

National Energy  
Board



Office national  
de l'énergie

## Discussion Papers

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16 August 2017

Abandonment Cost Estimates Review 2016

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Canada

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# Background

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On 26 May 2009, the National Energy Board (NEB or Board) released its [RH-2-2008 Reasons for Decision](#) regarding financial issues related to pipeline abandonment. This decision set out guiding principles, a five-year action plan for companies to follow, and a set of assumptions that included cost parameters and physical assumptions (Base Case) for preparing preliminary cost estimates. The Board indicated that the process and mechanism for setting aside the funds for abandonment should have regular reviews (at least every five years). The Board noted two key principles fundamental to its future decisions with respect to the financial matters related to pipeline abandonment. These were:

- Abandonment costs are a legitimate cost of providing service and are recoverable upon Board approval from users of the system; and
- Landowners will not be liable for costs of pipeline abandonment.

On 17 November 2009, the Board held a technical conference to discuss the Base Case assumptions. The Board issued a [conference report](#) and subsequently released a [Revised Base Case](#) on 4 March 2010 after considering all of the submissions it received. This Base Case included Tables A-1, A-2, A-3 and A-4 but not Unit Costs.

In 2012, the Board initiated a hearing process (MH-001-2012) to consider the Group 1 preliminary Abandonment Cost Estimates (ACEs). The Board's [MH-001-2012 Reasons for Decision](#) were issued on 14 February 2013. This decision provided direction to the Group 1 companies about their abandonment cost estimates, and discussed the assumptions used to create these estimates. On that date, the Board also issued a [letter](#) providing the Board's assessment of the Group 2 filings and further direction to Group 2 companies.

The Board, in its [Reasons for Decision](#) for Group 1 companies, said that it anticipates future developments in research, technology, information sharing and actual abandonment experience will lead to greater precision in the estimation of future abandonment costs, likely informing future initiatives and decisions in these matters. The Board identified a number of areas where some consistency among Group 1 companies would be helpful for future reviews of cost estimate filings. The Board strongly encouraged companies to work together with Board staff, landowners (or their associations) and other interested persons to, where possible, achieve consistency.

# Overview of Abandonment Cost Estimates Review

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In the Board's [8 February 2016](#) letter, the Board initiated the Review of Abandonment Cost Estimates 2016 (ACE Review 2016) by requiring Group 1 companies (Applicants) to file updated ACEs and supporting filings by 30 September 2016.

On 13 February 2017, the Board issued [Procedural Direction No. 1](#) – Process Decision and Schedule) including the plan to issue discussion papers and hold a technical conference. In this procedural direction, the Board issued a preliminary list of topics for the Technical Conference(s) as Appendix II. The Board received the comments from the Participants<sup>1</sup> on the preliminary topics and on Group 1 ACE Review 2016 filings. The Board has considered all the comments received in finalizing the topics and in shaping the discussion on these topics.

The ACE Review 2016 is an opportunity to refine and advance the Board's abandonment framework that was established during 2008-2010 for deriving ACEs for the end of life phases of the pipeline. The Board recognizes the vast differences in NEB-regulated facilities, and the goal of this review is to achieve consistency among the regulated companies, where possible.

The Board has drafted nine discussion papers on various topics that were identified in the Board's [Procedural Direction No. 1](#), dated 13 February 2017.

The discussion papers include background information, issues pertaining to each individual topic and focus questions for consideration. The issues focus on:

- issues or inconsistencies found by the Board in the ACE filings;
- areas that need consistency as identified by the Board in its [MH-001-2012 Reasons for Decision](#); and
- gaps or issues in the Board's current framework (for example, Tables A-1 and A-2 do not relate to Table A-3).

## Purpose of the Discussion Papers

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These discussion papers are intended to provide background information on key issues related to the ACE Review 2016 and to stimulate input. This will also facilitate efficient and productive discussions at the Technical Conference(s) planned for fall 2017.

Through these discussion papers, and subsequently in the Technical Conference(s), the Board expects an informal exchange of information and discussion among industry, Indigenous groups, landowners, landowner associations, government departments and other stakeholders.

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<sup>1</sup> Participants include interested persons who expressed their intent to participate in the process.

It is possible that the issues raised in these discussion papers may not be resolved at the Technical Conference(s), and consistency among Group 1 companies may not be achievable or desirable. Depending on the topic, the input received on the paper and the discussion at the Technical Conference(s) may lead to a refined framework for future reviews and filings.

The discussion papers do not represent an all-inclusive list of issues to be examined during the Technical Conference(s) and by the Board when reviewing and adjudicating the updated ACEs. Input received in relation to these papers will be filed on the public record and discussed at the Technical Conference(s).

The specific topics explored in these discussion papers are:

- **Discussion Paper 1:** Development of a refined ACE framework
- **Discussion Paper 2:** Consultation and impacts to current and future land uses
- **Discussion Paper 3:** Land use categories, descriptions and definitions
- **Discussion Paper 4:** Scope and methodology of land use studies
- **Discussion Paper 5:** Potential refinements to abandonment method assumptions for land use categories
- **Discussion Paper 6:** Inflation rate
- **Discussion Paper 7:** Cost categories and unit costs for abandonment activities
- **Discussion Paper 8:** Methodology for the application and derivation of contingency including insurance and taxes.
- **Discussion Paper 9:** Salvage value

Some of these discussion papers (Discussion papers 2, 3, 4 and 5) also include the Board's proposed approach to addressing issues, and lays the framework for future ACE reviews.

## Responding to the Discussion Papers

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The Board invites Participants (including Group 2 companies), and expects the Group 1 companies, to prepare and file written submissions outlining their views on the discussion papers in advance of the Technical Conference(s).<sup>2</sup> The Board welcomes input on the discussion papers from those intending to participate at the Technical Conference(s), as well as from those not intending to participate.

The deadline for providing comments on the discussion papers is 20 September 2017. The Board will consider the input received and will communicate the details (schedule and agenda) for the Technical Conference(s) in a future Procedural Direction.

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<sup>2</sup> As stated in the Board's letter of 13 February 2017, Procedural Direction No. 1 – Process Decision and Schedule ([A81714](#)).

Comments are most helpful if they:

- indicate the topic of the discussion paper and the specific question to which the comment relates;
- contain a clear rationale, and provide evidence to support the view expressed;
- pose additional questions for discussion not listed by the Board; and
- describe any approaches the Board should consider to address an issue.

# Discussion Paper 1 – Development of a refined ACE framework

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## 1.1 Background

- a) In its [MH-001-2012](#) decision, the Board identified a number of areas where some consistency among the companies would be helpful for future reviews of abandonment cost estimate (ACE) filings. These areas include, and are not limited to: future research studies; conducting land use studies; collaboration among pipeline companies; and consultation with landowners (or their associations) and other interested persons.
- b) The Board, in its [MH-001-2012](#) decision, strongly encouraged companies to work together with Board staff, landowners (or their associations) and other interested persons to achieve, where possible, consistency in land use designation and cost estimate methodology. The Board noted that such coordination would be particularly helpful to the Board, prior to any regular Board review of cost estimate filings.
- c) In the Board’s [letter](#) of 8 February 2016, the Board said that the objective of the ACE Review 2016 is to refine the assumptions and abandonment methodology that companies use to calculate the cost of abandonment of their pipeline systems over time.
- d) On 13 February 2017, the Board issued [Procedural Direction No. 1](#) – Process Decision and Schedule. In this Procedural Direction, the Board stated its decision to conduct Technical Conference(s) and issued a preliminary list of topics for the Technical Conference(s). One of the topics identified in the preliminary list was “potential changes to Tables A-1, A-2, A-3 and A-4 (including framework, units of measurement, calculation consistency, etc.)”. (Issue # 9).

## 1.2 Proposed framework

The Board is proposing a refined framework for ACE to provide greater clarity, consistency and transparency, and to better test the reasonableness of the ACEs filed by the companies. This framework is intended to address some of the issues or inconsistencies found by the Board in its review of the ACE filings and the challenges that arise when assessing the adequacy of these filings.

By requiring companies to adopt this framework, the Board will be able to assess the adequacy of ACE filings in a consistent manner because companies will adhere to a standard format for filing their ACEs. This refined framework is meant to replace the existing Base Case Tables A-1 to A-4. The spreadsheet will allow companies to enter data in a systemic manner and to easily update the data should any of the assumptions change in the future. This will also assist the Board in comparing the cost estimates among the regulated companies.

The proposed refined framework consists of a spreadsheet and a User Guide providing instructions on how to input data into the spreadsheet and what supporting information will be required by the Board to validate the assumptions.

### *1.3 Highlights of the refined ACE framework*

- Uses a common approach for conducting land use studies and categorizing pipeline systems and above-ground facilities by land use;
- Uses consistent categories and sub-categories for land use, crossings and above-ground facilities;
- Includes several new sub-categories for land use, crossings and above-ground facilities which reflect various factors Group 1 companies have considered when developing their ACEs;
- Uses common definitions and descriptions for each land use category;
- Uses consistent units of measurement;
- Reports lengths of pipeline by land use category, pipeline diameter, commodity and abandonment method assumptions;
- Pre-populates the total ACEs using built-in formulas within the cells of the spreadsheet;
- Proposes “set” or “fix” abandonment method assumptions to be used by all companies for future ACEs;
- Uses an assumption-based approach for calculating ACEs;
- Reflects unit cost values for each cost category by pipeline diameter and land use category. Some cost categories are reflected by commodity type (e.g. purging and cleaning; land remediation);
- Uses a separate Tab for post-abandonment monitoring and other post-abandonment costs;
- Uses a separate Tab in the spreadsheet for “Special treatment” for reporting the total lengths of pipe by crossing type and pipeline diameter that assumes special treatment (fill);
- Uses a separate Tab in the spreadsheet for “Above-ground facilities” to report costs by facility type (i.e. costs associated with abandoning meter stations, pump stations and compressor stations) and by land use category (excluding crossing categories);
- Calculates cost contingency a percentage and bases it on the accuracy of cost estimates for each cost category;
- Treats costs in current year dollars; and
- Allows for salvage value for above-ground facilities and where pipeline is removed.

### *1.4 Questions for consideration*

- 1) Is the refined ACE framework a positive step towards refinement and advancement of the current ACE framework?
- 2) Will the refined ACE framework lead towards more accurate cost estimates?
- 3) Should the refined ACE framework aim to achieve consistency among the regulated companies?

- 4) Are the worksheets within the spreadsheet useable and readable?
- 5) Are the built-in formulas within the cells functional?
- 6) Does the spreadsheet misrepresent or double-count any data inputs? Where?
- 7) Are the instructions in the User Guide clear and easy to follow?
- 8) What would make the spreadsheet and User Guide better? Do you have any suggestions for improvement?
- 9) Are there any inconsistencies between the spreadsheet and the User Guide?

## Discussion Paper 2 – Consultation and mitigating impacts on current and future land uses

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### 2.1 *Consultation with landowners, indigenous groups and stakeholders*

#### 2.1.1 *Background*

- a) The Board expects companies to have a Consultation program that establishes a systematic, comprehensive and proactive approach for the development and implementation of consultations occurring throughout the lifecycle of its facilities. The Board's [Filing Manual](#) (section 3.4 Consultation) states that a consultation program should be appropriately integrated into a company's overall management system to provide protection for the public, landowners, stakeholders, Indigenous communities, property and the environment throughout the lifecycle (design, construction, operations, maintenance, and abandonment) of a pipeline system.
- b) In its engagement activities and consultation initiatives, the Board has heard from landowners, Indigenous groups and stakeholders that they expect to be engaged during the lifecycle of a project, including the economic matters relating to the funds set aside for the eventual abandonment of a pipeline.
- c) In the MH-001-2012 ACE proceeding, landowners and landowner associations and representatives expressed concerns about the methodology used by companies to account for and estimate the costs for abandonment and they were of the view that there was inadequate consultation on these matters to be persuaded that future changes in their land use and land use planning as a result of pipeline abandonment were included in these costs.
- d) In the ACE Review 2016 filings from Group 1 companies, the consultation program design, activities and updates submitted by companies demonstrated limited consultation activities and updates and lacked reference to an established acceptable industry standard.

#### 2.1.2 *Context*

The Board may consider establishing consultation guidance including identifying a role for the Board in assessing and evaluating consultation programs. A selection of topics for discussion in regard to the ACE Review could include: the frequency, timing and manner in which landowners, Indigenous groups and stakeholders be consulted; the standard for these consultation programs; level and frequency of reporting; and role for the Board in assessing and evaluating the overall program design and implementation. The Board staff has drafted consultation guidance (see section 2.3.1).

#### 2.1.3 *Questions for consideration*

- 1) Do the proposed guidance outlined in section 2.3 below adequately define the expectations for companies and their stakeholders in terms of the design and implementation of consultations for ACE Reviews?

- 2) For what elements of the consultation program should the Board stipulate prescriptive filing requirements for future ACE Reviews? What elements could be adapted or customized, providing that appropriate justification can be demonstrated?
- 3) How could the Board oversee the design and implementation of consultation activities specific to each ACE Review including how companies incorporate the input gathered during ongoing consultation activities to inform the ACE Reviews?
- 4) In what way could the company demonstrate that its consultation program and outcomes have contributed to and informed the financial aspects of the ACE Review filings?
- 5) In the event that the Board is of the view that a consultation program is inadequate or insufficient, in what way should the Board interpret this conclusion and what should be the impact to the Board's decision-making in regard to the specific ACE Review filings?

## 2.2 *Abandonment methods and possible approaches to mitigating impacts to current and future land uses*

### 2.2.1 *Background*

- a) In the [MH-001-2012](#) proceeding, landowners, landowner associations or representatives expressed concerns about how Group 1 companies identified, accounted for and estimated the potential impacts on current and future uses of privately held lands when determining abandonment costs associated with the respective methods of abandonment.
- b) In order to mitigate the potential impacts, companies may consider direct compensation to the landowner or identify indirect methods of mitigating the impacts. While the Board has no jurisdiction to decide on matters pertaining to compensation (including damages) payable directly to landowners, companies are expected to identify, assess and estimate the possible financial costs which could be incurred to address such impacts and ensure they are reflected in the total amount set aside for future abandonment.

### 2.2.2 *Context*

The Board is interested in augmenting its general understanding of the fundamental issues and concerns associated with the possible impacts to current and future land uses on types of privately held property and whether companies are collecting this information so as to establish the costs related to the proposed abandonment methods including costs to mitigate the impacts.

### 2.2.3 *Questions for consideration*

- 1) With reference to an industry standard in appraisal or land evaluation techniques, what specific criteria could be essential for a company to rely upon in order to identify, quantify and estimate the possible impacts of abandonment methods on current and future land uses at a general level?
- 2) What should be the relationship between these criteria and the possible abandonment methodologies in determining an estimate of an identified financial impact to current and future land uses?

- 3) If there are measures or alternatives to mitigate the impacts to current and future land uses, how should they be represented within the calculations for costs?

## *2.3 Proposed guidance*

### *2.3.1 Consultation and awareness program*

Provide a summary of consultation activities that have been undertaken for the ACE Review. This summary should include a description of:

- a) relevant discussions with directly affected landowners and stakeholders regarding land rights and the manner or in which this has been factored in to the abandonment method assumptions, or the weight given to these discussions in determining abandonment method assumptions (such as removal versus abandon in-place);
- b) relevant discussions with Indigenous groups and how this has been factored in to the abandonment method assumptions (removal versus abandon in-place);
- c) a summary of the issues or concerns (e.g., environmental or safety) raised by landowners, Indigenous groups and stakeholders; and
- d) how companies maintain current records of land ownership information.

### *2.3.2 Possible approaches to mitigating impacts to current and future land uses*

Provide a description of how values for types of current and future land uses were factored within cost estimates and how the plan was used by the company to consult and engage with landowners, stakeholders and Indigenous groups in order to determine and refine the company's costs since the last ACE Review filing. This description must include but not be limited to:

- a) the method used to assess the impacts to landowners, stakeholders, Indigenous groups on their current or proposed future use of the lands (such as agricultural operations, land development plans, etc.);
- b) the research performed in order to assess and quantify the costs associated with these impacts;
- c) a description of the typical mitigation measures that would be in-place or considered to address impacts associated with the proposed method of abandonment;
- d) the method used to record and manage the data resulting from consultation activities with landowners, stakeholders and Indigenous groups in order to refine these estimates; and
- e) the manner in which the results of this information will be shared with landowners, stakeholders and Indigenous groups.

# Discussion Paper 3 – Land use categories, descriptions and definitions

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## 3.1 Background

- a) In its [4 March 2010 letter](#), the Board issued Table A-1, which provides a framework for reporting pipeline length and number of above-ground facilities by land use and pipeline diameter category, for the purposes of estimating preliminary abandonment cost estimates. A copy of Table A-1 is provided in Appendix A of this discussion paper.
- b) In its [MH-001-2012](#) decision, the Board found each Group 1 company's designation of land use categories reasonable, as it was of the view that, for the purposes of designating land use categories, companies are best positioned to categorize land use along their pipeline systems. The Board further noted that land use categories will continue to be refined as new information becomes available and encouraged applicants to collaborate and, where possible, standardize the land use categories with the input of landowners, regional and municipal planners, or by conducting pipeline-specific land use studies.
- c) In its [8 February 2016 letter](#), the Board directed Group 1 companies to file pipeline-specific land use studies with their 2016 ACE Review filings, which should include: land use categories, definitions and basis for the definitions.

## 3.2 Issues / inconsistencies

### 1. Lack of clear land use category definitions

The Board has identified a need for establishing clear definitions for land use categories to ensure that the categorization of pipeline systems is occurring in a consistent manner and being applied in a similar way by all companies when developing their ACEs (*see Issues 2 and 3 below*).

While some Group 1 companies provided land use category and sub-category definitions and described the methods they used to categorize the lands along their pipeline systems, other companies did not, or did so with varying degrees of detail. Many companies stated that they relied on the land use category descriptions and considerations outlined in the CEPA (2007) report<sup>3</sup>.

The Board recognizes that it has not provided definitions or descriptions for the land use categories presented in Table A-1, or guidance regarding how to best to define land use categories for estimating abandonment costs. The Board also notes that the CEPA report does not provide robust, clear definitions for each land use category that would allow for similar interpretation and use of land use categories by all companies in preparing their ACE.

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<sup>3</sup> Canadian Energy Pipeline Association. 2007. *Pipeline Abandonment Assumptions: Technical and Environmental Considerations for Development of Pipeline Abandonment Strategies*. Prepared for the Terminal Negative Salvage Task Force of the Canadian Energy Pipeline Association. September 2006 – April 2007.

## 2. Land use categories used vary by company

The land use categories reported in the companies' respective Tables A-1 vary. While many companies have used the land use categories provided in the Table A-1, other companies modified their land use categories based on the results of their pipeline-specific land use studies or the proposed abandonment method for a specific land use category or sub-category. For example,

- [Kinder Morgan](#) created a category entitled “Road, Railway and Utility Crossings” which has separate sub-categories for “Roads”, “Railway” and “Major Utility” crossings. It also separated its “Watercourse Crossing” category into sub-categories for “Rivers” and “Creeks”.
- [Westcoast's](#) Table A-1 did not include a land use category for “Other, Environmentally Sensitive Areas”, but rather lengths of pipe in environmentally sensitive areas were accounted for in its “Agricultural” and “Non-Agricultural” land use categories with the same abandonment assumption (i.e., abandonment in-place).

## 3. Land use categorization is not always transparent

Many Group 1 companies used similar land use categories and sub-categories to those presented in Table A-1, but then qualified the use of those categories for reporting pipe lengths as a result of the associated abandonment assumptions or to avoid redundancy with other categories. Examples include:

- Kinder Morgan<sup>4</sup> included wetlands in the title of its “Non-Agricultural, Undeveloped (e.g, Forest, Wetland, etc.)” land use sub-category, but then noted, in a response to a NEB Information Request, that it put all wetlands in its “Other, Environmentally Sensitive Areas (including wetlands)” land use sub-category to avoid redundancy.
- [Trans Mountain's](#) “Other, Environmentally Sensitive Areas” land use sub-category only includes lands with planned removal treatments. It reported lengths of pipe in environmentally sensitive areas, where the abandonment method was assumed to be abandonment in-place, in its “Non-Agricultural, No Future Development Anticipated (e.g., forest)” category.
- [Trans Mountain](#) indicates in its Table A-1 that its “Other (Crossings), Water Crossings” sub-category includes rivers, creeks, streams and wetlands, but notes that only watercourse crossings with planned special treatment (A+) were accounted for in the sub-category.
- [TQM](#) (as well as the other TransCanada companies) created a “Gravel Road Crossings” sub-category in the “Other” category and applied a different abandonment assumption to these crossings than road crossings in its “Railway and Paved Road” sub-category.
- TCPL<sup>5</sup> (as well as the other TransCanada companies) noted that its “Non-Agricultural, Prospective Future Development” land use sub-category originally (in 2011) reflected cost

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<sup>4</sup> [A5F4J9](#); [A5I4T2](#)

<sup>5</sup> [A5I4Q9](#); [A3G8Z3](#)

estimates for the future removal of pipe on lands that were currently categorized as “Agricultural” but that would be subject to potential future development based on urban development trends. In 2016, TCPL indicated that it did not report any lengths of pipe on lands with future development in this land use sub-category in its 2016 ACE, but rather reported them within the “Agricultural, Cultivated” land use category. The company noted that this was done in response to the Board’s direction in its [MH-001-2012](#) decision requiring TCPL to use the Base Case assumption.

#### **4. Lack of reporting of above-ground facilities by land use category**

None of the companies reported above-ground facilities by land use category in their Tables A-1. Several companies noted in their ACEs that land use is not a primary factor in determining abandonment costs for above-ground facilities.

While the Board did not provide specific guidance to companies as to how to report above-ground facilities by land use type in Table A-1, the table itself provides rows for reporting above-ground facilities by land use type. Refer to Discussion Paper 7 for further discussion regarding this topic.

#### *3.3 Proposed approach*

To provide greater clarity and consistency in companies’ approaches in classifying and reporting land use for development of their ACEs and to ensure the use of common definitions and descriptions for each land use category, the Board proposes the use of set categories and sub-categories for land use, crossings and above-ground facilities to be consistently used by all companies when developing their ACEs. In the accompanying refined ACE framework, the Board has proposed a selection of categories to be used:

- Section 4.0 of the User Guide lists and describes each proposed land use, crossing and above-ground category.
- Section 4.1.1 and Appendix 2 of the User Guide describe how the proposed categories should be used to delineate companies’ pipeline systems for reporting in the proposed spreadsheet and includes a list of supporting information that should be provided as part of a Land Use Study.

In some cases, the categories are new. In other cases, the categories are the result of splitting previous land use categories into more detailed sub-categories, or in consideration of the different factors some companies considered when developing their ACE (see Discussion Paper 5). In all cases, the Board has designed the new categories to align with land use considerations that are likely to result in different abandonment method assumptions and unit costs.

#### *3.4 Questions for consideration*

- 1) Do the proposed land use categories and definitions described in the refined ACE Framework appropriately capture the majority of land use considerations as they relate to abandonment of pipeline systems and above-ground facilities?

- 2) Are any of the proposed land use categories and sub-categories problematic? If so, why and how could they be better delineated or described?
- 3) Would creation of the proposed new land use categories and sub-categories be a positive refinement and lead towards more accurate cost estimates?
- 4) Are the proposed land use categories suitably delineated so as to ensure that there is only one abandonment assumption for each category (e.g., A, R, A+, a percentage of A and R such as 80/20, or a percentage of A+ such as 50/50)?

*Note: Land use, crossing and above-ground facility categories cannot be appropriately designed without considering the abandonment assumptions assigned (or to be assigned) for each category and how the resulting pipeline lengths or number of units will be applied to appropriate unit costs to determine an overall cost estimate. Participants should refer to Discussion Papers 4 and 5 to consider the issues identified and questions posed in those papers when considering the questions above.*

# Discussion Paper 4 – Scope and methodology of land use studies

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## 4.1 *Background*

- a) In its [MH-001-2012](#) decision, the Board recognized that the methodologies used by Group 1 companies were based on each company's current knowledge and databases of their own pipeline systems. The Board noted the land use studies done by several companies in support of their ACEs and encouraged all companies to conduct pipeline-specific land use studies to help designate land use in a more transparent manner.
- b) In its [8 February 2016 letter](#), the Board directed Group 1 companies to file pipeline-specific land use studies (or updates to previously-filed land use studies), which included, at a minimum:
  - the scope of the land use study;
  - the methodology used to complete the land use study, including information sources, land use categories, definitions, and basis for the definitions and assumptions regarding abandonment methods;
  - identification of locations or areas where pipeline is expected to be abandoned in-place, removed or abandoned in-place with special treatment; and
  - results and analysis of the land use study.

## 4.2 *Issues / inconsistencies*

### **1. Not all companies provided a pipeline-specific land use study with their 2016 ACE**

Many of the 2016 ACEs did not include a stand-alone pipeline-specific land use study, as directed by the Board in its [8 February 2016 letter](#).

For those companies that filed land use studies, they were, for the most part, similar to what was filed in support of their 2011 ACEs, with updates indicating areas where land use categorization was changed based on the results of their 2016 review.

For those companies which did not provide land use studies with their 2016 ACEs, responses to NEB Information Requests indicate that all companies, to some degree, verified land use along their pipeline systems.

### **2. Each company has taken a unique approach to conducting its land use analysis**

Each Group 1 company has taken a different approach for conducting its land use analysis in both 2011 and 2016, which leads to differences in land use classification. In many cases, companies' efforts for reviewing land use in 2016 was not as rigorous as their initial land use analyses

conducted in 2011, and was generally limited to conducting spot checks of land use classification and assigning land use to locations where new infrastructure had been built since 2011.

In addition, there are differences in the types of information sources (including year taken or published) considered and level of rigor taken by companies to verify land use in 2016, with some companies choosing to re-review their entire system, while others conducted spot checks.

Examples include:

- [Enbridge](#) and [Enbridge NW](#) checked for new sources of publically available information and data and used those information sources to compensate for data limitations in its 2011 land use study. Enbridge noted that existing publically available data for prospective future development on non-agricultural land was not available across its system, so limited the data utilized for this category to pits, quarries and mining area claims.
- [Kinder Morgan](#) conducted a review of its internal pipeline database system (2016), Google Earth (2015/2016) and Bing imagery to confirm its 2011 land use assessment and to assess where the potential for pipeline removal was likely due to future land use expansion.
- [TCPL](#) (and other TransCanada companies) conducted spot checks in areas of the pipeline where there is higher potential for land use to change. These spot checks included comparison of the company's own imagery collected from 2006 to 2016.
- [Trans Mountain](#) conducted a review of municipal land use planning documents to determine where pipeline removal is likely due to future land use expansion. It also reviewed available rezoning applications made by landowners to determine if land use categories required revision.
- [Trans-Northern](#) reviewed site and project-specific landowner consultations and a conducted a spot check review of its imagery to verify land use classifications.
- [Westcoast](#) did not re-assess its entire pipeline system, but rather only used GIS information and/or other satellite or aerial imagery to detect land use changes for those pipelines constructed between 2010 and 2016. It noted that as part of ongoing pipeline surveillance, any developments within 200 m either side of its pipeline are recorded, and it receives subdivision applications and zoning amendments for lands traversed by its pipeline system from municipalities and provincial government agencies.

### **3. Varying approaches taken to verify results of desktop assessment**

Companies took varying approaches to verifying the results of their desktop assessments. For example:

- [Alliance](#) conducted spot checks to confirm the accuracy of its aerial imagery using Google Earth satellite imagery. It also noted that its field staff regularly utilizes the company's GIS platform, which broadly confirms the accuracy of the land use data within its GIS.
- [Enbridge](#) and [Enbridge NW](#) provided its quality control methodology in its land use study, which included:

- Examining the pipeline within the GIS by zooming in to ensure the pipeline was included in one of the defined land uses; and
- Spot checking 2 per cent of the line by comparing the results of the GIS model with the land use apparent on Enbridge’s aerial photographs.
- [Westcoast](#) confirmed the results of its land use review with its Land and Community Representatives located in the communities in which it operates.

#### **4. Different factors were considered by each applicant**

The companies’ explanations of the methodology they used to conduct their land use studies indicate that each company considered different factors when doing their land use analysis. For example:

- [Trans Mountain](#) identified 1.36 km of pipeline where removal is warranted at the time of abandonment for timber harvesting operations in areas traversed by its pipeline. It calculated the length of pipe by considering locations where pipe would require removal to accommodate road construction and using an allowance of 100 m of pipe removal per 50 km of licensed timber harvesting land.

#### *4.3 Proposed approach*

The Board has not issued any specific guidance to companies as to how to conduct their land use studies in support of their ACEs, including an appropriate scope and methodology.

To provide greater clarity and consistency in companies’ approaches in conducting land use studies in support of their ACEs, Board staff propose that all land use studies be conducted using a common approach as outlined in Appendix 2 of the User Guide.

#### *4.4 Questions for consideration*

- 1) Does the guidance outlined in Appendix 2 of the User Guide appropriately capture the steps required to initially conduct a land use study in support of an ACE?
- 2) Is the use of desktop analysis and interpretation of current satellite and aerial imagery as the primary basis for initially categorizing land use on a pipeline system appropriate?
- 3) What would be the appropriate qualifications and experience for personnel conducting the desktop analysis to have in order to conduct the work?
- 4) What is an appropriate minimum scale for imagery used to identify land use type, crossing lengths and detect land use change?
- 5) What imagery sources are most appropriate? Is the use of GoogleEarth, StreetView and other readily available satellite and aerial imagery appropriate?
- 6) How old can imagery be before it is of limited use for determining current land use or detecting land use change?
- 7) What additional factors should be considered when conducting land use studies?

- 8) What other information sources (in addition to imagery) should be used to understand future land use plans for the lands crossed by a pipeline system? What would be appropriate “minimum” sources of information to be considered (e.g., land use plans, consultation with landowners)?
- 9) What are appropriate quality assurance and control techniques that should be applied when conducting a land use study to ensure results are accurate? Should they include spot checks or field verification?
- 10) For subsequent ACE reviews, what is an appropriate methodology that should be taken by all companies to review and update their land use studies? Should it differ from that described in Appendix 2 of the User Guide? If so, how?

# Discussion Paper 5 – Potential refinements to abandonment method assumptions for land use categories

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## 5.1 *Background*

- a) On [4 March 2010](#), the Board issued a letter with revised Base Case assumptions (Table A-2). The abandonment assumptions included in Table A-2 are: abandonment in-place; abandonment in-place with special treatment (fill); and pipeline removal (see Appendix A).
- b) In [MH-001-2012](#), the Board considered the assumptions used by each company for each land use category, along with the submissions made by intervenors in that hearing and provided the following views:
  - It imposed 20 per cent removal for medium and large diameter pipe in “Agricultural, Cultivated” and “Agricultural, Non-Cultivated” land use categories.
  - The Board accepted the assumptions proposed by companies as a starting point for estimating purposes and as a result of their pipeline-specific analysis and justifications.
- c) In the Board’s [8 February 2016 letter](#), the Board directed Group 1 companies to file updated ACEs.

## 5.2 *Issues / inconsistencies*

### 1. **Variability in Abandonment Assumptions and Differences with that in Table A-2**

In the ACE Review 2016 filings, Group 1 companies, for the most part, applied similar assumptions to what they had used in 2011. The assumptions applied either:

- follow Table A-2;
- are the same as the applicant-specific assumptions used in 2011 and accepted by the Board in its decision for [MH-001-2012](#); or
- are as directed by the Board in its decision for [MH-001-2012](#).

Also, in some cases, the company’s assumptions are more conservative than Base Case assumptions (e.g., removal instead of abandonment in-place, special treatment applied) for certain land use categories.

The following are examples showing applicant-specific assumptions that were used in 2011, accepted by the Board in MH-001-2012 and continued to be used in 2016:

- For small diameter pipe, most companies assumed abandonment in-place for many of the land use categories with the view that ground subsidence is expected to be minimal.
- All companies, except M&NP, used 100 per cent abandonment in-place for all pipeline diameter categories in the “Non-Agricultural, No Future Development Anticipated” land use category.

- TCPL<sup>6</sup> (and the other TransCanada companies) used an assumption of abandonment in-place with no special treatment for the medium and large-sized pipe diameter categories for the “Other, Other Crossings (Utilities)” land use category, noting that concrete fill could potentially impact the stability of utility crossings below its pipeline.
- [Westcoast](#) assumed partial removal for some of its above-ground facilities on company-owned land.

The following are examples showing applicant-specific assumptions that are more conservative than the Base Case:

- [Alliance](#) used an assumption of abandonment in-place with special treatment for small diameter pipe category in its “Other, Other Crossings (Utilities)” land use category.
- [Kinder Morgan](#) indicated that its Cost Category 4 (Special Treatment) in Table A-3 includes costs for cut and cap at 221 sites at wetland and watercourse crossings.
- [Trans Mountain](#) assumed that wetlands would be segmented on either side of the crossing for all wetlands greater than 30 m x 30 m in size and more than 200 m from the nearest road crossing or other adjacent wetland.
- Trans Mountain<sup>7</sup> assumed that all watercourses would be segmented on either side of each crossing and that:
  - five per cent of all watercourse crossings, regardless of size, would be segmented on either side of the crossing;
  - five per cent of medium and large watercourse crossings would be filled from bank to bank or sagbend to sagbend;
    - all large watercourse crossings (i.e, those located in proximity to a populated area) would be filled from bank to bank (or sagbend to sagbend).

## **2. Approach used by some companies for the “Non-Agricultural, Prospective Future Development” category is not assumption-based**

Several companies did not apply the assumptions provided in their respective Tables A-2 to lengths of pipeline identified in their “Non-Agricultural, Prospective Future Development” land use category, but rather assumed abandonment in-place and provided justifications for why those pipeline lengths should not be removed. For example:

- [Kinder Morgan](#) reviewed areas of known future development to decide if they warranted special consideration for pipe removal and then only included those areas of prospective future development for which it determined pipeline removal would be warranted in its “Non-Agricultural, Prospective Future Development” land use category.

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<sup>6</sup> [A5F4U0; A1Z4Q7](#)

<sup>7</sup> [A5F4Y9; A5F4X1](#)

- [Enbridge NW](#) identified 4.9 km of pipe as being subject to prospective future development during its land use study as a result of land claims on a portion of its right-of-way. While it included it in the length of pipe reported in its “Non-Agricultural, Prospective Future Development” land use category in its Table A-1, for which it assumed pipe removal, it chose not to include costs for removal of the pipe since it believed the development to be speculative and was unlikely to occur at the time of abandonment. It was of the view that any costs arising from future development were adequately provided for under its post-abandonment monitoring and remediation cost category. [Note: in its response to an NEB Information Request, Enbridge NW stated that the land claim had been cancelled.]

### *5.3 Proposed approach*

To provide greater clarity and consistency in companies’ approaches to applying abandonment and special treatment assumptions to the land use, crossing and above-ground facility categories, Board staff propose to set “fixed” assumptions for all categories.

### *5.4 Questions for consideration*

- 1) Should the Board set “fixed” abandonment and special treatment assumptions for all land use, crossing and above-ground facility categories that would be used by companies when determining their ACE?
- 2) What are the appropriate abandonment assumptions that should be applied to each land use, crossing and above-ground facility category proposed by the Board in its spreadsheet, considering that many of the assumptions used by companies in their 2016 ACEs differ from Table A-2?
- 3) Do the assumptions adequately address landowner, Indigenous groups and stakeholders’ concerns?
- 4) Do the assumptions adequately consider the potential need to remove pipe at the time of abandonment? Are there some land use and crossings categories where it would be more appropriate to account for potential pipe removal as part of the “Post-Abandonment - Other” unit cost, rather than as part of the abandonment assumption? If so, why?
- 5) Should removal of pipe at crossings be considered, as opposed to only considering application of special treatment?
- 6) Is there any new research for the Board to consider when setting assumptions?

# Discussion Paper 6 – Inflation rate

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## 6.1 *Background*

- a) In [RH-2-2008](#), an inflation rate of two per cent was adopted as one of the Base Case assumptions. This rate reflected the Bank of Canada inflation target and approximated historical rolling averages.
- b) In its [4 March 2010 Letter](#), the Board stated that there may be a role for two types of inflation assumptions: an industry-specific inflation for cost escalation and a general economy-wide inflation. However, at that time, the same value could be used for each type of inflation. The Board saw the value in relying on the Bank of Canada's inflation target to establish the long-term inflation to be used in the Base Case, and to the extent that this inflation target continues to meet the Board's need as an external benchmark, the Board would continue to give considerable weight to it in setting the inflation component of the Base Case.
- c) In [MH-001-2012](#), Group 1 companies filed their ACE using the assumption of a two per cent inflation rate. At that time, companies' ACEs were in 2010 and 2011 dollars.
- d) In [MH-001-2013](#), companies used a two per cent inflation rate to calculate the future value of their ACE in the calculation of their annual contribution amount.
- e) In its [8 February 2016 letter](#), the Board directed Group 1 companies to file an updated ACE reflecting the costs in 2016 dollars.

## 6.2 *Issues / inconsistencies*

- 1) In their 2016 ACE filings, Group 1 companies used various approaches to reflect the costs in 2016 dollars. Some companies used an inflation rate (ranging from zero to two per cent) while other companies used an escalation or inflation factor (ranging from 6.8 to 13 per cent). Another approach was to use more current/accurate information regarding the costs, rather than using an inflation rate.
- 2) Those companies that used an inflation rate based it on various sources. Some companies used an average annual inflation rate based on Bank of Canada inflation data, while others used the Base Case inflation rate. However, there was variation between those inflation rates that were based on the Bank of Canada data.
- 3) Those companies that used an escalation or inflation factor based these percentages on data such as the IHS Global Insight economic indices or the Consumer Price Index – All Items for the period of 2011 to June 2016. Other percentages were based on calculating the sum of the product of the weighted percentage and overall average percentage difference for a discrete component of construction costs between 2010 and 2016.
- 4) One company chose to use a zero inflation rate, stating that it had considered the general market conditions since it had last filed its ACE with the Board in September 2013 and had regard for the generally low inflation rates during that economic period and general economic climate.

- 5) Another approach, used by Enbridge and Enbridge NW, was to use more current and accurate information to ensure the ACE reflected the best information possible. This approach focused on new information in three major areas of change in the Land Use Study, the pipeline facilities and unit cost estimates arising from projects undertaken since 2011.
- 6) With regard to the two per cent used in the Base Case, some companies stated that the Bank of Canada long-term inflation target of two per cent continued to be appropriate, for the purpose of calculating the Annual Contribution Amount. Other companies stated that the Base Case inflation rate would, at times, not reflect inflationary pressures for input costs that would affect the ACEs; however, it was expected that any differences between the actual cost changes and the target inflation rate would be captured through the regular reviews.

### 6.3 *Questions for consideration*

- 1) Should all companies use the same methodology when revising their ACE to reflect the costs in current period dollars?
- 2) Which of the following is an appropriate methodology for revising an ACE to reflect the costs in current period dollars:
  - a) Inflation rate
    - i) Should a company use an average of the actual annual inflation rates over the period leading up to the next Board review of the company's ACE? If so, where should the data come from?
    - ii) Are there other methods to determine an inflation rate?
  - b) Escalation Factor
    - i) What data should this be based on? Can it be the same factor for all companies or should it be company-specific?
      - o Would an escalation factor based on the Consumer Price Index of a specific basket of goods be appropriate? Should the basket of goods be the same for all companies or company-specific?
    - ii) Other methods to determine an escalation rate?
  - c) Actual unit cost change information
    - i) Could the unit costs be the same for all companies for all cost categories or would the unit costs be company-specific?
    - ii) If the unit costs were to be the same for all companies, should this information be provided by the Board after being determined and verified by a third-party cost consultant?
      - If it is company-specific, how can the Board confirm that the unit costs are current and accurate?
- 3) If a company's circumstances are such that it should have a company-specific approach in revising its ACE to reflect current period dollars, what factors should the Board take into consideration when determining whether the approach is appropriate?

- 4) Is the use of the present Base Case inflation rate of two per cent still appropriate based on the five-year revision of ACE to reflect the costs in current period dollars?

# Discussion Paper 7 – Cost categories and unit costs for abandonment activities

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## 7.1 *Background*

- a) In its [4 March 2010 Letter](#), the Board developed its Base Case Cost Definition Grid (Table A-3) with broad categories and activities that may be included in these categories for the purposes of estimating abandonment costs. At the time, Table A-3 did not contain any cost factors due to insufficient information before the Board to support publishing estimates of unit cost factors for abandoning pipelines and facilities
- b) As part of the 4 March 2010 Revised Base Case, the Board applied an annuity factor (66:1) to derive the initial financial provision at the time of abandonment needed to fund each dollar needed over the subsequent years, with inflation. For example, an initial amount of \$66 is required to generate an annual flow of \$1 per year, inflating. The factor 66 used the real return of 1.5 per cent, based on a 3.5 per cent return on funds less the 2 per cent inflation.
- c) On [29 March 2010](#), the Board released a letter regarding Base Case Cost Factor Values (Unit Costs) indicating that Board staff would be consulting with all stakeholders to assist the Board in establishing Unit Costs that would be useful for as many companies as possible.
- d) In its [21 December 2010 Letter](#), the Board issued an amended Table A-3 which contained unit costs.
- e) In [MH-001-2012](#), Group 1 companies filed their ACE based on the cost categories in the amended Table A-3. The Board accepted as reasonable the unit cost estimates for the cost categories filed by Group 1 companies outside of the unit costs in the amended Table A-3 where applicants provided sufficient justification. The Board strongly encouraged companies to work together with Board staff, landowners (or their associations) and other interested persons to, where possible, achieve consistency in cost estimate methodology.
- f) In the Board's [8 February 2016 letter](#), the Board directed Group 1 companies to file an updated ACE reflecting revisions to abandonment costs associated with changes to pipeline specific land use studies, land use categories and physical assumptions to the method of abandonment.

## 7.2 *Issues / inconsistencies*

- 1) Some companies combined the costs of different breakdowns ((a) and (b)) within a cost category. For instance:
  - [Kinder Morgan](#), [M&NP](#), [Trans-Northern](#) and [Westcoast](#) combined the costs of Land access and clean up (cost category 2a) and Pipeline purging and cleaning (cost category 2b) as one cost line item.

- [Enbridge](#) placed the cost of Basic pipeline abandonment in-place (cost category 3a) within the cost for Special treatment (cost category 4) and Above-ground facilities (cost category 6).
  - [Trans Mountain](#) placed the cost for Special treatment (cost category 4) within the cost of Basic pipeline abandonment-in-place (cost category 3a).
  - [Enbridge](#), [M&NP](#) and [Trans-Northern](#) combined the costs of Pipeline removal and backfilling (cost category 5a) and Pipeline removal – land restoration (cost category 5b).
- 2) Pipeline cleanliness criteria has not been established for abandoned pipelines which may impact the unit cost estimates associated with the Pipeline purging and cleaning unit cost estimates.
  - 3) Remediation and restoration costs of abandoned pipeline right-of-ways and above-ground facilities are neither explicit nor transparent based on the current Amended Table A-3 Base Case Cost Definition Grid.
  - 4) Financial provision for post-abandonment activities reflect varying degrees of length of the monitoring period with respect to perpetuity, type of monitoring and provision for problems caused by the presence of a pipeline.
    - Trans-Northern based its post-abandonment activities cost for monitoring and remediation on a 25 year time frame.
    - Trans Mountain assumed a 500 year period for post-abandonment monitoring and remediation costs.
    - TransCanada companies applied an escalation factor to the post-abandonment activities costs from MH-001-2012, which were based on a 10 year period. They further stated that annual monitoring and remediation provisions were calculated in perpetuity based on the Board's Amended Table A-3 Base Case.
    - Kinder Morgan estimated a constant annual cost of \$144,000 using an infinite term and discount rate of 1.5 per cent for the provision of post-abandonment activities.
    - Enbridge applied an annuity factor of 100 to post-abandonment unit costs instead of the annuity factor of 66 identified by the Board in its Revised Base Case.
    - M&NP did not assign costs to monitoring activities.
  - 5) Alliance, Trans-Northern, and Westcoast provided Special treatment (cost category 4) unit cost estimates on a dollar per crossing basis (number of crossings) while Enbridge and Kinder Morgan used a dollar per km of crossing basis (length of crossings and average segment length).
  - 6) Companies adopted the range of unit cost estimates in the Board's amended Table A-3 across different cost categories and provided their own unit cost estimates for cost categories where the Board's Base Case unit cost estimates were not used. One company used the Board's Base Case unit costs for the entirety of its submission.
  - 7) Companies used varying units of measurement for the unit cost estimates associated with the removal of above-ground facilities.

- 8) Westcoast did not account for complete removal of above-ground facilities (processing plants and compressor stations) on company owned land in its cost estimates, consistent with the assumption it provided in [MH-001-2012](#).

### 7.3 *Questions for consideration*

- 1) Should the Board update the range of Base Case cost estimates in the amended Table A-3 to reflect the most up-to-date unit costs associated with abandonment activities? If yes, how should the Board undertake such updates, e.g., the use of an external third-party to conduct an abandonment cost verification exercise, and how should stakeholders be engaged in the process?
- 2) Should unit cost estimates for the cost categories be collected based on land use categorization in order to reflect the variability of abandonment costs associated with the different land use categories? Does this approach lead to a more refined and reasonable abandonment cost estimate?
- 3) What criteria should be established with respect to the cleanliness of abandoned pipelines in consideration of pipeline purging and cleaning unit cost estimates?
- 4) Should the unit costs for the remediation and restoration of abandoned pipeline right-of-ways be separate line items and be collected on a \$/km basis separately for oil and gas pipelines?
- 5) Should the unit costs for remediation and restoration be separate line items measured on a \$/m<sup>2</sup> basis with respect to the costs for remediation and restoration of pump stations, compressor stations, oil storage facilities (terminals) and processing plants?
- 6) Should the units of measurement for the unit costs of abandonment for crossings be standardized on a \$/length of crossing instead of a \$/number of crossings due to the variability in the distances and topographical characteristics of crossings?
- 7) Should the costs of post-abandonment monitoring (patrols, aerial surveys, etc.) and post-abandonment, other (e.g., future removal of portions of abandoned pipelines and addressing unforeseen events that may arise in the future), currently combined under Provision for post-abandonment activities (cost category 3b), be separate cost categories?
- 8) For what length of time should companies be required to conduct post-abandonment monitoring on abandoned pipelines and how should the associated costs be determined and reflected in the unit cost estimates?
- 9) Should a contingency factor be added to unit cost estimates for post-abandonment monitoring and post-abandonment?
- 10) Is the current annuity factor of 66:1 still applicable? If not applicable, what should the annuity factor be and what is it based on?
- 11) What should be the number of assumed post-abandonment events per year (e.g., subsidence, pipe exposure, pipe displacement, creation of water conduits, discovery of contamination and any other problems caused by the presence of a pipeline) and how should such number be determined?

- 12) Should the post-abandonment contingency unit costs be a separate line item to account for the costs to address the number of assumed post-abandonment events and what should be the associated assumed unit costs values in terms of a \$/event or \$/km basis?
- 13) Does Westcoast's assumption of partial removal of above-ground facilities on company owned land remain appropriate? If yes, how should potential future removal be reflected in the "Post-abandonment – other" cost category?

# Discussion Paper 8 – Methodology for the application and derivation of contingency including insurance and taxes

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## 8.1 Contingency Costs

### 8.1.1 Background

- a) In [MH-001-2012 Reasons for Decision](#), the Board noted that Group 1 companies used different methodologies to estimate contingency costs. Trans Mountain was the only company to include an amount for taxes and insurance as part of its contingency costs. In the Decision, the Board encouraged all Group 1 companies to:
  - work towards a more transparent and rigorous approach to calculating contingency;
  - where possible, collaboratively develop a consistent approach to contingency that is suitable for all companies; and
  - consider the necessity of taxes and insurance in future estimates.
- b) In its [8 February 2016 letter](#), the Board directed Group 1 companies to file as part of the ACE Review “updated information on the methodology used to estimate contingency costs including the supporting assumptions; a description of items included under these costs and how these were determined. The costs must include the necessity of taxes and insurance.”
- c) The Group 1 companies stated that contingency cost estimates were based on past project and cost management experience, the use of proprietary internal cost estimating tools and methodologies, and experience with pipeline and facility projects.

### 8.1.2 Issues / inconsistencies

- 1) Board staff note that Group 1 companies continued to use different methodologies to estimate contingency costs. Contingency costs estimates ranged from 5.8 per cent of total abandonment cost estimates to the adoption of the Board’s Base Case estimate of 25 per cent applied to the total cost of abandonment preparation, basic pipeline abandonment in-place, special treatment, pipeline removal and above-ground facilities cost categories.
- 2) Trans Mountain remained the only company to include provision for taxes and insurance in its contingency costs. The company applied a 24 per cent contingency (20 per cent project contingency and 4 per cent insurance and taxes) to its overall abandonment costs estimates.
- 3) Two companies applied a flat 10 per cent rate to their total ACE to derive contingency costs (one of which excluded certain cost items). Three companies utilized the Board’s Base Case methodology but applied varying percentages (13 per cent, 14 per cent and 15 per cent) and did not adopt the Board’s 25 per cent cost factor.
- 4) Companies considered their ACE’s as either AACEI Class 4 or 5 estimates with varying ranges of accuracy, i.e., per cent under run or over run of the ACE, inclusive of contingency.
  - TransCanada companies considered their ACEs as a Class 5 estimate with a +30/-20 per cent range of accuracy.

- Westcoast considered its ACE as a Class 5 estimate with a +50%/-20 per cent range of accuracy.
- Kinder Morgan considered its ACE as a Class 5 estimate with a +100%/-50 per cent range of accuracy.
- Trans Mountain considered its ACE as a Class 4 estimate with a +35%/-22.5 per cent range of accuracy.

### 8.1.3 *Questions for consideration*

- 1) Should the Board require companies to apply a contingency factor consistent with AACEI guidelines to the total abandonment cost estimates based on the AACEI classification of the ACE and associated accuracy range?
- 2) Should the Board set the contingency factor(s) for ACE based on the AACEI classification and associated accuracy range of the ACE?
- 3) Should a contingency factor be applied to each abandonment cost category in order to reflect the accuracy and quality of the cost estimate within a cost category, given that each unit cost estimates may have varying levels of uncertainty in its estimation?

## 8.2 *Review of the consideration of Taxes and Insurance in the contingency cost category*

### 8.2.1 *Background*

- a) In the [MH-001-2012](#) Decision, the Board noted that taxes and insurance were not currently included in the Base Case. The Board accepted one company's addition of taxes and insurance on the basis that such costs are likely to have an impact on contingency. The Board encouraged other Group 1 companies to consider the necessity of taxes and insurance in future estimates.
- b) In its [8 February 2016 letter](#), the Board directed Group 1 companies to consider the necessity of taxes and insurance in the estimate of the contingency cost category.

### 8.2.2 *Issues / inconsistencies*

In its 2016 ACE submission, [Trans-Northern](#) stated it required further clarification from the Board regarding post-abandonment taxes and insurance. Trans-Northern submitted that, based on NEB documents to date, it is not clear what types of taxes and insurance are applicable to the ACEs.

Not all Group 1 companies have disclosed if they considered post-abandonment taxes and insurance in their ACE. For the Group 1 companies that did consider taxes and insurance in the ACE, not all explained how taxes and insurance were included in the contingency cost category.

- A company stated abandonment activates in B.C. would incur sales tax while another company submitted that the scope of work for abandonment does not involve material purchases of new materials and therefore would not be subject to sales tax. Another

company submitted that contingency allowance is inclusive of any applicable GST and PST.

- A company stated it considered the necessity of taxes and insurance in developing its updated ACE. With respect to taxes, the company stated that the net effect of income taxes had been appropriately considered, with property taxes being inapplicable to abandoned assets. With respect to insurance, the company submitted that it includes monies in the abandonment fund (using a trust) to cover the remediation of any issues that may arise during abandonment, and carries prudent levels of liability insurance.
- Another company stated that it had considered the necessity of taxes and insurance in determining contingency to be included in the ACE. It did not anticipate insurance costs associated with abandonment work to be material and therefore had not made any specific allowance related to insurance.

### 8.2.3 *Questions for consideration*

- 1) Which types of taxes would it be appropriate to account for in the contingency cost category (sales taxes, property tax, other)? Provide the rationale for accounting for that specific tax in the contingency cost category and the percentage of contingency that should be used.
- 2) Which types of taxes should apply to activities in the post-abandonment cost category?
- 3) How should the estimate for taxes and insurance be reflected within contingency? For example, should taxes be a separate line item within contingency? Or should it be reflected as a separate cost category? What is the rationale for that approach?
- 4) What type of insurance is required for abandonment activities and for the post-abandonment period monitoring?

## Discussion Paper 9 – Salvage value

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### 9.1 *Background*

- a) In [RH-2-2008](#) the Board defined salvage to be the value at removal of pipe and facilities. As no data was filed in the proceeding, and to be conservative, the Board assumed an estimated salvage value of zero.
- b) In the [4 March 2010 Letter](#) the Board acknowledged that all written submissions received prior to the technical conference on 17 November 2009 were unanimous in their support for retaining the Board's preliminary assumption of zero salvage value at that time, as it was viewed as a reasonable and conservative assumption. Many submissions suggested there should be periodic reviews of this assumption.
- c) At the technical conference, there was some discussion about the salvage value of above-ground facilities and a value of 15 per cent was mentioned by a participant. However, others generally agreed that using a zero value for above-ground facilities was appropriate at that time, with regular reviews. For underground facilities, there continued to be general agreement that a value of zero is the conservative assumption and was fine at the time, with a suggestion for regular reviews.
- d) The Board was of the view that the initial assumption in the [RH-2-2008](#) Decision for salvage value of zero remained appropriate at that time, including for above-ground facilities. The Board stated the assumption would be reviewed over time and could be revised in the future should circumstances or information change.
- e) In [MH-001-2012](#), for the Pipeline Removal cost category, one company assumed a salvage value of 0.9 per cent of pipeline removal costs. The Board noted that while the Base Case assumed a salvage value of zero, the Board was of the view that the inclusion of this salvage value was minor in the context of that company's total ACE and therefore accepted its approach to salvage value.
- f) In relation to above-ground facilities the Board recognized in [MH-001-2012](#) that two Group 1 companies assumed some salvage value in this cost category. However, neither company indicated the figure that they assumed for salvage value. While the Board accepted the costs proposed by both companies, it did not assess the impact of salvage value on the estimates in this category. The Board stated that if salvage value was to be included in future estimates, the Board expected companies to provide a more detailed accounting and further justification for its inclusion.

## 9.2 *Issues / inconsistencies*

- 1) Most Group 1 companies in the ACE Review 2016 filings used the Board's Base Case assumption of zero salvage value. A few Group 1 companies included some salvage value, including:
  - One company that applied a salvage value to skid-mounted maintenance buildings in its 2016 ACE.
  - Another company that included some salvage value for compressor stations and processor plants in its 2016 ACE. They stated it was typical for heavily equipment-based projects to salvage reusable equipment such as in processing plants and facilities.
- 2) One company revised its ACE by removing the salvage value assumptions in the Pipeline Removal and Above-ground Facilities cost categories to be consistent with the Board's Base Case assumption and the approach used by other Group 1 companies.

## 9.3 *Questions for consideration*

- 1) Is the assumption of zero per cent estimated salvage value still appropriate? Why or why not?
- 2) If a non-zero salvage value is used, should salvage value be applied to specific categories (e.g. above-ground facilities, underground pipe, moveable facilities such as skid mounted facilities etc.)?
  - a) which specific facilities could have salvage value?
  - b) what is a reasonable dollar estimate for these specific facilities?
- 3) How can companies mitigate the risk of under collection should the salvage value be less than accounted for in their ACE estimate?
- 4) Can companies get "presale" contracts in place guaranteeing salvage value in the future (e.g. pre-sell steel or above-ground equipment)? If yes, can companies provide this contract as support of any salvage value estimate, and what should these estimates include? If no, what support can be provided as part of the ACE?
- 5) Should salvage value also include any land sale proceeds at the end of abandonment?
  - a) If yes, discuss a rationale to develop an estimate.

## Appendix A – Base Case Tables A-1 to A-4

*Table A-1*

**Step 1: Land use analysis** – Use the following table to determine the number of kilometres of pipeline in each land use and pipeline-diameter category. For the Above-Ground facilities, determine the facilities and the units (for example, number of tanks or compressors) to be abandoned.

| <b>Table A-1: Framework for Land use Analysis,<br/>For the Purposes of Estimating Preliminary Cost Estimates</b> |   |                                 |                                  |                 |                                |
|--|---|---------------------------------|----------------------------------|-----------------|--------------------------------|
| <b>Land Use</b>  |   | <b>Pipeline Diameter</b>        |                                  |                 | <b>Above-Ground Facilities</b> |
|  |   | 2" to 12"<br>60.3 to<br>323.9mm | 14" to 24"<br>355.6 to<br>610 mm | >26"<br>>660 mm |                                |
| <b>Agri-cultural</b>   | Cultivated                                      |                                 |                                  |                 |                                |
|  | Cultivated with special features                |                                 |                                  |                 |                                |
|  | Non-Cultivated                                  |                                 |                                  |                 |                                |
| <b>Non-Agri-cultural</b>   | Existing Developed Lands                        |                                 |                                  |                 |                                |
|  | Prospective future development                  |                                 |                                  |                 |                                |
|  | No future development Anticipated (e.g. forest) |                                 |                                  |                 |                                |
| <b>Other</b>   | Environmentally Sensitive Areas                 |                                 |                                  |                 |                                |
|  | Roads & Railways                                |                                 |                                  |                 |                                |
|  | Water Crossings                                 |                                 |                                  |                 |                                |
|  | Other Crossings (Utilities)                     |                                 |                                  |                 |                                |

*Table A-2*

**Step 2:** If using the Base Case, apply the entries in Table A-2 to the entries in Table 1 to determine the Method of Abandonment for the purposes of cost estimation.

| <b>Table A-2: Physical Assumption by Land Use and Facility<br/>For the Purpose of Estimating Preliminary Cost Estimates</b> |   |                                 |                                  |                     |   |
|---|---|---------------------------------|----------------------------------|---------------------|---|
| <b>Land Use</b>   |   | <b>Pipeline Diameter</b>        |                                  |                     | <b>Above-<br/>Ground<br/>Facilities</b> |
|   |   | 2" to 12"<br>60.3 to<br>323.9mm | 14" to 24"<br>355.6 to<br>610 mm | >26"<br>>660 mm     |   |
| <b>Agri-<br/>cultural</b>   | Cultivated                                      | A: 80 %<br>(R: 20%)             | A: 80 %<br>(R: 20%)              | A: 80 %<br>(R: 20%) | R                                       |
|   | Cultivated with special features                | R                               | R                                | R                   | R                                       |
|   | Non Cultivated                                  | A: 80 %<br>(R: 20%)             | A: 80 %<br>(R: 20%)              | A: 80 %<br>(R: 20%) | R                                       |
| <b>Non-Agri-<br/>cultural</b>   | Existing Developed Lands                        | A                               | A                                | A                   | R                                       |
|   | Prospective future development                  | R                               | R                                | R                   | R                                       |
|   | No future development Anticipated (e.g. forest) | A: 80 %<br>(R: 20%)             | A: 80 %<br>(R: 20%)              | A: 80 %<br>(R: 20%) | R                                       |
| <b>Other</b>  | Environmentally Sensitive Areas                 | A                               | A                                | A                   | R                                       |
|   | Roads & Railways                                | A+                              | A+                               | A+                  | R                                       |
|   | Water Crossings                                 | A                               | A                                | A                   | R                                       |
|   | Other Crossings (Utilities)                     | A                               | A+                               | A+                  | R                                       |

Legend: A = Abandon in-place, A+ = Abandon in-place with special treatment,<sup>8</sup> R = Removal

<sup>8</sup> CEPA defined A+ as pipeline is abandoned in-place with special treatment to prevent potential ground subsidence (e.g. fill pipe with concrete)

*Table A-3*

**Unit Costs for Abandonment Activities**

Table A-3 (with definitions issued 4 March 2010) now includes the Unit Costs developed during 2010.

| Amended Table A-3   |                                  |                     |   |   |  |           |              |        |
|---|----------------------------------|---------------------|---|---|--|-----------|--------------|--------|
| Table A-3 Base Case Cost Definition Grid  |                                  |                     |   |   | December 2010  |           |              |        |
|   | Broad Category                   | Method <sup>9</sup> |   | May Include   | Estimated Cost Factor Value <sup>10</sup> (2010 C\$)                               |           |              |        |
| 1.  | Engineering & Project Management | A                   | R | Regulatory, legal and finance support, external relations and land support, environment, health and safety support, operations support, stakeholder consultation. Detailed cost estimates, planning, applications, detailed engineering and environmental studies. Engineering and project management, Construction management, project & cost control. | Apply the factor shown to sum of costs in categories (2a, 2b, 3a, 4, 5a, 5b and 6) |           |              |        |
|   |                                  |                     |   |   | If pipeline abandonment project <sup>11</sup> is                                   |           | Apply        |        |
|   |                                  |                     |   |   | <50 km   |           | 20%          |        |
|   |                                  |                     |   |   | 50 to 500 km   |           | 10%          |        |
|   |                                  | >500 km             |   | 5%  |  |           |              |        |
| Pipe diameter definitions used in estimates below (as set out in Table A-1 of 4 March 2010 release) |                                  |                     |   |   | Pipe Diameter  | Small     | Medium       | Large  |
|   |                                  |                     |   |   | Imperial   | 2" to 12" | >12" to <26" | ≥26"   |
|   |                                  |                     |   |   | Metric   | 60.3 to   | >323.9mm     | ≥660mm |

<sup>9</sup> Method A, A+ or R respectively: Abandon in-place; Abandon in-place with special treatment; and Removal. For purposes of the preliminary cost estimation, the cost factors described here would be applied by companies using the Base Case. For pipelines that are abandoned in-place, all rows with an A or A+ are applicable; for pipelines that are removed, all rows with an R are applicable.

<sup>10</sup> Cost estimates or ranges are intended as typical averages for a pipeline system. For individual segments within the system, actual unit costs may vary more widely.

<sup>11</sup> Pipeline Abandonment project may include the whole pipeline system or smaller sections abandoned as separate projects.

| Amended Table A-3                        |   |                     |     |   |   |                    |                    |          |          |
|--|---|---------------------|-----|---|---|--------------------|--------------------|----------|----------|
| Table A-3 Base Case Cost Definition Grid |   |                     |     |   | December 2010   |                    |                    |          |          |
|  | Broad Category  | Method <sup>9</sup> |     | May Include   | Estimated Cost Factor Value <sup>10</sup> (2010 C\$)  |                    |                    |          |          |
|  |   |                     |     |   |   | 323.9mm            | to <660mm          |          |          |
| 2.                                       | <b>Abandonment Preparation</b> <sup>12</sup> Factors combine 2a and 2b, applicable to all km of pipe, removed or left-in-place. |                     |     |   |   |                    |                    |          |          |
| 2a.                                      | Land access and clean up  | A                   | R   | Access rights & permits, temporary work space, damages, re-establish survey markers, as-built survey, update GIS, discharge rights.   | Unit Cost per kilometer   | Pipe diameter      |                    |          |          |
|  |   |                     |     |   | Range   | low                | \$4,000            | \$6,000  | \$12,000 |
|  |   |                     |     |   |   | high               | \$6,000            | \$16,000 | \$18,000 |
| 2b.                                      | Pipeline Purging and Cleaning   | A                   | R   | Pump or draw down gas; Pipeline pigging, cleaning and purging, including pre-cleaning pig runs. Isolate pipe sections, test pipe for cleanliness. Final cleaning pig runs (in N <sub>2</sub> ), waste storage and disposal. Cleanliness verifications (testing and analysis). <sup>13</sup> | This factor may be strongly influenced by pipeline terrain and by the product shipped. Those using the Base Case may choose to refine their estimates as follows: |                    |                    |          |          |
|  |   |                     |     |   | <b>Pipeline Terrain</b>   | <b>Gas Shipped</b> | <b>Oil Shipped</b> |          |          |
|  |   |                     |     |   | Flat or downhill  | Low end            | Mid Range          |          |          |
|  |   |                     |     |   | Mountainous or uphill   | Mid range          | High End           |          |          |
| 3  | <b>Pipeline Abandonment-in-Place</b>  |                     |     |   |   |                    |                    |          |          |
| 3a.                                      | Basic Pipeline Abandonment-in-Place   | A                   | n/a | Install plugs to prevent water movement, removal of some underground appurtenances, backfilling and reclamation of dig sites. <sup>14</sup> At the 9 September 2010   | Applicable to all km left-in-place.   |                    |                    |          |          |
|  |   |                     |     |   | Unit Cost per kilometer. Unit costs depend less on pipe diameter and more on distance between plugs. High end of range is more applicable for challenging         |                    |                    |          |          |

<sup>12</sup> The a and b breakdowns in some Broad Categories were expected to only be necessary until further exploration of dollar values for costs took place. Current estimates have removed some of the (a) and (b) breakdowns.

<sup>13</sup> Pigging costs are dependent on the pipeline length and volume (i.e., the square of pipe diameter). Estimates shown take the volume into account.

<sup>14</sup> The number of plugs to be used is related to the length and angle of the slope, soil type and land use. In theory, the cost of plugs is dependent on volumes of material to be used, and therefore could be related to pipeline diameter squared. However crew mobilization drives costs more than pipeline volume, and the pipe diameter distinction has been removed.

| Amended Table A-3                        |   |          |             |  |   |                    |                      |
|--|---|----------|-------------|--|---|--------------------|----------------------|
| Table A-3 Base Case Cost Definition Grid |   |          |             |  | December 2010   |                    |                      |
| Broad Category                           | Method <sup>9</sup>                       |          | May Include |  | Estimated Cost Factor Value <sup>10</sup> (2010 C\$)  |                    |                      |
|  |   |          |             | meeting, parties discussed whether to include removal of underground appurtenances in category 3a or in 6. The estimates shown to the right include removal of underground appurtenances.  | terrain, with more frequent plugs.  |                    |                      |
|  |   |          |             |  | Range   | Low<br>High        | \$10,000<br>\$25,000 |
| 3b.                                      | Provision for Post abandonment activities | A and A+ | n/a         | Financial provisions for periodic monitoring and for contingencies, such as later removal of some pipeline/associated facilities if problems occur.<br><br>Events include subsidence issues, pipe rising to surface, or discovery of contamination <sup>15</sup> | See footnote for description of approach. <sup>16</sup>   |                    |                      |
|  |   |          |             |  | Assumed annual monitoring costs \$100,000 per 500 km pipe.  |                    |                      |
|  |   |          |             |  | Pipe diameter   | Small Medium Large |                      |
|  |   |          |             |  | Assumed # of Events per year per 100 km   |                    |                      |
|  |   |          |             |  |   | 0.5 0.5 0.5        |                      |
|  |   |          |             |  | Assumed ratio of Event to unit cost 5(a&b) of planned removal & restoration of 1 km of right-of-way |                    |                      |
|  |   |          |             |  |   | 0.1 0.2 0.3        |                      |

<sup>15</sup> Includes line locations, as needed, maintain signage, erosion and subsidence, frost heave control, pipe displacement at slopes or river crossings, remediation of contamination, the creation of waterways, or soil drainage problems, weed control (where not dealt with under easement agreements), or any other problem caused by the presence of a pipeline.

<sup>16</sup> Annual monitoring is set at \$200 per km based on the assumption shown in the table. An annuity factor (66:1) is applied to derive the initial financial provision at the time of abandonment to fund each dollar needed over the subsequent years, with inflation, i.e., an initial amount of \$66 is required to generate an annual flow of \$1 per year, inflating. This factor 66 uses the 1.5 per cent (3.5 per cent return on funds less the 2 per cent inflation) set out in the 4 March 2010 Revised Base Case. As a result \$13,333 per km should be set-aside at the time of abandonment to cover future monitoring of pipe left in-place.

Contingency is (the number of remediation events per year per km of pipe left-in-place) x (the cost of one remediation event relative to the average cost of one km of planned removal for that pipe diameter). This average annual contingency amount is grossed up with the 20 per cent project management and engineering applicable to small projects. The result is an average annual contingency allowance of \$105, \$700 and \$1255 per km for small, medium and large diameter pipe respectively. These annual estimates are multiplied by the same 66:1 annuity factor as above to derive the amount needed at the time of abandonment.

Combining the monitoring and contingency amounts result is the \$20,000, \$60,000 and \$97,000 respectively for the pipe diameters as shown in the table.

| Amended Table A-3                        |  |                     |     |   |  |          |          |          |          |
|--|--|---------------------|-----|---|--|----------|----------|----------|----------|
| Table A-3 Base Case Cost Definition Grid |  |                     |     |   | December 2010  |          |          |          |          |
|  | Broad Category   | Method <sup>9</sup> |     | May Include   | Estimated Cost Factor Value <sup>10</sup> (2010 C\$)   |          |          |          |          |
|  |  |                     |     |   | Resulting Estimate of Provision, in \$ per kilometer   |          |          |          |          |
|  |  |                     |     |   |  | \$20,000 | \$60,000 | \$97,000 |          |
| 4  | Special treatment  | A+                  | n/a | Until possible future clarification from the NEB on any differences between default handling at river crossings and at other crossings, use the low end of 'cut, cap and fill' range provided for road, rail and utility crossings. | Pipe diameter  | Small    | Medium   | Large    |          |
|  |  |                     |     | Unit cost per crossing of utility corridor  |  |          |          |          |          |
|  |  |                     |     | Cut, cap and fill with cellular material at crossings – road, rail, utility. <sup>17</sup>  | Range  | Low      | \$30,000 | \$35,000 | \$50,000 |
|  |  |                     |     |   |  | High     | \$45,000 | \$60,000 | \$85,000 |
|  | Other environmentally sensitive areas. Further study is needed on types of environmentally sensitive areas, appropriate treatment and costs. |                     |     | Until further study is done, a placeholder unit cost of \$50,000 per km of environmentally sensitive area may be used for all pipe diameters.   |  |          |          |          |          |
| 5  | <b>Pipeline Removal</b>  |                     |     |   |  |          |          |          |          |
| 5a                                       | Pipeline Removal and backfilling   | n/a                 | R   | Remove impediments and topsoil stripping, excavation, cutting and capping of pipelines, cutting of pipeline sections and removal to stockpile, loading and hauling of removed   | Cost applicable where pipe removed. Apply 100 % of the unit cost for the first pipe and 25 % of the unit cost for subsequent pipe, owned by the same company, in the same ditch. <sup>18</sup> |          |          |          |          |

<sup>17</sup> Fill volume (or pipeline volume) depends on crossing length and pipeline diameter squared. Unit cost of concrete, if used, depends on the hauling distance from the batching plant. Remote locations would attract costs at the higher end of the range. The low end of the range is only applicable where the majority of the fill locations are close to fill sources.

<sup>18</sup> For example, for a 10km ditch with 2 parallel large diameter pipes the calculation would be: 10km x \$450,000 + 10km x (\$450,000x0.25)

| Amended Table A-3                        |                                     |                     |   |  |   |                                   |           |           |           |
|--|-------------------------------------|---------------------|---|--|---|-----------------------------------|-----------|-----------|-----------|
| Table A-3 Base Case Cost Definition Grid |                                     |                     |   |  | December 2010   |                                   |           |           |           |
|  | Broad Category                      | Method <sup>9</sup> |   | May Include  | Estimated Cost Factor Value <sup>10</sup> (2010 C\$)  |                                   |           |           |           |
|  |                                     |                     |   | lines, disposal of lines, coating and associated facilities, backfill, compaction. Mobilization and demobilization may further increase costs, particularly for remote areas.  | Diameter of largest pipe in ditch   | Small                             | Medium    | Large     |           |
|  |                                     |                     |   |  | Unit cost per kilometre of pipe.  |                                   |           |           |           |
|  |                                     |                     |   |  | Range   | Low                               | \$100,000 | \$300,000 | \$450,000 |
|  |                                     |                     |   |  |   | high                              | \$250,000 | \$800,000 | \$900,000 |
| 5b                                       | Pipeline Removal – land restoration | n/a                 | R | Restoration, reclamation and remediation of contamination, fencing and clean-up, soil decompaction, re-vegetation, inspection of removal activities. <sup>19</sup>   | Costs to restore simpler terrain are assumed to be already included in averages for 5a above, rough or mountainous terrain may add a further 10-15 % to costs estimated for category 5a |                                   |           |           |           |
| <b>6 Above-Ground Facilities</b>         |                                     |                     |   |  |   |                                   |           |           |           |
| 6a.                                      | All above-ground                    | A                   | R | Purging and cleaning piping and fabrications. Site reclamation, (remediation of contamination, re-contouring, replacement of topsoil, re-vegetation). This includes restoration of land as close as possible to the surrounding land | 6 (a) and (b) applicable to all above-ground facilities.  | Range \$ per unit except as noted |           |           |           |
|  |                                     |                     |   |  |   | Low                               |           | High      |           |
|  |                                     |                     |   |  | Block valve assemblies  | \$15,000                          |           | \$55,000  |           |
|  |                                     |                     |   |  | Meter station (gas)   | \$ 50,000                         |           | \$250,000 |           |

<sup>19</sup> Clearing, stripping and grading work is related to the width of right-of-way and temporary work space. Excavation and backfilling depends on to the pipeline volume and depth of cover. Pipeline cutting, removal, loading, hauling and disposal depend on pipeline diameter and wall thickness.

| Amended Table A-3                        |                        |                     |     |   |   |   |                   |
|--|------------------------|---------------------|-----|---|---|---|-------------------|
| Table A-3 Base Case Cost Definition Grid |                        |                     |     |   | December 2010   |   |                   |
|  | Broad Category         | Method <sup>9</sup> |     | May Include   | Estimated Cost Factor Value <sup>10</sup> (2010 C\$)                        |   |                   |
|  |                        |                     |     | Excludes the value of any above-ground facilities that may be salvaged and re-used.   | Meter station (oil) <sup>20</sup>   | \$ 50,000   | \$500,000         |
|  |                        |                     |     |   | Maintenance Base  | \$50,000  | Could be salvaged |
| 6b                                       | Portions removed       | n/a                 | R   | Demolition (as applicable), haul material away<br>Removal of associated underground tanks.  | Compressor station per mw <sup>21</sup><br><i>Applicable to stations of</i> | <i>Under 5mW, use up to \$400,000 for over 5mW, use up to \$120,000</i> |                   |
|  |                        |                     |     |   | Pump Station <sup>22</sup>  | \$300,000   | \$1,500,000       |
| 6c                                       | Portions left in-place | A                   | n/a | Securing any facilities left in-place. (Not applicable, as all above-ground, to be removed)   | Other facilities <sup>23</sup><br>Reclamation <sup>24</sup>                 |   |                   |
| 7  | Contingency            |                     |     | Contingency allowances are influenced by many factors, including the quality of the project cost estimate. Companies using the Base Case Unit Costs should apply a contingency factor as shown, as each of the individual Unit Cost estimates has considerable uncertainty in its estimation. | Applicable to estimates flowing from cost factors 2, 3a, 4, 5(a&b) and 6.   | approximately 25%   |                   |

<sup>20</sup> The low end of the Unit Cost range is only appropriate where there are no additional facilities at any oil meter stations in a pipeline system.

<sup>21</sup> Industry suggests using unit cost per installed horsepower/megawatts, with range to cover electric, gas or other turbines. Scope includes all units, yard piping, concrete foundations to 1m below grade, buildings removed

<sup>22</sup> Factors affecting this cost could be number of pumps, number of buildings and types of foundations.

<sup>23</sup> Companies should also provide estimates for other above-ground facilities not listed here, such as gas plants, batteries; tanks or tank farms; booster pumps, sending and receiving pipeline barrel assemblies, communication facilities, power generation equipment, or other above-ground facilities. These are not listed in the table, as no generic estimates are yet available these facilities.

<sup>24</sup> Site reclamation is assumed to be included in the unit costs for above-ground facilities shown.

Some reminders regarding the use of this guidance for filing estimates of pipeline abandonment costs:

- Where cost ranges are provided, a company relying on the Base Case should use a Unit Cost approximately in the middle of any range provided, unless they have reason to support selecting a Unit Cost elsewhere in the range.
- The pipeline company remains responsible for appropriate financial preparation for future abandonment activities. (see RH-2-2008)

Table A-4

**Step 4:** Add up the rows of estimated costs to get total estimated costs

| Table A-4<br>Total Estimated costs   |   |                      |     |                                 |                            |                                |
|--|---|----------------------|-----|---------------------------------|----------------------------|--------------------------------|
|  | Broad Category                            | Method <sup>25</sup> |     | Pipeline Features <sup>26</sup> | Average Cost <sup>27</sup> | Cost by Category <sup>28</sup> |
| 1  | Engineering & Project Management          | A                    | R   | n/a                             | E.g. 20-30 %               |                                |
| 2  | <b>Abandonment Preparation</b>            |                      |     |                                 |                            |                                |
| a.   | Land access and clean up                  | A                    | R   | X (Km)                          |                            |                                |
| b.   | Pipeline Purging and Cleaning             | A                    | R   |                                 |                            |                                |
| 3  | <b>Pipeline Abandonment-in-Place</b>      |                      |     |                                 |                            |                                |
| a.   | Basic Pipeline Abandonment-in-Place       | A                    | n/a | Y (Km)                          |                            |                                |
| b.   | Provision for Post abandonment activities | A and A+             | n/a | Y+ ST (Km)                      |                            |                                |
| 4  | Special treatment                         | A+                   | n/a | ST (Km)                         |                            |                                |
| 5  | <b>Pipeline Removal</b>                   |                      |     |                                 |                            |                                |
| a.   | Pipeline Removal and backfilling          | n/a                  | R   | X - (Y+ST) (Km)                 |                            |                                |
| b.   | Pipeline Removal – land restoration       | n/a                  | R   |                                 |                            |                                |
| 6  | <b>Above-ground facilities</b>            |                      |     |                                 |                            |                                |
| a.   | All facilities                            | A                    | R   | ___C_ #                         |                            |                                |
| b.   | Portions removed                          | n/a                  | R   | ___C_ #                         |                            |                                |
| c.   | Portions left in-place                    | A                    | n/a | ___ #                           |                            |                                |
| <b>Total Cost (e.g. in 2010 dollars) for future abandonment activities</b> |   |                      |     |                                 |                            |                                |

For example, for a 425 km pipeline with 25 km under roads, and 3 compressors:

- X = 425 km

<sup>25</sup> Method A, A+ or R respectively: Abandon in-place; Abandon in-place with special treatment; and Removal.

<sup>26</sup> Either linear kilometres or count by facility type. Table A-2 facilitates estimating the entries to this column.

<sup>27</sup> Entries in this column may come from Table A-3 when available.

<sup>28</sup> If using the Base Case cost assumptions, entries in this column are the product of the previous two columns. If using pipeline specific cost estimation, enter the total for each category.

- $Y = 320$  km, or 80 % (X-ST) using 80 % of 400 from Table A-2
- $ST = 25$  km
- $X - (Y + ST) = 80$  km, or  $425 - (320 + 25)$
- The 3 compressors to be removed would be entered as C.