estimated response time and response capacity.

The detailed review will be developed collaboratively with stakeholders over the next two years. Consultation to date has indicated a strong interest in pipeline safety and emergency response, and plans include continued engagement with emergency planners and first responders to

solicit input to planning efforts and to enhance understandings of pipeline hazards, emergency readiness, and roles and responsibilities.

The finalized ERPs and supporting documents will be completed sufficiently in advance of the operation of the expanded TMPL system to allow for appropriate training to take place.

#### **10.2.6.2.2 Equipment Review and Availability**

A comprehensive review of existing response equipment and locations is planned. This review will examine the existing equipment available internally as well as the potential locations for supplemental equipment available through mutual aid partners including WCSS and CEPA partners. The review will also include consideration of equipment availability through Aboriginal communities and local governments. The review will include:

- determining if the existing Trans Mountain OSCAR units have sufficient equipment and capacity for the expanded TMPL system;
- evaluating the current locations of all equipment caches in the context of strategic deployment;
- reviewing inventory, and evaluating equipment and personnel resources available through both formal and informal mutual aid programs; and
- cataloging all existing resources and defining future needs.

This scope of the review will include all of the pipelines and facilities (including pump stations, terminals, and ancillary facilities). Although the specific details may change, the planning completed to date based on the conceptual designs for Westridge Marine Terminal suggests that:

- additional equipment, possibly including boom and a skimmer, sized for a 250 tonne spill may be situated either at the existing WCMRC operations facility in Burnaby, BC, approximately 2 km west or at the utility dock;
- the Burnaby OSCAR unit will continue to be located at Burnaby, BC;
- two rapid deployment boom reels, in addition to the booms planned for the berths, may be placed at the eastern and western limits of the Westridge Marine Terminal shoreline, to allow for isolation of all three berths and the two nearby municipal storm water outfalls.

#### **10.2.6.2.3 Aboriginal Integration**

Consultation with Aboriginal communities has indicated an interest in participation in emergency response planning and programs with some communities already participating in emergency response exercises and training. The integration of Aboriginal communities provides opportunity for reduced response time in some locations and additional workforce to respond to a spill. Participation of Aboriginal communities in emergency planning and response also aligns with the principles outline in the BC land-based spill initiative.

Trans Mountain will continue to engage with Aboriginal communities with the objective of enhancing the current ERPs. Considerations for Aboriginal integration will include the location of

Aboriginal communities along the pipeline, their capacities, the need for intermediate response equipment locations, as well as training and exercise requirements.

Aboriginal community participation and roles and responsibilities will be established through formal agreements between KMC and the communities.

#### **10.2.6.2.4 Training and Exercises**

Kinder Morgan Canada will coordinate training and exercises to provide a smooth integration of the added resources and capacity required for the expanded TMPL system and the changes to the current ERPs and guides. The training program will include desktop and classroom training as well as exercises that focus on tactical response. The training will include participation of multiple levels of government, mutual aid organizations, and Aboriginal communities that have formalized agreements with KMC.

An Emergency Response Training Plan will be developed, which outlines the training program, participants, content, and exercise locations, with the intent of providing field deployment exercises that will cover the geographical extent of the TMPL system, and align with KMC's operating districts.

#### **10.2.6.2.5 Spill Response Tactics**

Standard spill response tactics are included in the ERPs, together with location specific tactics addressed in the Control Points Manual. The tactics are intended to control the spill source, and contain and recover spilled oil. For spills into watercourses, tactics will generally include boom deployment and the use of recovery equipment such as skimmers and vacuum trucks.

The results of the fate and behavior studies for diluted bitumen indicate that a prompt response can significantly reduce the consequences of a spill. While a prompt response to all incidents is important, the fact that weathering of diluted bitumen increases the likelihood of some portion of it sinking, makes a prompt response to a diluted bitumen spill especially important.

Tactics and equipment to be used for a spill depend on many factors. KMC has staff trained on a wide variety of tactics and equipment types, primarily mechanical methods for containment, protection and recovery, including the use of booms and skimmers. In addition to mechanical methods there are two other spill mitigation tactics that merit further discussion, the use of dispersants, and in situ burning. Experience has proven that dispersants and burning are effective spill responses but that they have to be applied early as their effectiveness diminishes over time. For additional information on application of dispersants and in situ burning, see Appendix C in Volume 7.

## **11.0 SECURITY MANAGEMENT PROGRAM**

Kinder Morgan Canada manages security under the KMC Operations Facility Security Plan (KMC OFSP), which is based on the NEB: Notice of Proposed Regulatory Change 2009-01 Adoption of CSA Z246.1-09, Security Management for Petroleum and Natural Gas Industry Systems, the Alberta Counter-Terrorism Crisis Management Plan, and other national and international security standards.

This KMC OFSP identifies measures that are required at differing threat levels for each type of designated facility and suggests security practices to be considered to tailor security practices to specific facilities.

The KMC Security Committee, led by the VP operations, provides oversight of the KMC security program.

As on the existing TMPL system, security systems to differing levels will be installed at the expanded TMPL system facilities. The selection of the security system will consider the following elements:

- security policies and procedures;
- threat monitoring and analysis;
- tracking and trending of security incidents;
- overall system vulnerability assessments;
- identification of criticality of individual facilities;
- individual facility vulnerability assessments;
- physical security measures;
- training of all personnel in accordance with their respective roles; and
- subject matter expertise and support.

The types of physical security measures at facilities may include perimeter fencing, intrusion alarms, surveillance systems, and enhanced lighting. Security patrol personnel will be used when appropriate. KMC will continue to work with local and federal law enforcement agencies, regulatory authorities and industry associations to identify and monitor security trends, issues, and best practices.



## **12.0 PRELIMINARY ABANDONMENT PLAN**

### **12.1 Introduction**

This section provides a discussion regarding abandonment planning for the pipelines and facilities to be constructed for TMEP to ensure that they are eventually abandoned to the satisfaction of NEB and any other regulatory authorities having jurisdiction, and in consultation with Aboriginal communities, landowners, and stakeholders.

A comprehensive Abandonment Plan will be provided as part of Trans Mountain's application for abandonment at the time of abandonment, as currently required under Section 74 of the *NEB Act*, and Section 50 of the NEB OPR.

### **12.2 Background**

In 2007, the NEB established the Land Matters Consultation Initiative (LMCI) as a public forum for continual improvement related to land matters. The NEB believed this program would help to maintain effective working relationships between companies and landowners.

#### **12.2.1 RH-2-2008**

In May 2009, the NEB issued its Reasons for Decision RH-2-2008 in the Matter of LMCI Stream 3 - Financial Issues Related to Pipeline Abandonment (NEB 2009) in determining the optimal approach to ensure that funds were available when pipeline infrastructure abandonment costs are eventually incurred. As a result of RH-2-2008, all Group 1 companies, including Trans Mountain, were required to prepare and file, by May 31, 2011, a Physical Plan for abandonment. Subsequently, all Group 1 companies were required to prepare and file by November 30, 2011, a preliminary Abandonment Cost Estimate. RH-2-2008 also set out guiding principles, a five-year Action Plan and a Base Case for preparing preliminary Abandonment Cost Estimates.

#### **12.2.2 MH-001-2012**

On February 1, 2012, the NEB issued Hearing Order MH-001-2012 to all Group 1 companies, including Trans Mountain, for the purpose of assessing the reasonableness of the preliminary Abandonment Cost Estimates. Group 1 companies defended preliminary Abandonment Cost Estimates and associated Physical Plans and underlying assumptions in an oral hearing in late 2012. In early 2013, Reasons for Decision, Abandonment Cost Estimates, MH-001-2012 (NEB 2013b) was released, providing an overview of the matters considered in reaching a decision with respect to reasonableness of the Abandonment Cost Estimates. Subsequently, the Group 1 companies filed revised preliminary Abandonment Cost Estimates in accordance with the NEB's instructions. The Group 1 companies will also be required to submit updated Abandonment Cost Estimates for board review every five years, with the first update due in late 2016 or early 2017, subject to confirmation from the NEB.

#### **12.2.3 Ongoing Technical Research**

In a study conducted by Det Norske Veritas (DNV) together with TERA Environmental Consultants (TERA) and BGC Engineering Inc., as part of LMCI Stream 4 - Physical Issues Related to Pipeline Abandonment, it was determined that there is insufficient practical experience in determining the risks and environmental concerns associated with pipeline abandonment and that further research will be required (DNV 2010). The DNV study identified a number of knowledge gaps regarding abandonment such as the causes and time horizons of

pipeline decomposition, collapse and exposure. It is anticipated that future research and developments in technology will lead to improvements in the rationale and process behind the determination of appropriate methods of abandonment, the determination of cost estimates, and the collection of funds for abandonment. Some of the knowledge gaps in abandonment rationale and methods are currently being addressed by studies being directed by the multi-stakeholder Pipeline Abandonment Research Steering Committee, of which Trans Mountain is a member.

#### **12.2.4 Filing Requirements**

As a result of the LMCI process, a Preliminary Abandonment Plan is required by the NEB as part of the Environmental and Socio-Economic Assessment to support the applicants' estimation of funds required to be set aside for abandonment during the life of the pipeline. The *Canadian Environmental Assessment (CEA) Act, 2012*, also requires an assessment of abandonment and decommissioning activities for projects that fall within the *CEA Act, 2012 Regulations Designating Physical Activities*. However, given the subsequent future application process required for abandonment, at the time of a pipeline facilities application the NEB examines the preliminary abandonment activities in a broad context only. The plan should:

- describe what pipeline components will be removed, reused or abandoned in place and provide the rationale for doing so, including details on special methodologies required for site-specific situations;
- provide the reclamation objectives or principles to be applied to abandonment;
- provide sufficient information to demonstrate that abandonment of the project will return the right-of-way to a state comparable with the surrounding environment;
- be developed in consultation with the persons or groups potentially affected; and
- provide the estimated total cost to abandon, as well as the collection period over which revenue will be accumulated.

#### **12.3 Preliminary Abandonment Plan**

In consideration of the requirements in Section 12.2.4, Trans Mountain believes that the preparation of a preliminary Physical Plan for the abandonment of the pipelines and facilities to be constructed as part of TMEP cannot be meaningfully done at the time of filing for the following reasons:

- unlike the existing TMPL system, the pipeline routing and the crossing methodologies, both of which will have a significant impact on the Physical Plan, are not finalized and will continue to evolve throughout the detailed engineering and design phase;
- unlike the existing TMPL system, the facilities designs are conceptual in nature and have insufficient design definition and detail to allow determination of abandonment quantities; and

- given that the Project constitutes an expansion and the pipelines and facilities are intricately associated with the existing TMPL system, the Physical Plan cannot be done in isolation and will effectively be a revision or update to the Physical Plan already approved under MH-001-2012.

The purpose of this section, therefore, is to present the strategy that Trans Mountain intends to use for the future revision of the TMPL system Physical Plan.

### **12.3.1 Abandonment Methodology**

Similar to the existing TMPL system, pipeline segments and facilities constructed for the Project will be abandoned with a combination of the following approaches:

- abandonment-in-place;
- abandonment-in-place with additional special treatment; or
- removal.

In general abandonment activities will likely include:

- purging and cleaning of pipeline segments;
- cutting, capping, and filling of pipeline segments at some road, railway, and utility crossings;
- application of special measures such as cutting and capping of pipe at some locations;
- special measures, yet to be determined, at some river and stream crossings;
- removal of pipe at some locations;
- reclamation of areas disturbed during abandonment activities;
- reclamation and restoration of areas associated with the operating pipeline such as access roads;
- purging and cleaning of facility piping and tanks; and
- removal of facilities to a depth of 1 m.

In the determination of the appropriate abandonment method at a particular location, a number of factors will be reviewed at the time of abandonment, including current and future land use as well as environmental issues associated with various methodologies.

A detailed description of the rationale that was used to develop the Physical Plan for the existing TMPL system was included in the filing required by NEB RH-2-2008 on May 31, 2011. Some of that rationale was based on a Land Use Study completed by TERA. Once the pipeline routing and crossing methodologies are finalized, during the detailed engineering and design phase, another land use study will be completed and it is anticipated that similar approaches will be used to revise the Physical Plan for the expanded TMPL system. The methods of abandonment that will ultimately be implemented for the pipeline segments and facilities constructed for the

Project will be determined at the time of the planning for abandonment and will be based on the most current body of scientific knowledge and accepted industry practices. It is expected that most of the pipeline will be abandoned in place; however, land use considerations and other factors may lead to some pipeline segments being removed.

Current and future land use will be one of the most important factors in the determination of pipeline abandonment rationale. It is unlikely that any one abandonment technique will be appropriate for all land uses and the decision to abandon in place, abandon in place with special measures, or remove pipeline segments will be made on a site-specific basis and after consultation with affected parties and at the time of abandonment.

Environmental issues associated with potential abandonment methodologies such as ground subsidence, soil erosion and soil and water contamination may be regarded on a site-specific basis in determining the most appropriate abandonment methodology. Additionally, an assessment will be conducted to determine if there is any contamination of the associated land and, if warranted, special soil handling and remediation procedures would be implemented. Any lands disturbed by physical activities will be reclaimed to the appropriate land use at that time.

### **12.3.2 Post-abandonment Reclamation Objectives**

The reclamation objectives or principles to be applied to abandonment of the pipeline segments and facilities constructed for the Project will be in accordance with legislation in place at that time and likely similar to those required for Project construction. The primary goal of the reclamation will be to stabilize and re-vegetate affected lands such that they will, in time, achieve productivity equivalent to the adjacent land use, ensuring the ability of the land to support various land uses.

The process of reclamation post-abandonment will likely involve a combination of measures such as: topsoil and root zone material salvage; subsoil conditioning and grade and drainage re-establishment; topsoil and root zone material replacement; installation and maintenance of temporary and permanent erosion and sediment control measures; and re-vegetation. Parameters such as vegetation, soil and landscape will be used as criteria to measure the degree of reclamation success, ensuring that land productivity is equivalent to the adjacent lands. Where no known or visible limitations to normal management, access, soil productivity, and ecosystem function are evident during the evaluation, land reclamation will be determined to be successful.

### **12.3.3 Abandonment Consultation**

If there is a future determination that the abandonment of any segment of the TMPL system, as expanded, is an appropriate strategy, stakeholders will be consulted prior to the filing of an abandonment application. A comprehensive stakeholder engagement program will be designed to engage members of potentially impacted communities and landowners and seek meaningful input on methodology.

### **12.3.4 Preliminary Abandonment Cost Estimate**

Once a revised Physical Plan is available, after the completion of detailed engineering and design, likely in mid-2016, the preliminary Abandonment Cost Estimate for the TMPL system, as approved by the NEB in MH-001-2012, will be updated. The methodology to be used for the development of the preliminary Abandonment Cost Estimate revision will be the same as for the approved preliminary Abandonment Cost Estimate. The revised preliminary Abandonment Cost Estimate will take into account the changes in the configuration of the existing pipeline

segments and the impacts on project management and other indirect costs created by the synergies of the expanded TMPL system.

Given that anticipated timing of the completion of the revised Physical Plan and preliminary Abandonment Cost Estimate will coincide well with the expected timing of required five-year updates to the Physical Plan and preliminary Abandonment Cost Estimate for the existing TMPL system, and that funds for the incremental abandonment costs will not be collected until the expanded TMPL system is in service in late 2017, Trans Mountain believes it will be appropriate to file the revised Physical Plan and revised preliminary Abandonment Cost Estimate at the time of the required update in late 2016 or early 2017.

However, in order to comply with the intent of the requirement identified in Section 12.2.4, Trans Mountain has prepared a conceptual Abandonment Cost Estimate for the expanded TMPL system, which identifies the order of magnitude of the incremental abandonment costs associated with TMEP. This conceptual Abandonment Cost Estimate appears in Volume 2, Section 2.9.2.

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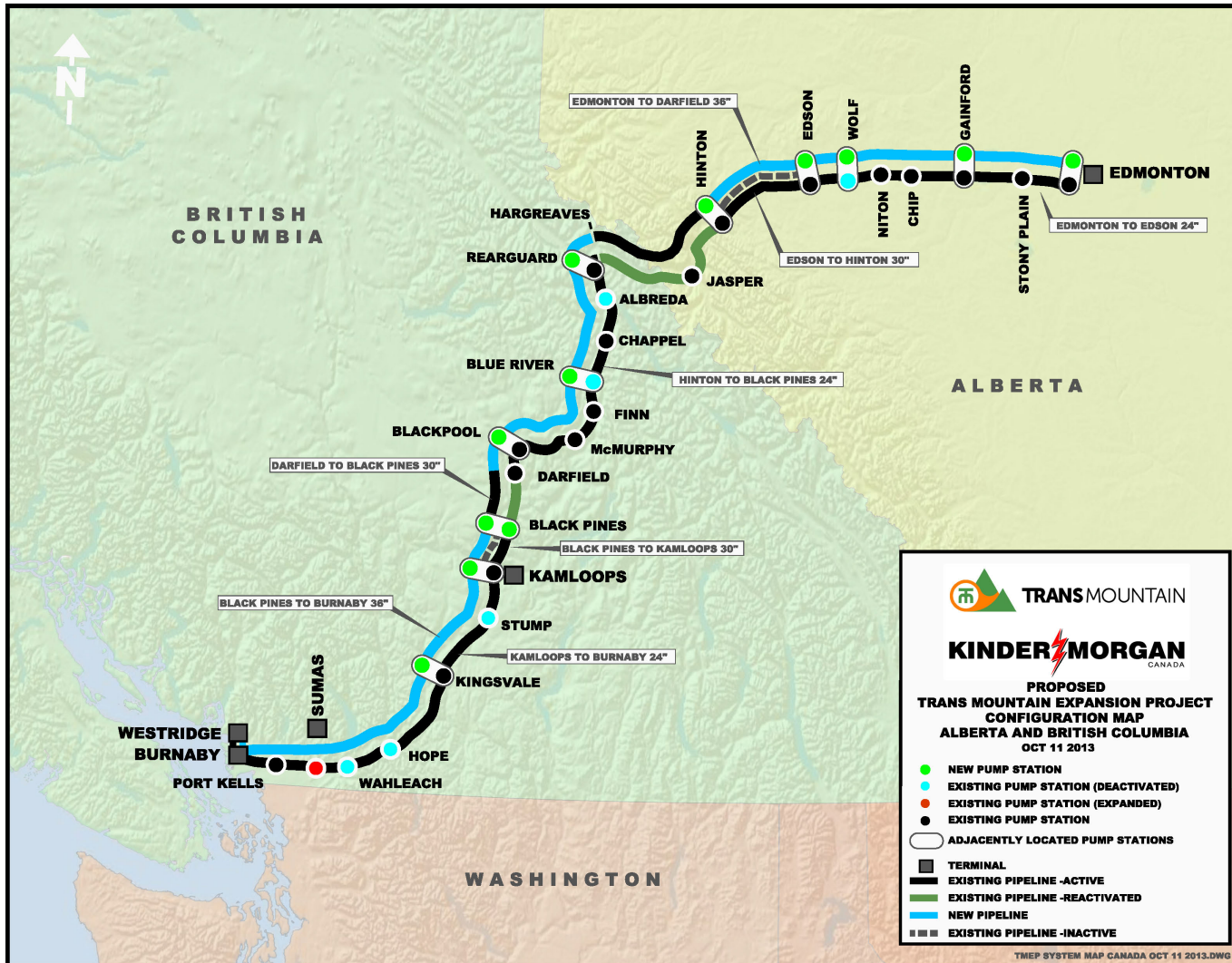
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## **14.0 APPENDICES**

## **Appendix A Project Configuration Map**

### Map 14.1.1 Project Configuration Map





Map 14.1.1 Project Configuration Map

## **Appendix B Kinder Morgan Code of Business Conduct and Ethics**

# **CODE OF BUSINESS CONDUCT AND ETHICS**

*(Effective 01/01/2000)*

*(Revised 05/25/2012)*

## ***Kinder Morgan's Values***



**Table of Contents**

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Table of Contents ..... 2, 3

Letter from Chairman and CEO ..... 4

Introduction..... 5

General Business Principles ..... 6

    Responsibilities ..... 6

    Economic Principles..... 7

    Business Integrity..... 7

    Political Activities..... 7

    Health, Safety and the Environment..... 8

    The Community..... 8

    Communication ..... 8

Legal and Ethical Obligations Under the Code of Business Conduct and Ethics ..... 8

Company Compliance Policies ..... 9

    Fraud ..... 9

    Accuracy of Records and Reporting..... 10

    Anti-Boycott Laws ..... 10

    Antitrust Laws ..... 11

    Confidential Information ..... 11

    Conflicts of Interest ..... 11,12

    Drug and Alcohol Abuse ..... 13

    Equal Opportunity ..... 13

    Export Control ..... 14

**Table of Contents - continued**

---

Fair Dealing.....	14
Government Contracts .....	14
Health, Safety and the Environment.....	15
Insider Trading .....	15
Kickbacks, Bribery and Other Improper Payments; Foreign Corrupt Practices Act.....	16
Product Quality and Safety.....	17
Protection of Assets .....	17
Relationships Among the Companies.....	18
Procedures for Obtaining Guidance.....	18
Reporting Compliance Issues .....	18, 19
Investigating Suspected Violations of Our Code.....	19
Discipline .....	20
Interpretation and Waivers.....	20



Richard D. Kinder  
Chairman and CEO

Dear employees,

Kinder Morgan's success depends on operating our assets in a safe, compliant and efficient manner, meeting our customers' needs and doing business the right way – every day. As a Kinder Morgan employee, we all have a responsibility to review and follow the company's Code of Business Conduct and Ethics (Code), which outlines our commitment to honesty, integrity and respect. At our company, compliance is not optional and is every employee's responsibility.

Kinder Morgan's Code explains many of the basic rules that apply to how we conduct our business and serves as a valuable resource guide to help ensure that your actions are representative of our expectations and values. It is important to understand that how we conduct our business is of the utmost importance and reflects on our corporate reputation. No one should ever compromise our Code in order to meet financial goals or objectives.

There may come a time when a situation you face is not covered in the Code, or you have a compliance or ethics question or concern – seek advice and get the help you need either from your supervisor, management or by calling the company's Ethics Hotline, EthicsPoint, at (866) 293-2402. The hotline is hosted by a third party to maintain confidentiality and anonymity when requested. There will be no action taken against anyone who in good faith reports an ethics or compliance concern.

As you continue in your every day duties, remember, maintaining Kinder Morgan's good corporate reputation is paramount. We are judged by how we act and what we do. The company's strong reputation can only be maintained if each of us is dedicated to upholding our high standards for business conduct.

Sincerely,

A handwritten signature in black ink, appearing to read "Richard D. Kinder". The signature is written in a cursive, flowing style.

Richard D. Kinder  
Chairman and CEO



***Code of Business Conduct and Ethics***  
***(Effective 01/01/2000)***  
***(Revised 05/25/2012)***

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This Code of Business Conduct and Ethics includes certain general business principles that govern how Kinder Morgan, Inc., Kinder Morgan Energy Partners, L.P., Kinder Morgan Management, LLC, El Paso Pipeline Partners, L.P. (individually, a "Company" and collectively, the "Companies") and their subsidiaries conduct their affairs, as well as certain specific policies and procedures.

Upholding the Companies' reputation is paramount. We are judged by how we act. Our reputation will be upheld if we act with honesty and integrity in all our dealings and we do what we think is right at all times within the legitimate role of business.

The Companies have as their core values **honesty, integrity and respect for people**. The Companies also firmly believe in the fundamental importance of the promotion of trust, openness, teamwork and professionalism, and pride in what we do.

The Companies recognize that maintaining the trust and confidence of securityholders, employees, customers and other people with whom we do business, as well as the communities in which we work, is crucial to the Companies' continued growth and success.

We intend to merit this trust by conducting ourselves according to the standards set out in our values. These values have served the Companies well for many years. It is the responsibility of management to ensure that all employees are aware of these values and the importance of acting in accordance with the spirit as well as the letter of this Code.

To assist in accomplishing these goals, the Boards of Directors of the Companies have adopted this Code, which is designed, among other things, to:

- Deter wrongdoing;
- Promote honest and ethical conduct, including the ethical handling of business relationships and of actual or apparent conflicts of interest between personal and professional relationships;
- Promote full, fair, accurate, timely, and understandable disclosure in reports and documents that the Companies file with the Securities and Exchange Commission and in other public communications made by the Companies;
- Promote compliance with applicable governmental laws, rules and regulations;
- Promote the prompt internal reporting of violations of this Code to appropriate persons; and
- Promote accountability for adherence to this Code.

This Code is applicable to the employees and directors of all of the Companies and their subsidiaries. "Employee" is defined broadly to mean any employee, full- or part-time or

temporary, and any officer of any of the Companies or their subsidiaries. "Director" means any member of the board of directors, or persons performing similar functions, of any of the Companies or their subsidiaries. This Code therefore is applicable to the principal executive officer, the principal financial officer, and the principal accounting officer or controller of each of the Companies, and is intended to meet the requirements of Section 406 of the Sarbanes-Oxley Act of 2002, Item 406 of Regulation S-K promulgated by the SEC, and Section 303A of the New York Stock Exchange's Listed Company Manual.

In addition to the obligation to comply with this Code and promptly report suspected violations, all employees may be required to certify periodically that they have read and complied with this Code.

## **GENERAL BUSINESS PRINCIPLES**

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### **1. Responsibilities**

The Companies recognize five areas of responsibility.

a. To shareholders and unitholders

To protect shareholders' and unitholders' investment, and work to enhance the return to the shareholders and unitholders within the spirit of our values.

b. To customers

To win and maintain customers by developing and providing products and services which offer value in terms of price, quality, safety and environmental impact, and which are supported by the requisite technological, environmental and commercial expertise.

c. To employees

To respect the human rights of our employees, to provide our employees with good and safe working conditions and good and competitive terms and conditions of service, to promote the development and best use of human talent and equal opportunity employment, to encourage the involvement of employees in the planning and direction of their work and in the application of these principles within our Companies.

d. To those with whom we do business

To seek mutually beneficial relationships with contractors, suppliers and joint venture partners, and to promote the application of these principles in so doing. The ability to promote these principles effectively will be an important factor in the decision to enter into or remain in such relationships.



e. To society

To conduct business as responsible business members of society, to observe the laws of the countries in which we operate, to express support for fundamental human rights in line with the legitimate role of business and to give proper regard to health, safety and the environment consistent with our commitment to contribute to sustainable development.

We see these five areas of responsibility as inseparable. Therefore it is the duty of management continuously to assess these principles and discharge its responsibilities as best it can on the basis of that assessment.

**2. Economic Principles**

Profitability is essential to discharging these responsibilities and staying in business. It is one measure both of efficiency and of the value that customers place on the Companies' products and services. Without profits and a strong financial foundation it would not be possible to fulfill the responsibilities outlined above.

**3. Business Integrity**

The Companies insist on honesty, integrity and fairness in all aspects of our business and expect the same in our relationships with all those with whom we do business. We expect all employees to conduct themselves in a manner which would not be detrimental to the best interests of the Companies and in a manner which would not bring to the employee financial gain derived from third parties as a direct consequence of his or her employment with the Companies. We will adhere to all laws and regulations applicable to our businesses. The direct or indirect offer, payment, solicitation and acceptance of bribes in any form are unacceptable practices. Employees and directors must avoid conflicts of interest between their private financial activities and their part in the conduct of the Companies' businesses. All business transactions on behalf of the Companies must be reflected accurately and fairly in the accounts of the Companies in accordance with established procedures and be subject to audit. All employees will cooperate with the Companies' accountants and internal and independent auditors to ensure that they have all relevant information necessary to record transactions appropriately on the Companies' books and records.

**4. Political Activities**

a. Of the Companies

The Companies act in a socially responsible manner within the laws of the countries in which we operate in pursuit of our legitimate commercial objectives. The Companies do not make payments to political parties, political organizations or their representatives or take any part in party politics. However, when dealing with governments, the Companies have the right and the responsibility to make our position known on any matter, including those which affect our employees, our customers, our securityholders, or ourselves. We also have the right to make our

position known on matters affecting the communities that we serve and in which we operate.

b. Of employees

The Companies encourage all employees to participate in the political process by registering and voting and keeping informed on political matters. Employees are free to contribute financially to or otherwise support the candidates or political parties of their choice. When participating in the political process, however, employees must make clear that they are doing so as private individuals, and not as representatives of the Companies. Employees should be aware that lobbying activities on behalf of organizations or businesses such as the Companies are subject to state and federal laws which must be strictly observed. If an individual wishes to stand for election to public office, he or she may do so if it does not in any way hinder the employee's job performance. Employees should notify their Human Resources representative before making plans to campaign for, or serve in, public office.

## **5. Health, Safety and the Environment**

The Companies support health, safety and environmental management in their day-to-day business activities. Employees are required to comply with all Kinder Morgan policies and local, state, provincial, and federal health, safety and environmental laws and regulations.

## **6. The Community**

The Companies believe employees should take a role in community affairs and support employees in those activities.

## **7. Communications**

The Companies recognize that open communication is essential. The Companies are therefore committed to full, fair, accurate, timely and understandable disclosure in the reports they file with the SEC and in their public communications generally.

## **LEGAL AND ETHICAL OBLIGATIONS UNDER THE CODE OF BUSINESS CONDUCT AND ETHICS**

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These obligations are simply stated:

- Comply fully with all applicable laws;
- Foster an affirmative attitude concerning fair dealing and compliance with the law among those reporting to you and among your colleagues;
- Demand and exhibit conduct consistent with the expectations of the communities in which we operate and necessary to maintain the good reputation of the Companies for fair, honest and ethical conduct; and
- Report any violation of this Code or applicable laws or regulations or any threat to human health, safety, the environment or assets of the Companies that you have a good faith reason to believe has occurred or exists to your supervisor, your Human

Resources representative, the Companies' Legal Department or through the Companies' Ethics hotline.

## **COMPANY COMPLIANCE POLICIES**

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In addition to this Code, the Companies have compliance policies covering many of the topics discussed below that are generally applicable to all employees and may be obtained from your Human Resources representative. Other policies are adapted specifically to certain work areas or to employees dealing in the areas covered by those policies. It is the responsibility of every employee to know which policies apply to his or her job performance, to be familiar with all relevant policies and to conduct his or her job in strict compliance with those policies. Questions concerning all policies may be addressed to your immediate supervisor, your Human Resources representative or the Company's Legal Department. The Companies also conduct ongoing educational programs and training on certain compliance issues for employees. Because written policies and training programs cannot anticipate every possible factual situation, there is logically a burden on you to seek clarification and advice whenever a question concerning compliance with this Code or our other policies arises.

### **1. Fraud**

All employees have a responsibility to prevent or detect fraud. Fraud is defined as the intentional, false representation or concealment of a material fact for the purpose of inducing another to act upon it to his or her injury. Each member of the management team will be familiar with the types of improprieties that might occur within his or her area of responsibility, and be alert for any indication of irregularity. Any fraud, misconduct, or dishonesty that is detected or suspected must be reported immediately to the employee's supervisor or Human Resource representative. The supervisor or Human Resource representative then has the responsibility to see that the Vice President of Human Resources and the General Counsel, as appropriate, are informed; however, the Vice President of Internal Audit should be informed in all instances. In the event the party is not comfortable with communicating the concern to their supervisor or Human Resource representative, then the Vice President of Human Resources, the General Counsel, and the Vice President of Internal Audit are available for reporting of any concerns.

In addition, to facilitate reporting of suspected violations, especially in those situations where the reporting individual wishes to remain anonymous, the company has established an Ethics Point hotline or Integrity hotline that can be accessed via telephone or the internet. The Companies' Ethics Hotline is available twenty-four (24) hours a day, seven (7) days a week. The Companies' Ethics' Hotline telephone number is 1-866-293-2402 and the website address is: <https://secure.ethicspoint.com/domain/media/en/gui/6874/index.html>. Ethics banners have been sent out to all locations and corporate offices. The banners are to be prominently displayed in areas where employees, vendors, and contractors will see them. Any reprisal against an employee or other reporting individual because that individual, in good faith, reported a violation is strictly forbidden. Please see the fraud policy on the "Ethics Hotline/ Corporate Governance" link on the KMonline home page or

## **2. Accuracy of Records and Reporting**

The Companies are committed to full, fair, accurate, timely and understandable disclosure in the reports they file with the SEC and in their public communications generally. This is not possible if the Companies do not have complete and accurate records, information and data. The Companies' books, records and accounts will be maintained in reasonable detail to accurately and fairly reflect transactions and dispositions of assets of the Companies and will be kept in accordance with applicable laws and accounting practices. No fund, asset, liability, revenue or expense of the Companies shall be concealed or incompletely or incorrectly recorded. Each employee shall cooperate with the Companies' accountants and internal and independent auditors to ensure that they have all relevant information necessary to record transactions appropriately on the Companies' books and records. No employee or director shall make any materially false or misleading statement or omission to the Companies' accountants or internal or independent auditors in connection with the audit or review of the Companies' financial statements or the preparation or filing of any document or report to be filed with the SEC. No employee or director shall take any action to coerce, manipulate, mislead, or fraudulently influence the Companies' independent auditors in the performance of an audit or review of the Companies' financial statements.

You should use common sense and observe standards of good taste regarding content and language in your records and documents. Business records and communications often become public, and we should avoid exaggeration, derogatory remarks, guesswork and inappropriate characterizations of people and entities that can be misunderstood. This applies equally to e-mail, internal memos and formal communications. You should keep in mind that in the future, the Companies or a third party may rely on or interpret a document or communication with the benefit of hindsight or the disadvantage of imperfect recollections. Records should always be retained or destroyed according to the Companies' record retention policies.

## **3. Anti-Boycott Laws**

Federal law prohibits persons from taking or agreeing to take certain actions in connection with any unsanctioned foreign boycott directed against any country friendly to the United States. This prohibition applies to persons located in the United States (including individuals and companies), United States citizens and permanent residents anywhere in the world, and most activities of U.S. subsidiaries abroad.

In general, these laws prohibit the following actions (and agreements to take such actions) that could further any boycott not approved by the United States: (a) refusing to do business with other persons or companies (because of their nationality, for example); (b) discriminating in employment practices; (c) furnishing information on the race, religion, gender or national origin of any U.S. person; (d) furnishing information about any person's affiliations or business relationships with a boycotted country or with any person believed to be blacklisted by a boycotted country; or (e) utilizing letters of credit that contain prohibited boycott provisions. Boycott related requests may be subtle or indirect, coming in a request in a bid invitation, purchase order, contract, letter of credit, orally in connection with a

transaction or in other ways. If you receive such a request, you should contact your supervisor or the Companies' Legal Department. Violations of these laws carry both civil and criminal penalties.

#### **4. Antitrust Laws**

The Companies' intention is to conduct operations in strict compliance with all applicable Federal, state and foreign antitrust laws. The antitrust laws, which are sometimes known as monopoly, fair trade, competition or cartel laws, are designed to ensure a fair and competitive market system and protect consumers from unfair business arrangements and practices. These laws generally prohibit business activities that constitute unreasonable restraints of trade. Among other things, they also prohibit certain conduct between competitors, such as price fixing agreements. Severe criminal and civil penalties, both corporate and individual, exist for violations of the antitrust laws.

#### **5. Confidential Information**

Employees and directors must maintain the confidentiality of sensitive or proprietary information entrusted to them by the Companies and their customers and business partners, except when disclosure is required by law or regulations or authorized by the Legal Department. Employees and directors should assume that such information includes all non-public information that might be of use to competitors or harmful to the Companies or their customers if disclosed, and that it includes information entrusted to the Companies by suppliers and customers. Employees must preserve the confidentiality of such information even after they cease employment with the Companies. Equally important, employees and directors must not use such information for their personal benefit.

Certain Kinder Morgan entities are considered to be a common carrier under the Personal Information Protection and Electronic Documents Act, as well as the provisions of the Interstate Commerce Act which specifically prohibits the disclosure of specific shipper volumes and information pertaining to shipments to parties outside Kinder Morgan. Employees should consult with the Kinder Morgan Legal Services Department before divulging shipper information to a third party.

#### **6. Conflicts of Interest**

A "conflict of interest" occurs when an individual's private interest interferes with the interests of the Companies. Employees and directors must avoid such conflicts of interest. Further, employees and directors must continually bear in mind that even the appearance of a conflict of interest can be detrimental to the Companies. A conflict situation can arise when an employee or director takes actions or has interests that make it difficult to perform his or her Company work or duties objectively and effectively. We are entitled to expect of every person loyalty to the best interests of the Companies and the application of their skill, talent and education to the discharge of job responsibilities, without any reservations whatsoever. Conflicts of interest may arise when an employee or director, or a member of his or her family, receives improper personal benefits as a result of his or her position with the Companies. Loans to, or guarantees of obligations of, such persons or their families may create conflicts of interest, and most loans to or guarantees of obligations of officers

and directors of the Companies are prohibited by law. Because it is impossible to describe every possible conflict between personal and professional relationships, the Companies rely on the commitment of each employee and director to exercise sound judgment, to seek guidance when appropriate and to adhere to the highest ethical standards.

For any business relationship or proposed business transaction involving any of the Companies or one of its affiliated companies and in which an employee or an immediate family member has a direct or indirect interest, or from which they or an immediate family member may derive a personal benefit ( a “Related Party Transaction”), the employee must obtain prior authorization from the appropriate Business Unit President of the relevant Company (using the online request/approval form) or head of corporate function. An employee must not approve payments to be made pursuant to an approved Related Party Transaction involving such employee or any of his or her immediate family members; rather, these payments must be approved by the employee’s supervisor. Further, any Related Party Transactions that would bring the total value of such transactions in terms of payments, revenue, expense or otherwise to greater than \$250,000 in any calendar year must also be approved by the Office of the Chairman. Any Related Party Transaction that would bring the total value of such transactions in a calendar year to greater than \$1,000,000 shall, in addition, be referred to the Audit Committee of the appropriate Board of Directors for approval or to determine the procedure for approval.

Any Related Party Transaction involving a Director, a Business Unit President, an executive officer, a head of a corporate function or any of the foregoing’s immediate family members must be approved by the Audit Committee (or the non-interested members of the Audit Committee, as applicable) of the appropriate Board of Directors.

Employees and directors have a duty to avoid situations that might be adverse to the Company's interest. Accepting business gifts and entertainment is commonplace and may only represent a desire on the part of the giver to build goodwill and sound working relationships, but employees and directors may not accept gifts that might influence their judgment when representing the Companies' interests.

You must not make personal investments that would affect your ability to make unbiased decisions on behalf of the Companies. If you made such an investment before joining the Companies, or if your position with the Companies changes in such a way that a previous investment would affect your decision-making, you must report the facts to your supervisor or Human Resources representative. Investments subject to this prohibition could include investments in a public or private company that is a vendor to the Companies, a customer or competitor of the Companies, or otherwise does business with the Companies. This policy does not prohibit per se investments of less than 1% of the outstanding equity or debt securities of a public company.

As reflected in Section 17 below, the Companies ensure efficient application of their human resource talent when the employees of one Company perform services for another Company. However, employees may not simultaneously work for a competitor, customer or supplier of any of the Companies. Employees and directors are prohibited from taking personal opportunities that are discovered through the use of Company property,

information or position. Employees and directors may not use Company property, information or position for improper personal gain.

Directors of the Companies should inform the General Counsel prior to joining the board of directors or advisory board of any other business enterprise so that any relevant disclosure requirements and conflict of interest issues can be analyzed and discussed.

## **7. Drug and Alcohol Abuse**

The Companies strive to provide employees with a workplace free from substance abuse (i.e., the illegal or illicit use of drugs and the abuse of alcohol) and a workplace where all individuals are able to perform their assigned responsibilities in a safe and productive manner. Accordingly, employees may not (a) use, possess, sell or distribute illegal or unauthorized drugs on Company property, while operating any Company vehicle or equipment, or while conducting Company business; (b) use, possess, sell or distribute alcohol on Company property, while operating any Company vehicle or equipment, or while conducting Company business (except the use and possession of alcohol during Company sponsored business or social functions where the use of alcohol remains moderate); (c) use any drug, including prescribed drugs, while operating Company vehicles or equipment if it is unsafe to use the drug in that circumstance; (d) possess, sell or distribute paraphernalia and equipment related to illegal or unauthorized drug use on Company property, while operating any Company vehicle or equipment, or while conducting Company business; or (e) refuse to test for drug or alcohol use in any testable situation.

All employees taking a prescription or over-the-counter medication that could adversely affect performance or job-related functions or pose a direct threat to the health and safety of the employee or others in the workplace are responsible for notifying their supervisor. It is not the intent of the Companies to interfere with the use of drugs legitimately prescribed by a physician.

Employees must realize that the use of alcohol or drugs on their own time or away from Company property may nevertheless affect their on-the-job performance or the safety of their co-workers. The Companies therefore have a "Zero Tolerance" policy with respect to drugs and alcohol – if an employee tests positive for drugs or alcohol, as defined in the Companies' policies, the resulting disciplinary action may be termination of employment or as otherwise set out in the Companies Drug and Alcohol policies. Employees must conduct themselves in compliance with the Companies' policies on drug and alcohol use and with any applicable Department of Transportation policies, rules and regulations.

## **8. Equal Opportunity**

The Companies are fully committed to a workplace that is founded on diversity and equal opportunity and is free from discriminatory action. In support of this commitment, the Companies prohibit discrimination on the basis of race, color, religion, sex, sexual orientation, national origin, age, marital status, physical or mental handicap or other disability, status as a special disabled veteran or veteran of the Vietnam era, military or veteran status, citizenship of individuals legally authorized to work in the United States or other legally protected status. Either without reasonable accommodation or with reasonable accommodations as required by law, disabled persons must in any case be able to perform

the essential functions of a job. In Canada, these rights are protected in provincial and federal Human Rights Acts and under the Canadian Charter of Rights and Freedoms.

The Companies are also committed to a workplace free from harassment or discrimination based on race, sex, sexual orientation, color, religion, national origin, age, military or veteran status or disability. Such harassment or discrimination is prohibited by the Companies.

Any person who feels that he or she has been or is being harassed or discriminated against in violation of the Companies' policy should bring such actions to the attention of their supervisor, their Human Resources representative, or the Vice President of Human Resources or call the Companies' Ethics hotline. The employee should choose the person with whom he or she is most comfortable in discussing the details of the incident or conduct. If you feel you cannot for any reason report an incident to any of these individuals, the Companies' Ethics hotline is available. Supervisors must notify the appropriate Human Resources representative with any reports of harassment.

## **9. Export Control**

Exports of commodities and technical data are regulated under federal law. These laws may impose licensing and reporting requirements, or in some cases prohibitions, relating to exports. For example, in the case of many countries these restrictions prevent the export or re-export of U.S.-origin goods or technical data that have the potential to be used in a manner detrimental to the United States. Violations of export control regulations can result in serious criminal penalties to the Companies and to individuals. For a summary of the export control laws and regulations, contact the Companies' Legal Department.

## **10. Fair Dealing**

Each employee and director should endeavor to deal fairly with the Companies' customers, suppliers, competitors and employees. In the course of their employment or duties with the Companies, no employee or director should take unfair advantage of anyone through manipulation, concealment, abuse of privileged information, misrepresentation of material facts, or any other unfair dealing practice. This Code and these provisions with respect to fair dealing do not, however, alter existing legal rights and obligations of the Companies and their employees, such as "at will" employment arrangements.

## **11. Government Contracts**

The federal government imposes additional obligations on companies with which it does business. The Companies and their employees and directors will observe all laws, rules and regulations which govern the acquisition of goods and services by the government.

Violations of applicable requirements can result in substantial penalties, the loss of future government contracts or subcontracts, and even criminal prosecution for the individuals involved and the Companies. Although no one is expected to know every detail of the many laws and regulations, it is important to know enough to determine when to seek advice from supervisors, managers, officers or other KM personnel. In appropriate circumstances,



applicable government contract requirements should be included in agreements with KM vendors, suppliers, subcontractors, consultants, agents and representatives.

KM personnel are encouraged to contact the Companies' Legal Department when in doubt about the best course of action in a particular situation. All KM directors, officers, and employees should report any illegal or unethical behavior and any perceived violations of laws and regulations or this Code using any one of the reporting channels within KM. KM may be required to disclose actual or suspected violations of law to the government.

## **12. Health, Safety and the Environment**

Every employee is expected to share the Companies' commitment to pursue the goal of not harming people, protecting the environment, using material and energy efficiently and promoting best practices, thereby earning the confidence of customers, securityholders and society at large, being a good neighbor and contributing to sustainable development. The Companies' policy is to comply with all health, safety and environmental laws, rules and regulations, not just because it is legally required, but also because we believe it is the responsible way to conduct our business. The Companies have a systematic approach to health, safety, and environmental management designed to ensure compliance with the law and to achieve continuous performance improvement. In addition to the Companies, contractors are required, and joint ventures under the Companies' operational control are expected, to apply this policy.

## **13. Insider Trading**

Employees and directors may not seek to benefit personally by buying or selling securities while in possession of material non-public information learned as a result of their relationship with the Companies. This rule applies to trading in the common stock, units, shares, debt securities, warrants or options of any of the Companies, and also applies to trading in the securities of other companies you learn something about in the course of your employment or relationship with the Companies. It can be difficult to know when information is "material." The determination is not just formalistic. Generally, information is "material" if a reasonable investor would consider it important in determining whether to buy or sell a security. If the information makes you want to buy or sell a security, it likely is material. Information need not be certain to be material. Information that something is likely to happen, may happen or is being considered may be material. "Nonpublic" information is any information that is not reasonably accessible to the investing public. Once the Companies release information through public channels (for instance, a press release or an SEC filing), it may take additional time for it to become broadly disseminated.

Besides their obligation to refrain from trading while in the possession of material non-public information, employees and directors also are prohibited from "tipping" others. The concept of unlawfully tipping includes passing on information to family, friends or others under circumstances where you know or reasonably suspect that the person receiving the information will misuse it by trading in securities or passing the information along further. Both the "tipper" and the "tippee" may be held liable, even if the tipper did not trade and receives no monetary benefit from the tippee, and this liability may extend to those to whom the tippee in turn provides the information. Trading on inside information is a crime. In

addition to exposing the Companies and their controlling persons and supervisory personnel to liability, penalties for insider trading include criminal fines of up to \$1 million (no matter how small the profit) and up to 10 years in jail for individuals. Under some circumstances, people who trade on inside information may be subjected to civil liability in private lawsuits.

Special rules on this subject apply to members of the board of directors of a Company and certain of its executive officers, and those individuals have received separate additional advice from the Companies' Legal Department.

More detailed information is contained in the Company's Securities Trading and Handling of Non-Public Information Policy. You should contact the Companies' General Counsel whenever you have a question about any contemplated securities transaction or the interpretation of the Companies' policy.

#### **14. Kickbacks, Bribery and other Improper Payments; Foreign Corrupt Practices Act**

Bribery laws generally prohibit companies from directly or indirectly promising, offering or paying money or anything of value to anyone (including a government official, an agent or employee of a political party, labor organization, business entity, or a political candidate) with the intent to induce favorable business treatment or to improperly affect business or government decisions. In addition to laws that apply domestically, the United States Foreign Corrupt Practices Act generally makes it a crime for companies, as well as their officers, directors, employees and agents, corruptly to pay, promise, offer or authorize the payment of money or anything of value to foreign officials, foreign political parties or their officials, candidates for foreign political office or officials of public international organizations for the purpose of obtaining or retaining business. That act also generally prohibits such payments, promises, offers or authorizations to any person while knowing that all or a portion of the money or thing of value will be given to a prohibited person for the purpose of obtaining or retaining business. The Foreign Corrupt Practices Act also requires covered entities to maintain accurate books, records and accounts, and to devise a system of internal accounting controls sufficient to provide reasonable assurance that, among other things, the entity's books and records fairly reflect, in reasonable detail, its transactions and dispositions of its assets. In particular, agreements with consultants, agents or sales representatives must be in writing and must state the services to be performed, the fee basis and the amounts to be paid and other material terms and conditions, and the form and content must be approved by the Legal Department of the applicable Company. Payments must bear a reasonable relationship to the value of the services rendered, must be completely documented and recorded, and must not violate the provisions of the Foreign Corrupt Practices Act. Payments to government employees or any other persons as a commercial bribe, influence payment or kickback are prohibited, as is the use of Company funds or assets for any unlawful or improper purpose.

As a policy, the Companies do not make payments with their funds to political parties or candidates for public office. This does not mean, however, that the Companies will not participate in public debate. The Companies have the right and responsibility, in the pursuit of their legitimate commercial objectives, to make their position known on any matter that affects the Companies, their employees or customers. The Companies also have the right

to make their position known on matters affecting the community if they have the expertise and can make a significant contribution to the Companies and society.

The Companies encourage employees to participate in the political and governmental process. Employees and directors are free with their own funds to contribute financially to or otherwise support the candidates or political parties of their choice. When participating in the political process, however, employees and directors must make clear that they are doing so as private individuals, and not as representatives of the Companies. Further, such activities must not hinder an employee's job performance.

### **15. Product Quality and Safety**

Federal laws require the reporting of suspect chemical hazards and/or defects in consumer products to the proper authorities. Failure to report can result in substantial civil and criminal penalties for the company and for individuals aware of the hazard.

### **16. Protection of Assets**

The Companies have a large variety of assets, including extremely valuable proprietary information and physical assets. Proprietary information includes the Companies' intellectual property, such as trade secrets, patents, trademarks and copyrights, as well as business and marketing plans, engineering ideas, designs, databases, computer programs, records, salary information, and unpublished financial information and reports, and also the confidential data entrusted to employees in connection with their jobs. All employees should endeavor to protect the Companies' assets and ensure their efficient use. Theft or misappropriation of Company funds or property will not be tolerated. Carelessness or waste with respect to assets of the Companies has a direct impact on the Companies' profitability. Protection of Company and third party confidential information properly in the Companies' possession is the personal responsibility of each employee.

Company property or equipment may not be removed from the premises without advance authorization from the employee's supervisor. Personal use of Company tools or equipment is prohibited except in case of prior supervisory approval.

The Companies' telephone, e-mail, voice-mail and other computer or communications systems are primarily for business purposes. You may not use these systems in a manner that could be harmful or embarrassing to the Companies. Personal communications using these systems should be kept to a minimum. The Companies reserve the right to monitor any and all aspects of the computer, network, telephone and communications systems, including e-mail. Similarly, our security systems are capable of recording (for each and every user) each world wide web site visit, each chat, newsgroup or e-mail message and each file transfer into or out of our internal networks, and we reserve the right to do so at any time. We also reserve the right to inspect all files stored in private areas of our networks to ensure compliance with our policies. Users of our systems should have no expectation of privacy with respect to anything they create, send, receive or store on their computer or our other systems and networks.

Further details concerning these obligations can be obtained by contacting the Companies' Human Resources Department.

### **17. Relationships Among the Companies**

From time to time, one of the Companies (or its subsidiaries or entities in which it owns an interest) may desire to enter into transactions, either within or outside the ordinary course of business, with (or desire for its employees to work for or provide services to) one of the other Companies (or a subsidiary of or such other Company or an entity in which such other Company owns an interest). The boards of directors of the Companies may from time to time adopt procedures setting forth the approvals required therefor or policies in accordance with which such transactions, work or services may be undertaken.

### **PROCEDURES FOR OBTAINING GUIDANCE**

When you have a concern or are called upon to evaluate the legal or ethical correctness of a course of action as a result of your employment or relationship with the Companies:

- Seek out the appropriate policy statements and training manuals and ask your supervisor for clarification when needed.
- Don't debate alone. Seek the advice of Legal or Human Resources and other administrative organizations that can be of assistance.
- As a guide in making your decision, consider whether if all the facts surrounding your decision were published in the local newspaper, you would have any regrets or concerns.
- Understand that the Companies' best interests can never be served by illegal or unethical conduct and that the Companies will never condone it.

Any question concerning legal compliance that cannot be answered promptly and clearly should be referred to the Companies' Legal Department for approval and continuing review. Legal and other appropriate administrative organizations, working with the Companies' General Counsel or Vice President of Human Resources or his or her designee, will seek to explain in a practical and readily understandable manner what is required of employees in order to comply with the law and with the Companies' ethical requirements. When an employee feels it is necessary or advisable to do so, calls seeking clarification regarding compliance with this Code may be addressed to the Companies' Ethics hotline.

### **REPORTING COMPLIANCE ISSUES**

Every employee must promptly report if he or she has a good faith reason to believe that:

- Any violation of this Code has occurred or is occurring;
- Any violation of applicable law or governmental rule or regulation has occurred or is occurring; or
- Any threat to human health, safety, the environment or the Companies' assets has arisen or exists in or as the result of conduct in the workplace.

Every employee should also promptly report any good faith:

- Complaints regarding accounting, internal accounting controls or auditing matters; or
- Concerns regarding questionable accounting or auditing matters.

Reporting to your supervisor or your Human Resources representative generally discharges this obligation. Those parties have the responsibility to see that the Vice President of Human Resources, the Vice President of Internal Audit, or the General Counsel, as appropriate, or his or her designee and, when compliance with law issues are raised, that the appropriate representatives of the Companies' Legal Department are promptly informed. Reports may also be made directly to the Vice President of Human Resources or General Counsel or by calling the Companies' Ethics hotline.

If you feel you cannot for any reason report a suspected violation of this Code, any other policy or any of the other matters described above to any of these individuals, the Companies' Ethics hotline is available to receive such calls twenty-four (24) hours a day, seven days a week. The Companies' Ethics hotline telephone number is 1-866-293-2402. If requested, calls to this hotline will remain anonymous and the Companies will not be informed of the identity of the caller. Any caller so requesting will be informed that the matter has been investigated and appropriate action taken.

The Pipeline Safety Improvement Act of 2002 prohibits employers from discriminating by discharge or other employment action regarding any employee that provides to the employer or the federal government any violation of any order, regulation or standard of the Federal law regarding pipeline safety. The Sarbanes-Oxley Act of 2002 prohibits public companies from discriminating by various employment actions against any employee who lawfully provides information or assists in an investigation by their supervisors, a federal regulatory authority or law enforcement agency or member or committee of Congress, regarding conduct the employee reasonably believes violates any Federal law relating to fraud against shareholders, any rule of the SEC and certain other laws. Various other laws have similar provisions. *No employee will be subject to such retaliation because of a good faith report of a complaint or concern about a violation of this Code, other policies of the Companies, accounting issues, laws or the other matters described above. We are committed to this principle.*

### **INVESTIGATING SUSPECTED VIOLATIONS OF OUR CODE**

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When non-compliance with this Code, laws, or any of the other matters described above is reported or otherwise suspected, the Vice President of Human Resources, the Vice President of Internal Audit, or the General Counsel, as appropriate, or his or her designee and the appropriate members of the Companies' Legal Department, in the case of an alleged violation of law, will be informed.

A prompt investigation will follow. Upon request, all employees must fully cooperate with any investigation conducted by or on behalf of the Companies. Failure to cooperate in an investigation is grounds for discipline up to and including termination of employment. In the event that the investigation results in a finding of a violation of this Code or applicable law, the Companies will make every effort to stop the violations and will take appropriate actions.

Employees must promptly give notice to the Legal Department if they receive notice of any governmental investigation of the Companies' business activities or financial affairs or otherwise directed at the Companies. Prompt action shall be taken upon notice of any such investigation to preserve documents believed to be relevant. It will be a serious violation of the Companies' policy to conceal an offense or to alter or destroy evidence.

### ***DISCIPLINE***

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The Companies will consistently and appropriately enforce this Code and their policies. Discipline will be determined by the appropriate officer, the Vice President of Human Resources or their designees in appropriate cases. Intentional non-compliance will constitute grounds for dismissal or other serious discipline. In appropriate cases or when required by law, law enforcement officials will be informed of facts discovered by any investigation concerning non-compliance with the law.

### ***INTERPRETATION AND WAIVERS***

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Questions regarding this Code should be referred to the Human Resources Department or the Legal Department. Waivers of this Code may be made only by the board of directors of the relevant Company or a duly authorized committee of its board, and will be disclosed as and to the extent required by applicable law and regulation.

This Code is a statement of the fundamental principles and policies that govern the Companies' operations. This Code is not intended to and does not constitute or imply a contract between or among the Companies and their employees or an assurance of continued employment. This Code creates no rights in any employee, director, supplier, customer, competitor, securityholder or other person or entity. The Companies may amend this Code at any time and for any reason without prior notice, and such amendment will be disclosed as and to the extent required by applicable law or regulation.