

# **EQUALIZATION PROCEDURES GUIDE**

DEVELOPED ON BEHALF OF  
THE CANADIAN CRUDE AND CONDENSATE SHIPPERS  
AND APPLIED BY THE EQUALIZED  
TERMINALS AND PIPELINES

EQUALIZATION STEERING COMMITTEE

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# The Canadian Crude Oil and Condensate Quality Equalization Process Procedures Guide

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## **EQUALIZATION PROCEDURES GUIDE**

### **DEFINITIONS**

**Butane**: Either of two isomers of a gaseous hydrocarbon, C<sub>4</sub>H<sub>10</sub>, extracted from natural gas or refinery gas streams. It includes isobutane and normal butane and is designated in ASTM Specification D1835 and Gas Processors Association Specifications for commercial butane. For purpose of the butane penalty, the butane content volume % term will refer to sum of C4 and lighter (C4-). This incorporates methane (C1) + ethane (C2) + propane (C3) + butanes (C4s isobutene and normal butane).

C3-: Sum of the volume % methane plus volume % ethane plus volume % propane contained in the condensate.

C4-: For purposes of the butane penalty, C4- content consists of the sum Butane content plus three (3) times the C3- content. i.e.  $C4- = (\text{volume \% Butane} + 3 \times \text{volume \% C3-})$

**COLC**: The Crude Oil Logistics Committee came into being in December, 1992 as a decision making body of crude oil and condensate producers and shippers; gathering and feeder pipeline and trunk line operators; truck and pipeline terminal operators; custom treater and cleaning plant operators; industry regulators; and, industry associations for the effective and efficient management of the western Canadian crude oil and segregated condensate logistics system.

**Enbridge**: Enbridge Pipelines Inc. (for the purposes of this document, Enbridge refers to the mainline system).

**Equalization**: An industry mechanism for making adjustments to the value of individual deliveries made to a commingled crude or condensate stream based on the difference in quality between the delivered quality and the calculated weighted average quality of the stream. The sum of all the equalization credits and debits within the month are by definition zero at an Equalized Facility to minimize financial gains or losses to the Shippers due to the commingling of the crude oil or condensate. The size of the credits or debits must reflect the market value of the crudes or condensates that comprise the combined stream to avoid the creation and/or distortion of value.

**Equalization Steering Committee**: The Equalization Steering Committee consists of a minimum of six elected Shipper representatives who coordinate and advise on the equalization process.

**Equalized Facility**: An Equalized Facility is defined as a pipeline, battery or terminal handling crude oil or condensate where equalization is applied.

**Settlement Date**: The business day on or closest to the 25<sup>th</sup> day of the month following the month of delivery.

**Shipper**: A Shipper is defined as a corporate entity, which is active in the movement of crude oil or condensate, on any equalized system administered under this Guide.

**WADE**: Weighted Average Differential Factor. A value assigned to each crude or condensate based on its sulphur and density and which reflects its value relative to a reference crude or condensate quality (see Attachment 7).

## **EQUALIZATION PROCEDURES GUIDE**

The procedures contained in this Equalization Procedures Guide (Guide) provide the mechanism used by all batteries, terminals and pipelines that operate under this Guide for quality equalization of light and medium commingled crudes (crude oil), and of condensate.

This document is provided as a guide only. Careful consideration must be given to all aspects of any transaction or agreement entered into based upon the principles and procedures set out below. Qualified advice should be sought in all instances. Since the rights and obligations of the parties can only be determined by an examination of the specific agreement into which the parties have entered, great care must be taken in the preparation of any agreement based on this Guide. The Equalization Steering Committee trusts that this Guide will be of valuable assistance to the reader. The Equalization Steering Committee shall not be responsible for any loss or damage attributed to any use of, or reliance upon, this Guide.

The purpose of Equalization is to credit or debit Shippers for the quality, and hence the value, of crude oils or condensates, they deliver into a pipeline system compared with the average quality of all crude oils or condensates, delivered into that system within the same time period.

### **1.0 GUIDING PRINCIPLES OF EQUALIZATION**

#### **1.1 Equalization Principles**

The following key principles are utilized for establishing and governing the equalization process:

- 1) The equalization quality adjustment is intended to reflect “market value”. Market value for crude oil is determined by using the methodology described in Attachment 1. Market value for condensate is determined by using the methodology described in Attachment 2.
- 2) It is not the intention of the equalization process to create or distort market opportunities or activities.
- 3) The Equalization Procedures Guide outlines the operational procedures that are followed to manage the equalization process.

#### **1.2 Rights and Responsibilities of a Shipper**

- 1) All Shippers who participate in the equalization process have the right to vote on any equalization issue.
- 2) Voting shall take place by ballot, signed by the Shipper’s designated representative. The results of the vote shall be conclusive and binding. Attachment 6 outlines the form of ballot that shall be used for the voting process.
- 3) If a Shipper elects not to vote or abstain from voting on any matter, the voting record shall show such Shipper as having abstained or failed to vote.
- 4) Any Shipper may withhold its vote on any issue affecting equalization; however, the results of the vote will be binding upon that Shipper.

- 5) The Shipper agrees to be bound by the Equalization Procedures Guide as amended from time to time. Amendments will be the result of a favorable vote by Shippers, and will be implemented in the month following a successful vote, or as otherwise agreed.
- 6) Shippers have the right to bring issues and/or concerns, in writing, to the Equalization Steering Committee for evaluation and to receive a fair and objective analysis of their issues and/or concerns. At the option of the Equalization Steering Committee, Shippers will retain responsibility for voicing these issues and/or concerns to other Shippers.
- 7) Equalization statements should be issued and paid in accordance with the procedures provided in this document.

### **1.3 Representation on the Equalization Steering Committee**

Shippers will nominate a representative to serve a two-year term on the Equalization Steering Committee. From those nominated, the Equalization Steering Committee will coordinate a vote to select three new representatives each year, thus providing continuity as three representatives will be serving their second year while three new ones will be in their first year. The preference of the Equalization Steering Committee is that two of the elected representatives will represent refiners, who are also Shippers; two will represent producers, who are also Shippers; and two will represent marketers, who are also Shippers. In the event that there are not candidates available to allow for this representation, the Equalization Steering Committee will ensure that the representation provides for at least one representative from each of refiners, producers, and marketers.

If an individual that is elected by the Shipper is unable to serve out the full term, the Shipper will replace that representative with an alternate who will continue to represent the Shipper through the balance of the term.

The Equalization Steering Committee will also endeavour to find a maximum of two representatives from pipeline operators as non-voting participants. CAPP and a third-party consultant will also have a representative on the Committee.

Each year the Equalization Steering Committee representatives will select a chairperson and secretary.

Each Shipper whose representative serves on the Equalization Steering Committee will pay that representative's expenses.

Each Shipper is expected to take its turn as a member of this committee.

#### **1.3.1 Mandate of the Equalization Steering Committee**

The mandate of the Equalization Steering Committee is to coordinate and advise on the equalization process by:

- 1) Ensuring that the principles of equalization are maintained.

- 2) Ensuring that the data required to recalculate the equalization scales are maintained and that the procedure for updating the scales is followed. For crude oil, the Equalization Steering Committee will provide the revised quality adjustment scale 15 days prior to the effective date as further detailed in Attachment 1. (Effective December 2014 industry voted to continue with existing scale indefinitely with an annual review).
- 3) For condensate, the Equalization Steering Committee will endeavour to provide the revised quality scale by the 10th business day of the month following the month of application as further detailed in Attachment 2.
- 4) Drafting updates to the equalization procedures as necessary and presenting these revised procedures to Shippers for acceptance.
- 5) Ensuring that Shippers' and Facilities' concerns/issues are addressed or directed to the appropriate parties for consideration in a timely manner.

#### **1.4 Role of the Canadian Association of Petroleum Producers (CAPP)**

CAPP will:

- 1) Maintain the database of pricing and quality data that is required to administer the equalization process.
- 2) Provide the semi-annual calculation of the Crude Oil Equalization Scale, and the monthly calculation of the Condensate Equalization Scale.
- 3) With the approval of the Equalization Steering Committee, issue the revised Crude Oil and Condensate Equalization Scales.
- 4) Facilitate communication with the industry on behalf of the Equalization Steering Committee.

#### **1.5 Role of Consultant**

A consultant will, as necessary, be engaged by the Equalization Steering Committee to:

- 1) Advise the Equalization Steering Committee on technical matters related to the equalization process.
- 2) Undertake any studies that industry or the Equalization Steering Committee deems necessary.

#### **1.6 Equalized Facilities Responsibilities**

The Role of an Equalized Facility is to:

- 1) Report to Shippers, equalizations which follow the procedures and timetables established by the Equalization Steering Committee.



- 2) Calculate equalization values using formulas established and updated occasionally by the Equalization Steering Committee.
- 3) Administer the collection and disbursement of equalization charges and payments made in accordance with procedures outlined in the Equalization Procedures Guide. The cost of administration of the equalization process is a Shipper cost separate from the transportation costs. Reasonable equalization administration costs may be added to the equalization charge and payments.
- 4) Estimate a recalculated equalization for crude oil for the month prior to implementing a new scale. More specifically, at the end of February and August, the Equalized Facility should issue a recalculated equalization for January and July respectively (effective December 2014 industry voted to continue with existing scale indefinitely with an annual review).

### **1.7 Notification of Shipper Meetings**

When a meeting of Shippers is required by the Equalization Steering Committee, written notice of that meeting shall be distributed to Shippers at least ten (10) business days prior to such meeting. Notice shall include a reasonable description of the matters to be considered at the meeting.

### **1.8 Procedure for Equalization**

The Equalization Procedures Guide outlines the operating procedures that will be followed for quality equalization on affected facilities. The Equalization Steering Committee will publish semi-annually, the Crude Quality Equalization Scale (effective December 2014 industry voted to continue with existing scale indefinitely with an annual review) , and will publish monthly the Condensate Quality Equalization Scale.

CAPP will maintain a webpage that includes the Equalization Procedures Guide, the current Crude Oil and Condensate Equalization Scales, the current versions of the Crude Oil and Condensate Equalization Calculation Models, historical scale values, and a list of the current Equalization Steering Committee members.

<http://www.capp.ca/library/relatedLinks/Pages/EqualizationSteeringCommittee.aspx#AgEODm0ihJGN>

### **1.9 Finance**

All costs, such as consulting fees and studies, will be shared equally by crude oil shippers.

## 2.0 CRUDE OIL EQUALIZATION PROCEDURES

### 2.1 Methodology

The methodology used for equalization across all systems is:

- 1) Each Equalized Facility will pass on its calculated density, sulphur, and equalization differential for the total stream to the Downstream Level. In turn, the Downstream Level will incorporate this calculated upstream differential directly into its equalization (see Attachment 7 for a full description of the Weighted Average Differential Factor (WADF)).
- 2) Each Equalized Facility performing an equalization will issue an equalization statement on a timely basis, as defined below. A typical equalization statement is illustrated in Attachment 8a.

Timely is defined as follows:

- All Equalized Facilities except Enbridge: Statements are to be received by Shippers within one month of the production month.
  - Enbridge: Statements are to be received by Shippers within six weeks of the production month. The two-week extension is allowed to facilitate incorporation of actual calculated differentials from feeder pipelines into the Enbridge equalization statement.
  - See Section 2.4 Timing, for details.
- 3) If the calculated differential from an Upstream Level is unavailable at the required time, see Section 2.4.4: Procedure for Failure to Meet Weighted Average Differential Factor (WADF) Deadline

### 2.2 Scales

Scales will be calculated in accordance with the methodology, as presented in Attachment 1. Scale updates will be issued by e-mail to industry and they will be published on the Equalization website. (effective December 2014 industry voted to continue with existing scale indefinitely with an annual review).

<http://www.capp.ca/library/relatedLinks/Pages/EqualizationSteeringCommittee.aspx#AgEODm0ihJGN>

For the density scale:

- If density is less than 800 kg/m<sup>3</sup>, the density penalty will increase for lighter crudes;
- If density is equal or greater than 800 kg/m<sup>3</sup> but less than or equal to 825 kg/m<sup>3</sup>, there will be no density penalty;
- If the density is greater than 825 kg/m<sup>3</sup>, the penalty will increase for heavier crudes.

For the sulphur scale:

- If the sulphur is greater than 0.5 wt% the penalty will increase for higher sulphur crudes.
- If the sulphur is less than 0.5 wt%, the penalty reverts to a credit.

## 2.3 Federal Goods and Services Tax (GST)

The equalization process is subject to the federal Goods and Services Tax (GST). As a result, equalizing systems should apply GST to all equalization charges/credits and service fees. GST charges/credits should be identified separately.

## 2.4 Timing

Equalization must be timely to ensure that Shippers do not build up excessive liabilities or credits. The schedule outlined below has been developed to ensure that all equalization payments and receipts are completed within two months of the production month.

### 2.4.1 Definitions Used in Timing Procedures

#### Facility Definitions

Facilities that are uncertain to the “Level” under which they operate should contact the downstream facility to confirm their respective “Level”. For clarification of these levels, please refer to the example in Attachment 3.

- Level 1 (L1) Facility – An Equalized Facility which flows into an equalized Enbridge Stream. (Gibson Hardisty Terminal in Attachment 3)
- Level 2 (L2) Facility – An Equalized Facility which flows into an L1 Facility (Hamilton Lake Pipeline in Attachment 3)
- Level 3 (L3) Facility – An Equalized Facility which flows into an L2 Facility (Gibson Throne Terminal in Attachment 3)

Downstream Level is the downstream pipeline or gathering facility from an Equalized Facility.

Upstream Level is the upstream pipeline or gathering facility from an Equalized Facility.

#### Month Definitions

Month 1 Production Month – the calendar month the crude being equalized was physically shipped

Month 2 Accounting Month – the month following production month

Month 3 Payment Month – the month following the accounting month

### 2.4.2 Timing Procedures

**NOTE: Each Facility is required to follow the reporting deadlines within the Crude Oil Logistics Committee (COLC) Reporting Calendar to determine its deadline(s) for each month.** Please refer to <http://www.colcomm.com/calendars.aspx> L3 Facilities are required to pass on their stream equalization WADFs to L2 Facilities by 4:00 p.m. on the 3rd business day following COLC Shippers Balance deadline of Month 2, as reflected in the COLC Reporting Calendar.

- L2 Facilities are required to pass on their stream equalization WADFs to L1 Facilities by 4:00 p.m. on the 5th business day following COLC Shippers Balance deadline of Month 2, as reflected in the COLC Reporting Calendar.
- L1 Facilities are required to pass on their stream equalization WADFs to Enbridge by 4:00 p.m. on the 3rd last business day of Month 2, as reflected in the COLC Reporting Calendar.

- L1 through L3 Facilities will issue equalization invoices to Shippers on or before the final business day of Month 2, as reflected in the COLC Reporting Calendar.
- Enbridge will report stream equalization WADFs to Shippers by 4:00 p.m. of the last business day of Month 2, as reflected in the COLC Reporting Calendar.
- Enbridge will issue equalization invoices to Shippers by no later than 4:00 p.m. on or before the 9th business day in Month 3, as reflected in the COLC Reporting Calendar.

\*Shippers Balance: In the absence of a Shippers Balance the WADF reporting deadlines will follow to the Shippers Balance deadline as reported in the COLC Reporting Calendar.

### **2.4.3 Equalization Payment Timing**

- 1) For all Facilities except Enbridge:
  - a) Each Shipper owing money into the equalization at a Facility must submit a payment, which will be received by the Facility on or before the 5th business day before Settlement Date in Month 3. Specific dates can be found in the COLC Reporting Calendar <http://www.colcomm.com/calendars.aspx>
  - b) A Facility will wait until all payments have been received before issuing any payment for that Facility. Subject to this, the Facility will issue payments to Shippers on the Settlement Date of Month 3. Specific dates can be found in the COLC Reporting Calendar <http://www.colcomm.com/calendars.aspx>
  - c) In the event that all payments have not been received, the Facility will notify all affected Shippers to establish a course of action.
- 2) For Enbridge:
  - a) Each Shipper owing money into the equalization must submit a payment, which will be received by Enbridge on or before the 5th business day before the last business day in Month 3. Specific dates can be found in the COLC Reporting Calendar. <http://www.colcomm.com/calendars.aspx>
  - b) Enbridge will wait until all payments have been received before issuing any payments. Subject to this, Enbridge will issue payments to Shippers on the last business day in Month 3. Specific dates can be found in the COLC Reporting Calendar. <http://www.colcomm.com/calendars.aspx>
  - c) In the event that all payments have not been received, Enbridge will notify all affected Shippers to establish a course of action.

### **2.4.4 Procedure for Failure to Meet Weighted Average Differential Factor (WADF) Deadline**

- 1) Default WADF

In the case where a WADF is not submitted to the Downstream Level by the required reporting deadline, the Downstream Level may apply a Default WADF based on the volume weighted rolling average of the three

most recent actual weighted average differentials from the subject Upstream Level to enable it to proceed with its necessary calculation. If this is not acceptable to the parties involved, an alternate, fair and equitable methodology may be adopted with the agreement of the parties.

Upon resolution, the Equalized Facility(ies) must notify any affected parties.

For a new delivery, during the initial months, if the required rolling average differential and the three previous actual differentials are unavailable, the most recent actual differential will be used or, failing that, a measured quality or, failing that, a default penalty that is consistent with the standard of the Downstream Level.

Example of the calculation of a volume weighted rolling average where an Upstream Level has failed to provide its stream equalization WADFs to a Downstream Level:

Production Month	Volume Delivered (m3)	Upstream WADF*	Value (\$/m3)
Mar xxxx	20,000	\$1.10	\$22,000
Apr xxxx	18,000	\$1.05	\$18,900
May xxxx	<u>21,000</u>	\$1.00	<u>\$21,000</u>
	59,000		\$61,000

June Default WADF = \$1.03/m3 (\$61,000/59,000)

\*actual WADFs submitted in the previous three months by the Upstream Level

#### **2.4.5 Procedure for Weighted Average Differential Factor (WADF) Discrepancies**

The onus is on the Upstream Level to ensure the WADF properly represents the actual stream quality. In the case where a WADF is provided by the required deadline but the Downstream Level finds a significant discrepancy between the submitted WADF and the tested quality, refer to the Testing Laboratory Quality Procedures in Attachment 4.

#### **2.4.6 Zero-Balance Process Maintained at the Downstream Level**

The intent of the equalization process is to maintain a zero-balance process at the Downstream Level. Any financial gains/losses realized by the Downstream Level when it applies a Default WADF to the Upstream Level are to be distributed proportionately, through the equalization process, to Shippers at that level, based on each Shipper's volume shipped in the month in which the gain/loss was realized.

### **2.5 Revisions**

If an Equalized Facility becomes aware of a discrepancy between the equalization value originally reported, either by its own submission or via the Default WADF, versus the actual stream equalization value, on or before the Shippers Balance deadline in Month 3 (refer to Section 2.4.1), it shall, immediately process the revision and notify the Downstream Level and Enbridge Pipeline. All affected Equalized Facilities will revise their equalization values in month 3. For example, a revision to the December 2013 WADF will only be accepted until the January 2014 shipper balance deadline of February 18th, 2014.

Please refer to the COLC Reporting Calendar for the Shippers Balance deadline.

<http://www.colcomm.com/calendars.aspx>

## **2.6 Quality Measurements**

It is integral to the equalization process that the quality of all inputs is known. To capture stream quality accurately, a suitable sampling frequency must be established that reflects quality variations of the receipts. Each Equalized Facility must establish its sampling protocols.

All downstream facilities are responsible to measure qualities for upstream facilities at frequent intervals to enable comparison against calculated qualities. This information will be made available upon request by an affected party.

It is suggested that quality testing be completed in accordance with equalization quality testing standards as outlined in Attachment 4.

### **2.6.1 Sampling of Field Receipts and Deliveries from a Non-equalized Facility into an Equalized Facility**

Equalized Facilities will be responsible for coordinating and scheduling quality sampling and measurement of field receipts and for deliveries from a non-equalized facility. The Equalizing Facility is in the best position to administer this process as it has access to, and familiarity with, all system inputs. All lab analyses will be performed by a qualified laboratory following industry recognized test procedures (e.g. ASTM, API, etc.) The onus is on the upstream party to provide the lab analysis results to the Equalizing Facility. In the event that these results are not provided, the Equalizing Facility will provide the necessary lab analysis results.

The Equalization Steering Committee recommends that each Equalizing Facility establish a quality data file covering all Equalized Facility inputs to store records on all quality test results. The file will assist in establishing an ongoing quality testing program and enable the Equalized Facility to readily check new information/test results against existing data.

Parties have the right to witness any quality tests performed on field receipts and for deliveries from a non-equalized facility for equalization purposes on crude they deliver. The upstream party is responsible for advising an Equalizing Facility of the locations where it wishes to witness quality tests. The Equalized Facility shall give the party adequate notification of such quality test schedules. The recommended frequency of sampling is, at a minimum, once per year.

### **2.6.2 New Location**

For new input locations, where an upstream party has not submitted lab analysis results performed by a qualified laboratory following industry recognized test procedures (e.g. ASTM, API, etc.) to an Equalized Facility, the Equalization Steering Committee accepts the concept of a penalty quality if an actual measurement is not available by the time it is required for the facility to perform its equalization. The penalty

quality concept provides an incentive for the upstream party to ensure the quality test is performed as soon as possible. It is recommended that the Equalizing Facility make the upstream parties aware of the penalty quality prior to delivery from a new location.

There should be no retroactivity of quality data used in the equalization calculation. It is only required that systems incorporate the data they have received at the scheduled time they do their equalization. If facilities subsequently obtain new test data (e.g. from Producers) confirming a difference, the new data should be incorporated in the next month's equalization. However, if a facility inadvertently neglects data after receiving it on time, the onus is on the facility and Producers to assess whether a revision is required.

## **2.7 Limits**

2.7.1 All volumes that enter an Equalized Facility must be equalized according to the current scales and guidelines. This includes any volumes that leave an Equalized Facility to an un-equalized facility and subsequently re-enter.

- 1) Unless otherwise agreed to by Shippers, equalization shall incorporate all crudes shipped through the system as a commingled stream.
- 2) Consistency in the equalization process used, i.e., if a calculated equalization is used going into the facility, a calculated equalization is used exiting the facility. The same applies to a measured equalization.
- 3) Responsibility for initiating an equalization (on an un-equalized facility) resides with the Shippers at that facility.

Examples of typical equalization receipt points include:

- a) Truck Terminals: Individual receipts from trucked location
- b) Pipelines: Stream receipts from each gathering terminal, battery or well which is separately connected to the Pipeline
  - i) In situations where batteries are jointly connected to the Pipeline and have significantly different quality, the equalization may be extended to the individual battery level, provided system Shippers and the equalizing system agree. The equalization statement should uniquely identify each such battery which is assigned its own quality.

## **2.8 Reporting**

The following guidelines are intended to standardize and streamline the reports and provide necessary information to Shippers.

### 2.8.1 Information Access

- 1) The company performing the equalization will provide each Shipper on that facility with equalization data on the specific crude volume inputs by that Shipper and on the aggregate volumes input by all the facility Shippers at each input point.
- 2) Shippers are not entitled to data on crudes input into an equalized system by another Shipper, except in aggregate as noted above.

### 2.8.2 Receipt Point Reporting

- 1) Location identification. Should show operator code/name, field/facility name, legal description, and field and battery codes.
- 2) Density and sulphur measurements<sup>1</sup>. Headings should confirm units, with density expressed in kg/m<sup>3</sup> and sulphur in weight percent.
- 3) Qualities used in equalization calculations and reports should be rounded to the nearest 0.01% sulphur and to the nearest 0.1 kg/m<sup>3</sup> density.
- 4) Calculated quality differential \$/m<sup>3</sup>.
- 5) Test date and data source: The format for each inlet location is as follows:

**xyymm**

Where **x** is the data source and where **yyymm** is the year and month that the latest sample was taken.

The codes to be used for **x** are:

**A** – analysis or monthly volume weighted average

**E** – estimate

**P** – penalty quality (new location)

**W** – weighted average differential factor (WADF) (differential passed on from upstream system)

- 6) Calculated quality differential: Downstream systems are to round any calculated stream differentials received from upstream equalizations to the nearest 0.01 \$/m<sup>3</sup>. Instances where a default quality (rolling average differential) is used are to be clearly identified.
- 7) Total volumes by receipt points for both facility and Shipper.
- 8) Quality adjustment (volume x differential) for both system and Shipper.

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<sup>1</sup> An example of a sulphur calculation is included in Attachment 7



### 2.8.3 Report Calculations

- 1) Volume weighted averages for density and sulphur for the total stream. Required to periodically test the accuracy of quality data.
- 2) Total volume for both facility and Shipper.
- 3) Total dollar value of quality reductions for both facility and Shipper.
- 4) Volume-weighted average differential factors (WADFs) for both total stream and total Shipper volumes.
- 5) Equalization payment owing/receivable. Determined as total differential (Shipper minus stream) times Shipper volume.
- 6) Federal Goods and Services Tax (GST) owing or receivable.

In a large report, where the number of receipt points is extensive, it may be desirable to subtotal by field, area, or truck terminal and then calculate the total system on a summary page.

### 2.8.4 Report Packaging <sup>2</sup>

- 1) Reports and invoices should show the date of issue as well as the name and contact information of the person at the company performing the equalization.
- 2) Reports and invoices should indicate the most expeditious routing address for equalization payment cheques.
- 3) Each page of the report should indicate the equalization month and system name.
- 4) Reports should be stapled and pages numbered to ensure that it is complete and in order.

## 2.9 Expenses

The equalization process is a necessary part of the transportation service provided by the Equalized Facility. In principle, Shippers are prepared to pay reasonable charges to the equalizing companies to cover their necessary costs to administer the equalization system. Reasonable costs include charges for accounting manpower, computer time, printing, postage, and quality testing.

***The definition of “reasonable charges” is system specific and has to be agreed upon between the system and its Shippers.***

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<sup>2</sup> A sample Crude Equalization statement is shown in Attachment 8a

### 3.0 CONDENSATE EQUALIZATION PROCEDURES

#### 3.1 Methodology

The methodology used for equalization across all systems is:

- 1) Each Equalized Facility will pass on its calculated density, sulphur content, butane content, propane content, ethane content, methane content, and equalization differential for the total stream to the downstream facility. In turn, the downstream facility will incorporate this calculated upstream differential directly into its equalization (see Attachment 7 for a full description of the Weighted Average Differential Factor (WADF)).
- 2) Each Equalized Facility performing an equalization will issue an equalization statement on a timely basis, as defined below. A typical equalization statement is illustrated in Attachment 8b.

Timely is defined as follows:

- All Equalized Facilities except Enbridge: Statements are to be received by Shippers within one month of the production month.
  - Enbridge: Statements are to be received by Shippers within six weeks of the production month. The two-week extension is allowed to facilitate incorporation of actual calculated differentials from feeder pipelines into the Enbridge equalization statement.
  - See Section 3.4 Timing, for details.
- 3) If the calculated differential from an Upstream Level is unavailable at the required time, see Section 3.4.4: Procedure for Failure to Meet Weighted Average Differential Factor (WADF) Deadline

#### 3.2 Scales

Scales will be calculated in accordance with the approved methodology as presented in Attachment 2. Monthly scale updates will be issued by e-mail to all interested parties and they will be published on the CAPP website.

<http://www.capp.ca/library/relatedLinks/Pages/EqualizationSteeringCommittee.aspx#87yGJJbmMCPm>

For the density scale:

- If density is less than 750 kg/m<sup>3</sup>, the density penalty reverts to a credit for lighter condensates;
- If density is greater than 750 kg/m<sup>3</sup>, a penalty per density point above 750 kg/m<sup>3</sup> will be imposed.

For the sulphur scale:

- If the sulphur is greater than 0.2 wt% a penalty per sulphur wt% above 0.2 wt% will be imposed;
- If the sulphur is less than 0.2 wt%, the penalty reverts to a credit.

For the C4- Penalty Scale:

- For C4- greater than 5.0%vol the first 5.0%vol of the butane will receive condensate price, and the portion over 5.0%vol will receive no value. The Deemed C4- value will be calculated by multiplying the C3- value by 3 and adding this value to the C4 value.
  - Assume C3- value at 1.0% and C4 value at 3.5%
  - Deemed butane value =  $(1.0\% \times 3) + 3.5\% = 6.5\%$  C4-

### **3.3 Federal Goods and Services Tax (GST)**

The equalization process is subject to the federal Goods and Services Tax (GST). As a result, equalizing systems should apply GST to all equalization charges/credits and service fees. GST charges/credits should be identified separately.

### **3.4 Timing**

Equalization must be timely to ensure that Shippers do not build up excessive liabilities or credits. The schedule outlined below has been developed to ensure that all equalization payments and receipts are completed within two months of the production month.

#### **3.4.1 Definitions Used in Timing Procedures**

##### **Facility Definitions**

Facilities that are uncertain to the “Level” under which they operate should contact the downstream facility to confirm their respective “Level”. For clarification of these levels, please refer to the example in Attachment 3.

- Level 1 (L1) Facility – An Equalized Facility which flows into an equalized Enbridge Stream
- Level 2 (L2) Facility – An Equalized Facility which flows into an L1 Facility
- Level 3 (L3) Facility – An Equalized Facility which flows into an L2 Facility

Downstream Level is the downstream pipeline or gathering facility from an Equalized Facility

Upstream Level is the upstream pipeline or gathering facility from an Equalized Facility

##### **Month Definitions**

Month 1 Production Month – the calendar month the condensate being equalized was physically shipped

Month 2 Accounting Month – the month following production month

Month 3 Payment Month – the month following the accounting month

### 3.4.2 Timing Procedures

**NOTE: Each Facility is required to follow the reporting deadlines within the Crude Oil Logistics Committee (COLC) Reporting Calendar to determine its deadline(s) for each month. Please refer to <http://www.colcomm.com/calendars.aspx>**

- L3 Facilities are required to pass on their stream equalization WADFs to L2 Facilities by 4:00 p.m. on the 3rd business day following COLC Shippers Balance deadline of Month 2, as reflected in the COLC Reporting Calendar.
- L2 Facilities are required to pass on their stream equalization WADFs to L1 Facilities by 4:00 p.m. on the 5th business day following COLC Shippers Balance deadline of Month 2, as reflected in the COLC Reporting Calendar.
- L1 Facilities are required to pass on their stream equalization WADFs to Enbridge by 4:00 p.m. on the 3rd to last business day of Month 2, as reflected in the COLC Reporting Calendar.
- L1 through L3 Facilities will issue equalization invoices to Shippers on or before the final business day of Month 2, as reflected in the COLC Reporting Calendar.
- Enbridge will report stream equalization WADFs to Shippers by 4:00 p.m. of the last business day of Month 2, as reflected in the COLC Reporting Calendar.
- Enbridge will issue equalization invoices to Shippers by no later than 4:00 p.m. on or before the 9th business day in Month 3, as reflected in the COLC Reporting Calendar.

\*Shippers Balance: In the absence of a Shippers Balance the WADF reporting deadlines will follow to the Shippers Balance deadline as reported in the COLC Reporting Calendar.

### 3.4.3 Equalization Payment Timing

- 1) For all Facilities except Enbridge:
  - a) Each Shipper owing money into the equalization at a Facility must submit a payment, which will be received by the Facility on or before the 5th business day before Settlement Date in Month 3. Specific dates can be found in the COLC Reporting Calendar. <http://www.colcomm.com/calendars.aspx>
  - b) A Facility will wait until all payments have been received before issuing any payment for that Facility. Subject to this, the Facility will issue payments to Shippers on the Settlement Date of Month 3. <http://www.colcomm.com/calendars.aspx>
  - c) In the event that all payments have not been received, the Facility will notify all affected Shippers to establish a course of action.
- 2) For Enbridge:
  - a) Each Shipper owing money into the equalization must submit a payment, which will be received by Enbridge on or before the 5th business day before the last business day in Month 3. Specific dates can be found in the COLC Reporting Calendar. <http://www.colcomm.com/calendars.aspx>

- b) Enbridge will wait until all payments have been received before issuing any payments. Subject to this, Enbridge will issue payments to Shippers on the last business day in Month 3. Specific dates can be found in the COLC Reporting Calendar. <http://www.colcomm.com/calendars.aspx>
- c) In the event that all payments have not been received, Enbridge will notify all affected Shippers to establish a course of action.

**3.4.4 Procedure for Failure to Meet Weighted Average Differential Factor (WADF) Deadline**

1) Default WADF

In the case where a WADF is not submitted to the Downstream Level by the required reporting deadline, the Downstream Level may apply a Default WADF based on the volume weighted rolling average of the three most recent actual weighted average differentials from the subject Upstream Level to enable it to proceed with its necessary calculation. If this is not acceptable to the parties involved, an alternate, fair and equitable methodology may be adopted with the agreement of the parties.

Upon resolution, the Equalized Facility(ies) must notify any affected parties.

For a new delivery, during the initial months, if the required rolling average differential and the three previous actual differentials are unavailable, the most recent actual differential will be used or, failing that, a measured quality or, failing that, a default penalty that is consistent with the standard of the Downstream Level.

Example of the calculation of a volume weighted rolling average where an Upstream Level has failed to provide its stream equalization WADFs to a Downstream Level:

Production Month	Volume Delivered (m3)	Upstream WADF*	Value (\$/m3)
Mar xxxx	20,000	\$1.10	\$22,000
Apr xxxx	18,000	\$1.05	\$18,900
May xxxx	<u>21,000</u>	\$1.00	<u>\$21,000</u>
	59,000		\$61,000

June Default WADF = \$1.03/m3 (\$61,000/59,000)

\*actual WADFs submitted in the previous three months by the Upstream Level

**3.4.5 Procedure for Weighted Average Differential Factor (WADF) Discrepancies**

The onus is on the Upstream Level to ensure the WADF properly represents the actual stream quality. In the case where a WADF is provided by the required deadline but the Downstream Level finds a significant discrepancy between the submitted WADF and the tested quality, refer to Attachment 4.

### **3.4.6 Zero-Balance Process Maintained at the Downstream Level**

The intent of the equalization process is to maintain a zero-balance process at the Downstream Level. Any financial gains/losses realized by the Downstream Level when it applies a Default WADF to the Upstream Level are to be distributed proportionately, through the equalization process, to Shippers at that level, based on each Shipper's volume shipped in the month in which the gain/loss was realized.

### **3.5 Revisions**

If an Equalized Facility becomes aware of a discrepancy between the equalization value originally reported, either by its own submission or via the Default WADF, versus the actual stream equalization value, on or before the Shippers Balance deadline in Month 3 (refer to Section 2.4.1), it shall, immediately process the revision and notify the Downstream Level and Enbridge Pipeline. All affected Equalized Facilities will revise their equalization values in month 3. For example, a revision to the December 2013 WADF will only be accepted until the January 2014 shipper balance deadline of February 18th, 2014.

Please refer to the COLC Reporting Calendar for the Shippers Balance deadline.

<http://www.colcomm.com/calendars.aspx>

### **3.6 Quality Measurements**

It is integral to the equalization process that the quality of all inputs is known. To capture stream quality accurately, a suitable sampling frequency must be established that reflects quality variations of the receipts. Each Equalized Facility must establish its sampling protocols.

All downstream facilities are responsible to measure qualities for upstream facilities at frequent intervals to enable comparison against calculated qualities. This information will be made available upon request by an affected party.

It is suggested that quality testing be completed in accordance with equalization quality testing standards as outlined in Attachment 4.

#### **3.6.1 Sampling of Field Receipts and Deliveries from a Non-equalized Facility into an Equalized Facility**

Equalized facilities will be responsible for coordinating and scheduling quality sampling and measurement of field receipts and for deliveries from a non-equalized facility. The Equalizing Facility is in the best position to administer this process as it has access to, and familiarity with, all system inputs. All lab analyses will be performed by a qualified laboratory following industry recognized test procedures (e.g. ASTM, API, etc.) The onus is on the upstream party to provide the lab analysis results to the Equalizing Facility. In the event that these results are not provided, the Equalizing Facility will provide the necessary lab analysis results.

The Equalization Steering Committee recommends that each Equalizing Facility establish a quality data file covering all Equalized Facility inputs to store records on all quality test results. The file will assist in

establishing an ongoing quality testing program and enable the Equalized Facility to readily check new information/test results against existing data.

Parties have the right to witness any quality tests performed on field receipts and for deliveries from a non-equalized facility for equalization purposes on crude they deliver. The upstream party is responsible for advising an Equalizing Facility of the locations where it wishes to witness quality tests. The Equalized Facility shall give the party adequate notification of such quality test schedules.

- 1) The recommended frequency of sampling is:

Butane and lighter components:	Monthly
Density:	Monthly
Sulphur:	As deemed necessary, minimum once per year.
  
- 2) To arrive at the most cost-effective approach for the ongoing sampling of condensate quality, industry support has been given for the use of existing testing apparatus where these apparatus reliably provide accurate sampling data. These apparatus would include gas chromatographs, continuous flow composite samplers and pressurized containers or other similar systems agreed to by the respective systems and its Shippers.
  
- 3) To monitor the accuracy of condensate qualities shipped, random spot sampling is recommended to verify reporting accuracy. Any discrepancies are first to be reviewed with the Shipper and/or producer involved. In cases where an ongoing discrepancy exists, review of the discrepancy by the Equalization Steering Committee is encouraged.

### **3.6.2 New Location**

For new input locations, where an upstream party has not submitted lab analysis results performed by a qualified laboratory following industry recognized test procedures (e.g. ASTM, API, etc.) to an Equalized Facility, the Equalization Steering Committee accepts the concept of a penalty quality if an actual measurement is not available by the time it is required for the facility to perform its equalization. The penalty quality concept provides an incentive for the upstream party to ensure the quality test is performed as soon as possible. It is recommended the Equalizing Facility make the upstream parties aware of the penalty quality prior to delivery from a new location.

There should be no retroactivity of quality data used in the equalization calculation. It is only required that systems incorporate the data they have received at the scheduled time they do their equalization. If facilities subsequently obtain new test data (e.g. from Producers) confirming a difference, the new data should be incorporated in the next month's equalization. However, if a facility inadvertently neglects data after receiving it on time, the onus is on the facility and Producers to assess whether a revision is required.

### **3.7 Limits**

3.7.1 All volumes that enter an Equalized Facility must be equalized according to the current scales and guidelines. This includes any volumes that leave an Equalized Facility to an un-equalized facility and subsequently re-enter.

- 1) Unless otherwise agreed to by Shippers, equalization shall incorporate all condensates shipped through the system as a commingled stream.
- 2) Consistency in the Equalization process used, i.e., if a calculated equalization is used going into the facility, a calculated equalization is used exiting the facility. The same applies to a measured equalization.
- 3) Responsibility for initiating an equalization (on an un-equalized facility) resides with the Shippers at that facility

Typical equalization receipt points include:

- a) Truck Terminals: Individual receipts from trucked location
- b) Pipelines: Stream receipts from each gathering battery or well which is separately connected to the Pipeline.
  - i) In situations where batteries are jointly connected to the Pipeline and have significantly different quality, the equalization may be extended to the individual battery level, provided system Shippers and the equalizing system agree. The equalization statement should uniquely identify each such battery which is assigned its own quality.

### **3.8 Reporting**

The following guidelines are intended to standardize and streamline the reports and provide necessary information to Shippers.

#### **3.8.1 Information Access**

- 1) The company performing the equalization is to provide each Shipper on the system with equalization data on the specific condensate volumes input by that Shipper and the aggregate volumes input by all Shippers at each input point.
- 2) Shippers are not entitled to data on condensate input into each equalized system by another Shipper, except in aggregate form as noted above.



### 3.8.2 Receipt Point Reporting

- 1) Location identification: Operator code, field/facility name and code, and legal description are to be shown.
- 2) Density and sulphur measurements. Headings should confirm units, with density expressed in kg/m<sup>3</sup> and sulphur in weight percent.
- 3) Qualities used in equalization calculations and reports should be rounded to the nearest 0.01% sulphur and to the nearest 0.1 kg/m<sup>3</sup> density.
- 4) Calculated quality differential \$/m<sup>3</sup>.
- 5) Butane and lighter volume composition: Expressed in liquid volume percent rounded to the nearest 0.01%.
- 6) Test date and data source: The format for each inlet location is as follows:

#### **xyymm**

Where **x** is the data source and where **yyymm** is the year and month that the latest sample was taken.

The codes to be used for **x** are:

**A** – analysis or monthly volume weighted average

**E** – estimate

**P** – penalty quality (new location)

**W** – weighted average differential factor (WADF) (differential passed on from upstream system)

- 7) Calculated quality differential: Downstream systems are to round any calculated stream differentials received from upstream equalizations to the nearest 0.01 \$/m<sup>3</sup>. Instances where a default quality (rolling average differential) is used are to be clearly identified.
- 8) Total volumes by receipt points for both facility and Shipper.
- 9) Quality adjustment (volume x differential) for both system and Shipper.

### 3.8.3 Report Calculations

- 1) Volume weighted averages for butane, propane, ethane, methane, density and sulphur: Required to periodically test accuracy of the quality data.
- 2) Total volume for both Equalized Facility and Shipper.
- 3) Total dollar value of quality reductions for both Equalized Facility and Shipper.
- 4) Volume-weighted average differential factors (WADFs) for both total stream and total Shipper volumes.

- 5) Equalization payment owing/receivable. Determined as total differential (Shipper minus stream) times Shipper volume.
- 6) Federal Goods and Services Tax (GST) owing or receivable.

In a large report, where the number of receipt points is extensive, it may be desirable to subtotal by field, area, or truck terminal and then calculate the total system on a summary page.

#### **3.8.4 Report packaging<sup>3</sup>**

- 1) Reports and invoices should show the date of issue as well as the name and contact information of the person at the company performing the equalization.
- 2) Reports and invoices should indicate the most expeditious routing address for equalization payment cheques.
- 3) Each page of the report should indicate the equalization month and system name.
- 4) Reports should be stapled and pages numbered to ensure that it is complete and in order.

#### **3.9 Expenses**

The equalization process is a necessary part of the transportation service provided by the terminals and pipelines. In principle, Shippers are prepared to pay reasonable charges to the equalizing companies to cover their necessary costs to administer the equalization system. Reasonable costs include charges for accounting manpower, computer time, printing, postage, and quality testing.

***The definition of "reasonable charges" is system specific and has to be agreed upon between the system and its Shippers.***

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<sup>3</sup> A sample Condensate Equalization statement is shown in Attachment 8b.

## **Attachment 1: Crude Oil Equalization**

### **Summary of Methodology\***

The Canadian crude oil equalization methodology is based on the fundamental concept that Canadian conventional light and medium crude pricing is primarily influenced by:

- 1) Competitive pricing in the Chicago area market.
- 2) Sulphur content and crude density. These two crude quality specifications are the primary influences for the difference in the price paid for any light or medium crude in Chicago regardless of where that crude originates. While this assumption is a simplification of the extremely complex real crude market, together with other simplifying assumptions it provides a reasonable basis for developing a methodology for adjusting the price of individual crude streams to reflect relatively small differences in stream quality.

To analyze the crude price behaviour using these fundamental concepts, pricing data is collected on a number of selected Canadian and US light and medium, sweet and sour crudes (see Attachment 1, Schedule 1) that can be delivered to the Chicago market. This pricing data is then processed through a multi-variable linear regression model to allocate the differences in landed price to the following four variables: a reference crude price (reference crude for Canadian and inland US crudes is WTI while reference crude for US Gulf Coast crudes is LLS), Canadian crude (a dummy variable to remove any influences of exchange rate risk and other factors that might uniquely affect all Canadian crude prices), sulphur, and density. The portion of the differential that is allocated to sulphur and density differences is used as the equalization value.

There is a seasonal swing in the market value of many crudes due to each crude's suitability to make asphalt and due to the seasonally changing gasoline-to-distillate ratio. To minimize these swings, the equalization values are updated twice yearly in February and August, using data from the previous January to June, and July to December, respectively. By using these calculation periods, the equalization calculations largely bridge the seasonal market changes.

### **Collection of Data**

A basket of light and medium, sweet and sour crudes that are representative of Canadian and US crudes that could reasonably be expected to be delivered to Chicago area, and that are publicly traded has been developed for analyzing the pricing behaviour of crudes of varying quality. The basket currently being used in equalization is included in Schedule 1 to this Attachment.

For Canadian crudes, the price is adjusted to a Chicago (Mokena) reference price, using publicly available tariffs and appropriate representative adjustments for losses.

For US crudes, the price is adjusted to a Chicago (Mokena) reference price, using publicly available tariffs, where possible, or using a best estimate of tariffs where tariffs are not in the public domain. All tariffs are adjusted for viscosity penalties, loss allowance, and any pump-over fees.

Company postings, as shown in Schedule 1 are determined based on an average for each month; the individual company postings are then combined into a stream posting. Where postings are at reference conditions, the posting is adjusted using the quality differentials in place at the time to provide a common base for the equalization. Where postings are at stream conditions the pricing is used as published. Where postings are at different locations, Enbridge published tariffs are used to adjust all of the individual postings to a common location before including them in the average.

To ensure that Canadian pricing fully reflects the market, after the price developed from postings has been determined it is averaged with a weighted average of the Net Energy and NGX indices to provide the Canadian prices that are used in the regression model.

For Canadian crudes, stream quality is estimated from data provided by Crude Monitor. To ensure that the data is representative of the expected quality of the stream, the Crude Monitor data for each stream is averaged over a 6 month period. Because Crude Monitor data is not fully current, the actual average employed is the average of 6 months lagged by 3 months to allow for data acquisition - i.e. the data for November would be the average of the stream quality for February to July.

For US-based crudes, CAPP provides pricing data to the Equalization Steering Committee as posted in Platts and Argus. This data is kept confidential to comply with its Platts and Argus agreements. For US-based postings, reference quality data is used as the quality basis for each of the streams. For the Argus ASCI index, quality associated with the price is based on the ratio of the stream components provided periodically by Argus and averaged in the same manner as the average of the Canadian stream qualities.

The postings included in the average change from time-to-time as the Equalization Steering Committee identifies new posters.

Data for both the Canadian and US crudes are compared on the basis of calendar month of posting without any consideration of timing of delivery or of differences in trading months between the US norm and the Canadian norm.

As the industry evolves, postings may not adequately reflect the value of individual crude streams. If the Equalization Steering Committee identifies market based pricing mechanisms that better reflect the industry pricing basis, these will be substituted for postings for that particular stream.

### **Equalization Calculation**

Calculation of the equalization penalties is done by the Equalization Steering Committee using a multivariable linear regression of the pricing data, sulphur data, density data, and country of origin data for each of the crudes. Independent variables in the regression are:

- 1) WTI crude price                      Used to represent the price variance that results from general price shifts in the Canadian and US Midwest market place.

- |                         |  |
|-------------------------|--|
| 2) Canadian crude price | Used to represent the differential that may exist in the market place due to differences between all Canadian crude prices and the US Midwest crude prices. This component of pricing difference is particularly significant if there is apportionment on the Canadian crude system. |
| 3) LLS crude price      | Used to represent the price variance that results from general price shifts in the USGC market place.  |
| 4) Sulphur              | Used to represent the sulphur content of each of the crudes being examined.  |
| 5) Density              | Used to represent the density of each of the crudes being examined.  |

Regression is done using monthly data for each of the crudes over a six-month evaluation period. When regression is complete, the value for the slope for each variable is used as the equalization value for that variable. Multiple r value and r2 is used to monitor the quality of the regression.

### **Approval and Distribution of Revised Scale**

When the equalization calculation is complete, the new scale is analyzed, reviewed and approved by the Equalization Steering Committee to ensure that it reflects market and is indicative of the behaviour of Canadian postings.

The approved equalization is distributed to industry and is posted on the Equalization website <http://www.capp.ca/library/relatedLinks/Pages/EqualizationSteeringCommittee.aspx#87yGJJbmMCPm>

### **Application of New Scale for Crude Oil**

The new scale is issued by the 15th day of January and July each year, its month of application is February and August, respectively. The lead time is provided so that pipelines and others can modify their databases in time for an orderly transition to the new scale.\*

### **Implementation of New Scale for Crude Oil**

Commercial trading activities use the prior month stream WADF as the basis for quality adjustment for market price calculation. Since the prior month WADF does not reflect the future month new scale, all equalizing facilities must perform two separate equalization calculations using both scales for the month prior to the month in which there is a scale change. Both WADF's must be clearly labeled as either NEW SCALE or OLD SCALE. For example, if there is a new scale for the month of February, the equalizing facility must submit WADF's for both scales for the month of January.

The old scale WADF will be used only for the equalization settlement invoice between the equalizing facilities and their shippers where there is a traditional equalization performed.

The new scale WADF will be used as the prior month stream WADF for commercial trading activities.

### **Application of New Methodology Approved by Industry for Crude Oil (and condensate)**

From time to time, the methodology used to derive the scale and to calculate the WADF will change due to various market and quality factors. This change in methodology will generate a new scale or process. Any change in methodology will be provided with implementation timing as part of its issuance.

#### Effective May 1, 2014

The Enbridge Medium Sour Blend (MSB) pool will be equalized as a Two Stage process.

A review of the Two Stage Equalization process is as follows:

#### Stage One:

- **Edmonton MSB components will be equalized.**
- An Edmonton MSB WADF will be issued monthly by Enbridge Oil Accounting.
- Shippers of record on receipt of Edmonton MSB components will be invoiced for participation in the Edmonton MSB process.
- **Hardisty MBL (MSB) component**
- With only one component received at Hardisty the MBL volume will be equalized in Stage Two of the process
- **Cromer MSB components will be equalized.**
- A Cromer MSB WADF will be issued monthly by Enbridge Oil Accounting.
- Shippers of record on receipt of Cromer MSB components will be invoiced for participation in the Cromer MSB process

#### Stage Two:

- Edmonton MSB, Hardisty MSB (MBL) and Cromer MSB volumes are equalized less deliveries upstream of Superior.
- An Enbridge MSB WADF will be issued monthly by Enbridge Oil Accounting.
- Shippers of record on receipt of remaining volumes of Edmonton MSB, Hardisty MBL (MSB receipt component) and Cromer MSB will be invoiced for participation in the MSB pool.

Each month both Stage One and Stage Two will be performed irrespective of MSB deliveries occurring upstream of Superior. Should there be no MSB deliveries upstream of Superior, the sum of the two stages will equal the result of a Single Stage MSB Equalization process.

### **Implementation of New Methodology for Crude Oil (and condensate)**

Commercial trading activities use the prior month stream WADF as the basis for quality adjustment for market price calculation. Since the prior month WADF does not reflect the future month methodology change, all equalizing facilities must perform two separate equalization calculations using both scales for the month prior to the month in which there is a methodology change. Both WADF's must be clearly labeled as either NEW METHODOLOGY or OLD METHODOLOGY. For example, if there is a new methodology for the month of February, the equalizing facility must submit WADF's for both scales for the month of January.

The old methodology WADF will be used only for the equalization settlement invoice between the equalizing facilities and their shippers where there is a traditional equalization performed.

The new methodology WADF will be used as the prior month stream WADF for commercial trading activities.

\*effective December 2014 industry voted to continue with existing scale indefinitely with an annual review.

**Schedule 1: Crude Basket**

<b>Canadian Crude</b>	<b>US Crude*</b>
Par (MSW)	ASCI (Argus Sour Crude Index)
Koch AB	Eugene Island
MSO	Mars
LSB	HLS
Midale	WTS
	WTI – independent variable for Canadian and US Midwest crudes
	LLS – independent variable for USGC crudes

US Crude prices are provided by Platts  
Effective August 4, 2001

ASCI crude price provided by Argus  
Effective September 1, 2011

Canadian Crude prices are an average of Refiner Postings and Monthly Index Reports provided by Net Energy and NGX  
Effective July 1, 2010



## **Attachment 2: Condensate Equalization**

### **Condensate Equalization Methodology**

The Canadian condensate equalization process is based on the concept that the difference in value of a condensate can be determined from the density, sulphur and C4- content of each condensate. While the market value of condensates is influenced by several refining parameters generally, from a producer blending perspective, a condensate value decreases for use in heavy crude blending with increasing density and increasing sulfur content. In addition, there is a C4- penalty to manage safety and environmental design premises, and to establish industry standards on condensate quality. By establishing a value for each of these three variables, the value of any condensate delivered to a mixed stream can be determined.

### **C4- Penalty**

Most condensates contain some C4- consisting of various ratios of butane, propane, ethane, and methane. While some butane is normally expected in condensate, the presence of C3- in the condensate has a significant detrimental effect on the value of the condensate. For this reason, the C3- components are multiplied by 3 in the determination of the C4- content that is used for equalization purposes.

For equalization it is assumed that C4- content that is:

- 1) Less than or equal to 5.0%vol results from the normal processing of the condensate and it does not influence the value of the condensate. If the C4- content is above 5.0%vol however, that extra C4- increases the condensate losses in the heavy crude blending facilities, increases transportation losses, and reduces the value of the final diluted bitumen blend. To reflect these losses, the value of the condensate is reduced as follows:
- 2) For a C4- content greater than 5.0%vol, the first 5.0%vol of the C4- will receive condensate price and the portion over 5.0%vol will receive no value. The Deemed C4- value will be calculated by multiplying the C3- value by 3 and adding this value to the C4 value.

For the purpose of calculating C4- content, the calculation will be rounded to the nearest 0.01% of butane content.

The Equalization Steering Committee will provide Shippers and Pipelines with monthly values for condensate for use in the calculation of the C4- penalty. The Condensate Price will be the Condensate Allowance Price at Edmonton as provided monthly to the Equalization Steering Committee by Enbridge.

### **Density Adjustment**

Condensate is added to bitumen to reduce the density to below the allowable pipeline maximum, and to reduce the diluted bitumen or heavy crude blend viscosity to below the maximum allowed at the Enbridge reference temperature that is in effect during shipping month. In comparing the value of the various condensates, the density of the condensate is critical because it is the most significant influence in how

much condensate must be added. However, the condensate's blending behaviour, or the effect the condensate has on the blend viscosity, and the reference temperature that the viscosity is determined at, all influence the value of the condensate as a blendstock.

To address all these issues, a generalized model has been developed based on measured statistically derived blending behaviors of a variety of condensates with a variety of bitumen/heavy crudes. This model has been simplified to calculate a blend value based on the reference temperature that is in effect, the average condensate density, the ratio of conventional heavy oil, to thermally produced bitumen, and an assumed bitumen/heavy oil density. To establish the relationship for pricing, Enbridge's heavy crude allowance price, and Enbridge's condensate allowance price provide the relative pricing references for determining the condensate density penalty.

The concept of the Condensate Density Penalty model is that the primary interest of the heavy oil/bitumen producer is to achieve a constant value for his productions regardless of what condensate he uses as a blend stock (Blending Efficiency). Offsetting this though is the fact that the market value of a blend that is higher in condensate is higher in the long term than a blend that is lower in condensate (Blend Value). The Density Penalty Model incorporates both of these values into a single slope.

Considerations in the Condensate Density Penalty Model include:

- 1) The Heavy Oil Price and the Condensate Price are the weighted average Heavy Oil Allowance Price and the Condensate Allowance Price respectively, as provided monthly to the Equalization Steering Committee by Enbridge.

As the industry evolves, postings may not adequately reflect the value of individual crude streams. If the Equalization Steering Committee identifies market based pricing mechanisms that better reflect the industry pricing basis, these will be substituted for postings for that particular stream.

- 2) The target density is the lower of the calculated density required to meet viscosity requirements at the reference temperature, or the maximum blend density allowed by Enbridge. For the viscosity calculation, experimental data for the blending behaviour of a variety of condensates with each of conventional heavy crude and Cold Lake bitumen was examined. The model of observed viscosity behaviour is used to calculate the required density to meet the viscosity specification at the current reference temperature.
- 3) Blending Efficiency penalty is determined by calculating the change of condensate value that is required as density varies to maintain the same bitumen realization
- 4) Blend Value penalty is determined by calculating the increase in value of the diluted blend as the amount of condensate in the blend increases.
- 5) Density Penalty Slope is calculated by adding the Blending Efficiency penalty and the Blend Value penalty.
- 6) The Diluent Density is the weighted average density for all condensate volumes received by Enbridge at Edmonton.

- 7) Density Penalty Slope references the Average Enbridge Condensate Density as a base point (i.e., Enbridge average density = no density penalty or credit). Credits are applied to volumes which have a density lower than the Enbridge average; penalties are applied to volumes heavier than the average.
- 8) The Density Penalty Slope and Average Enbridge Condensate Density used in the equalization process are provided to pipelines monthly by the Equalization Steering Committee.

The density model is provided on the CAPP website.

### **Sulphur Adjustment**

The sulphur adjustment is equal to that used for the industry accepted equalization process for light and medium crude oil. This value will be updated semi-annually by the Equalization Steering Committee.

### **Reference Basis**

The recommended reference basis for Weighted Average Differential Factor (WADF) calculations is:

Deemed C4-	Less than or equal to 5.0 vol% = no penalty Greater than 5.0 vol% = zero value
Density:	750.0 kg/m <sup>3</sup>
Sulphur:	0.2 wt%

### **Application of New Methodology Approved by Industry for Condensate (and crude oil)**

From time to time, the methodology used to derive the scale and to calculate the WADF will change due to various market and quality factors. This change in methodology will generate a new scale or process. Any change in methodology will be provided with implementation timing as part of its issuance.

### **Implementation of New Methodology for Condensate (and crude oil)**

Commercial trading activities use the prior month stream WADF as the basis for quality adjustment for market price calculation. Since the prior month WADF does not reflect the future month methodology change, all equalizing facilities must perform two separate equalization calculations using both scales for the month prior to the month in which there is a methodology change. Both WADF's must be clearly labeled as either NEW METHODOLOGY or OLD METHODOLOGY. For example, if there is a new methodology for the month of February, the equalizing facility must submit WADF's for both scales for the month of January.

The old methodology WADF will be used only for the equalization settlement invoice between the equalizing facilities and their shippers where there is a traditional equalization performed.

The new methodology WADF will be used as the prior month stream WADF for commercial trading activities.

Attachment 3: Illustration of Level Reporting Deadlines for Crude Stream WADFs

**Hardisty MSO June 2010 WADF**

<b>WHAT</b>	<b>PRODUCTION MONTH</b>	<b>WHEN (COLC Reporting Calendar)</b>	<b>FROM</b>	<b>TO</b>
COLC SHIPPER BALANCE	JUNE 2010	4:00 p.m. Mon. July 19, 2010 (Month 2)		
L3 WADF	JUNE 2010	4:00 p.m. Thur. July 22, 2010 (Month 2)	Gibson Throne Terminal	Hamilton Lake Pipeline
L2 WADF	JUNE 2010	4:00 p.m. Mon. July 26, 2010 (Month 2)	Hamilton Lake Pipeline	Gibson Hardisty Terminal
L1 WADF	JUNE 2010	4:00 p.m. Wed. July 28, 2010 (Month 2)	Gibson Hardisty Terminal	Enbridge Pipeline
L1-3 EQ INVOICES	JUNE 2010	5:00 p.m. Fri. July 30, 2010 (Month 2)	L1-L3 Facilities	Industry Shippers
ENBRIDGE STREAM WADFs	JUNE 2010	4:00 p.m. Fri. July 30, 2010 (Month 2)	Enbridge Pipeline	Industry Shippers
ENBRIDGE EQ INVOICES	JUNE 2010	4:00 p.m. Fri. Aug. 13, 2010 (Month 3)	Enbridge Pipeline	Industry Shippers

## **Attachment 4: Testing Laboratory**

### **Quality Procedures**

It is recommended that an Equalized Facility should use a single laboratory for all quality data used in equalization statements to minimize the problems associated with testing bias, reproducibility, and differing test methods. All testing should follow industry recognized test procedures (e.g. ASTM, API, etc.). Testing laboratories should use a statistical quality assurance program as described in ASTM STP 1209 and D6299 to ensure the measurement system being used is in statistical control and meets the reproducibility and repeatability limits of the test standard.

Elements of the program should include:

- 1) Regular analysis of (crude oil) quality control samples to monitor stability and precision.
- 2) Use of appropriate check standards to monitor accuracy
- 3) Participation in inter-laboratory exchange programs for density, sulphur, and butane measurement to verify the accuracy/bias of results (using crude test samples and where available)
- 4) Use of control charts and other statistical techniques to screen, plot and interpret results and evaluate system precision and bias in accordance with industry-accepted practices
- 5) Use of double blind QC and/or check standards submitted randomly to verify precision and bias of the measurement system where neither the sample status (i.e. that it is a quality control check) nor expected value is known to the person performing the analysis.

Equalized Facilities should review contract/internal laboratory quality control programs yearly to ensure results are being reported accurately. Where Upstream Levels are providing calculated quality data, the Downstream Level should do periodic and unannounced quality checks using composite samples to verify that the results provided by the Upstream Level are reasonable and within statistically expected limits. Deviations outside of expected limits should be reviewed with the Upstream Level immediately for resolution. The parties are encouraged to advise the Equalization Steering Committee of deviations and actions taken as a check of the integrity of equalization.

## **Attachment 5: Disputes**

### **Quality Dispute Resolution Procedures**

The following two-phased process is recommended when:

- A shipper or producer disagrees with the quality used in equalization by an Equalized Facility
- Downstream level disagrees with the WADF provided by the upstream level

Phase one of the process is to identify whether the differences between the Shipper/Producer's lab analysis and the lab analysis used for equalization, or between the upstream and downstream level lab analysis, are due to normal random testing variation that are within the range of reproducibility established by ASTM (or by inter-laboratory test program involving the labs concerned), or whether there is a systemic bias between the two labs. If it's established that there is a systemic bias, the process then proceeds to the second phase that is designed to identify which result is accurate, and then to correct the processes and techniques resulting in the discrepancy in the lab(s) found to be in error.

Lab analysis results from multiple labs should not be used for equalization purposes even if a bias is believed to exist. A consistent lab result bias should normally impact all shippers equally in the equalization process. Efforts should focus on removing the bias, not on replacing a result for a single shipper.

The following Phase two process is initiated upon request of one of the interested parties:

- 1) Ensure that both labs are using the same measurement standard (e.g. ASTM D4294 for sulphur).
- 2) Ensure that enough split samples have been drawn (minimum nine) to assess statistically whether each lab is in statistical control, whether the variation in each lab and the variation in the differences in results are outside the published reproducibility limits of the test standard (or the known reproducibility limit of the test if there is an accepted exchange program that has found a different reproducibility limit -see note below), and whether there is a systemic bias between the two labs.
- 3) If it is concluded there is a statistically significant bias between the two labs, it is necessary to establish which lab is "correct" by establishing the "true value" of the sample. This is done by obtaining another sample that should be split by a third party and sent to approximately nine different labs for testing (including the labs in dispute). After a statistical review of the data including a minimum outlier and Normality assessment per standard industry practice (e.g. the International Quality Exchange Testing Program conducted by ARC), a consensus result (the mean average) is determined and compared to the two disputing labs results, identifying the one in error. Additional information on the reproducibility of the test method is also provided by this analysis.
- 4) A review of the offending lab's quality control program would then be necessary to identify the cause of the error. Third party professional's who are familiar with the test equipment, standards, and quality control programs should do this review. A Certified Quality Auditor (available through Standards Council of Canada/Canadian Association of Environmental Laboratories (SCC/CAEAL) or one of the ISO

Registrars) and a technical person very familiar with the test equipment in question would meet this requirement. The Alberta Research Council and other companies in industry may provide assistance in this area.

- 5) If the lab found to be in error is that used by the Equalized Facility for equalization measurements, care should be taken to ensure **all** quality measurements used in the equalization statement are retested under the corrected process to ensure an equitable distribution of equalization funds.
- 6) The cost of a test program may be negotiated between the parties. If unable to agree, it is recommended that costs initially be borne by the objecting party. If the objecting party lab is in error, the objecting party retains all costs. If the alternate party lab is found to be in error, the objecting party is reimbursed by the alternate party for the testing costs. If both are found to be in error, the costs are split equally. Costs for any Equalized Facility re-testing that must be done as a result of identified lab errors will be paid according to the terms of the contract between the lab and Equalized Facility.

### **Sampling**

Inadequate sample handling or sampling procedures can significantly impact a test result. Appropriate care should be taken when drawing and splitting samples to ensure they are fully representative of the product being sampled/split. It is recommended that ASTM D 4057 Standard Practice for Manual Sampling of Petroleum and Petroleum Products or the API Manual of Petroleum Measurement Standards be used as a basis for sampling procedures.

**Attachment 6: Voting**

**Form of Ballot**

To: All Shippers Participating in the Equalization Process  
From: Equalization Steering Committee  
Date: \_\_\_\_\_  
Re: Example Voting Letter to Industry

As defined in the Equalization Procedures Guide, Section 1.2, Rights and Responsibilities of a Shipper, – “All shippers who participate in the equalization process have the right to vote on any equalization issue” and “Voting shall take place by ballot, signed by the Shipper’s designated representative.” The Equalization Steering Committee hereby requests you to respond to the following issue.

Description of issue.

Please indicate by marking an **“X” beside your company’s response**

	In favor
	Not in favor
	Abstain

Company: \_\_\_\_\_

Designated Representative: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Please respond by e-mail to \_\_\_\_\_ before 4:00 pm on \_\_\_\_\_, \_\_\_\_\_.

If you have any questions relating to this correspondence please feel free to contact the undersigned at 403 \_\_\_ - \_\_\_\_\_ or any other Equalization Steering Committee member.

Thank you for your attention to this matter.

Equalization Steering Committee  
\_\_\_\_\_



## **Attachment 7: Weighted Average Differential Factor (WADF)**

The Weighted Average Differential Factor (WADF) system is used as a convenient way to manage equalization calculations and to calculate equalization penalties. The basis of the WADF calculation is that each quality of crude or condensate that is supplied to an Equalized Facility is given a WADF which reflects its value compared to a recommended reference crude value at 825 kg/m<sup>3</sup> density and 0.5 wt% sulphur for crude or 750 kg/m<sup>3</sup> density and 0.2 wt% sulphur for condensate. The WADF penalty/credit reflects the current equalization values.

After the WADF is determined by an Equalized Facility for each upstream level, the weighted average sum of the WADFs for that Equalized Facility becomes the WADF for the stream leaving that Equalized Facility. In a similar manner the WADF calculations flow all the way through the full equalization value chain. See Table A under Attachment 7 for an illustration of the WADF calculation.

### **Calculations:**

#### **Density**

The calculation of the weighted average density is based on a volume weighted average (see Table A).

#### **Sulphur**

The calculation of the weighted average sulphur is based on a mass weighted average (a weight fraction).

If two crudes of different densities are blended, to calculate the sulphur of the resulting blend, the two crudes have to be converted to a mass basis (kg of crude) and the kilograms of sulphur in each stream is then calculated. The kg of sulphur and the kg of crude are then added. When the kg of sulphur in the blend is divided by the kg of total blend, this represents the wt% sulphur in the combined stream.

Table A shows an illustration of the calculation done properly and a calculation done by the simpler, but inaccurate method of calculating the sulphur based on the crude volume.

Table A: WADF Calculation of Weighted Average Density and Sulphur

## Correct Method

$$\text{Oil Mass} \times \text{Sulphur \%} / 100$$

$$\text{Density} \times \text{Volume}$$

	Volume m3	Vol %	Density kg/m3	Sulphur wt%	Oil Mass Kg	Sulphur Mass Kg
Battery 1	1,000.0	16.7%	720.0	0.250	720,000	1,800
Battery 2	2,000.0	33.3%	825.0	0.340	1,650,000	5,610
Battery 3	3,000.0	50.0%	940.0	0.120	2,820,000	3,384
Total	6,000.0	100.0%	865.0	0.208	5,190,000	10,794

$$\text{Total Sulphur mass} / \text{Total Oil mass} \times 100$$

## Wrong Method

	Volume m3	Vol %	Density kg/m3	Sulphur wt%
Battery 1	1,000.0	16.7%	720.0	0.250
Battery 2	2,000.0	33.3%	825.0	0.340
Battery 3	3,000.0	50.0%	940.0	0.120
Total	6,000.0	100.0%	865.0	0.215

$$\text{Vol\%} * \text{Sulphur wt\%}$$

Attachment 8a: Sample of Crude Oil Equalization Statement

Dec 2009  
CRD

Units: m3

Illustrative Crude Oil Equalization Invoice

Payment Due: Upon Receipt											
Operator	Facility	Product	LSD	Density	Sulphur	Differential	Volume	Value	Shipper	Value	
0026	9200172	CRD	06-18-074-08W6	822.2	0.210	\$(1.68)	74.2	\$(1,394.96)		74.2	\$(1,246.66)
0026	9480011	CRD	11-36-072-08W6	816.6	0.240	\$(1.51)	1,586.7	\$(2,395.91)		305.2	\$(460.85)
0039	0041054	CRD	08-32-078-09W6	831.7	0.220	\$1.26	232.5	\$292.95		30.0	\$37.80
0039	0042777	CRD	06-22-078-10W6	825.6	0.370	\$(0.49)	499.1	\$(244.56)		173.2	\$(84.87)
0039	0054040	CRD	03-27-072-05W6	810.3	0.460	\$(0.23)	1,834.0	\$(421.82)		272.5	\$(62.68)
0039	3590012	CRD	09-10-073-06W6	798.7	0.220	\$(1.06)	1,220.3	\$(1,293.52)		154.8	\$(164.09)
0205	9480016	CRD	14-03-073-08W6	806.8	0.230	\$(1.57)	2,509.6	\$(3,940.07)		497.6	\$(781.23)
0205	0000873	CRD	09-07-073-08W6	816.5	0.160	\$(1.98)	3,880.2	\$(7,682.80)		56.5	\$542.40
05P8	0040461	CRD	08-07-073-16W5	851.9	0.160	\$9.60	459.4	\$4,410.24		1,213.4	\$(1,613.82)
0HE9	9300018	CRD	15-07-064-23W5	811.9	0.270	\$(1.33)	4,890.3	\$(6,504.10)		387.7	\$(449.73)
0JD4	7290005	CRD	07-20-078-12W6	822.5	0.300	\$(1.16)	3,100.7	\$(3,596.81)		1,294.3	\$19,168.58
0JL8	8560001	CRD	07-04-071-18W5	863.2	0.220	\$14.81	4,487.9	\$66,465.80		685.1	\$11,742.61
0MD6	0048913	CRD	13-08-076-10W6	867.7	0.290	\$17.14	3,492.0	\$59,852.88		193.8	\$7,220.99
0MD6	8020028	CRD	08-17-077-05W6	880.1	2.840	\$37.26	1,048.7	\$39,074.59		848.0	\$7,487.30
0NZ1	0000989	CRD	03-29-062-20W5	818.6	0.510	\$0.06	9,146.0	\$548.76		6,187.2	\$42,457.76
ASBE	0051820	CRD	03-27-075-09W6	845.8	0.480	\$8.82	9,384.7	\$85,237.25		618.7	\$25,544.49
<b>Stream Differential</b>							<b>43,211.9</b>	<b>\$178,404.75</b>	<b>Shipper Value at Stream Differential</b>	<b>6,187.2</b>	<b>\$42,457.76</b>
<b>Shipper Differential</b>							<b>\$4.13</b>	<b>\$6.86</b>	<b>Equalization Payment (negative is receipt)</b>		<b>\$25,544.49</b>
											<b>\$16,913.26</b>

EQ Factors	
Property Name	Property Value
Lower limit density value for crude @ 15C(kg/m3)	800.00
Upper limit density value for crude @ 15C(kg/m3)	825.00
Crude density penalty/(credit) if value less than lower limit @ 15C(\$/CdN per kg/m3 per m3)	0.43
Crude density penalty/(credit) if value greater than upper limit @ 15C(\$/CdN per kg/m3 per m3)	0.43
Lower limit sulphur value for crude(wt% Sul.)	0.50
Upper limit sulphur value for crude(wt% Sul.)	0.50
Crude sulphur penalty/(credit) if value less than or equal to lower limit(\$/CdN per 0.1 wt% Sul. per m3)	(0.58)
Crude sulphur penalty/(credit) if value greater than upper limit(\$/CdN per 0.1 wt% Sul. per m3)	0.58

Location Differential x Facility Volume

Total Facility Value / Total Facility Volume = Stream Differential (WADF)

Density Differential + Sulphur Differential

**Attachment 8b: Sample of Condensate Equalization Statement**

## Illustrative Pipeline Condensate Equalization Invoice

Month: SAMPLE

Condensate Equalization Data	
Density Slope (\$ Cdn/m <sup>3</sup> per kg/m <sup>3</sup> )	0.33
Sulphur (\$ Cdn/m <sup>3</sup> per 0.1 wt.%)	1.38
Condensate Allowance Price (\$ Cdn/m <sup>3</sup> )	595.88

Operator	Facility	Product	LSD	Density	Sulphur	C3-	C4	Differential	Facility		Shipper	
									Volume	Value	Volume	Value
0001	ABBT0000001	C5+	00-00-000-00W0	722.4	0.17	0.49	4.43	(4.16)	1050.0	(4 368.00)	200.0	(832.00)
0002	ABBT0000002	C5+	00-00-000-00W0	680.4	0.08	0.11	3.74	(24.63)	2 450.0	(60 343.50)	0.0	0.00
0003	ABGP0000003	C5+	00-00-000-00W0	765.9	0.11	0.71	4.51	13.78	1 250.0	17 225.00	750.0	10 335.00
0004	ABGS0000004	C5+	00-00-000-00W0	758.4	0.21	1.19	5.86	29.31	1 900.0	55 689.00	1 500.0	43 965.00
0005	ABGS0000005	C5+	00-00-000-00W0	672.8	0.02	0.09	3.18	(27.96)	1 150.0	(32 154.00)	0.0	0.00
<b>Stream Total</b>									<b>7 800.0</b>	<b>(23 951.50)</b>	<b>2 450.0</b>	<b>53 468.00</b>

Shipper Value at Stream Differential (7 523.23)

Equalization Payment (negative is receipt) 60 991.23

Lower limit density value for condensate @ 15°C(kg/m<sup>3</sup>)  
 Upper limit density value for condensate @ 15°C(kg/m<sup>3</sup>)  
 Condensate density penalty (credit) if value less than lower limit (\$Cdn per kg/m<sup>3</sup> per m<sup>3</sup>)  
 Condensate density penalty (credit) if value greater than upper limit (\$Cdn per kg/m<sup>3</sup> per m<sup>3</sup>)  
 Lower limit sulphur value for condensate (wt.%)  
 Upper limit sulphur value for condensate (wt.%)  
 Condensate sulphur penalty factor if value less than or equal lower limit (\$Cdn per 0.1 wt.% Sulphur per m<sup>3</sup>)  
 Condensate sulphur penalty factor if value greater than upper limit (\$Cdn per 0.1 wt.% Sulphur per m<sup>3</sup>)  
 Lower limit deemed butane ((C3- multiplied by 3) plus C4) value for condensate (Vol%)  
 Upper limit deemed butane ((C3- multiplied by 3) plus C4) value for condensate (Vol%)

Location Differential  
X  
Facility Volume

Density Differential + Sulphur Differential +  
Deemed Butane Differential

Total Facility Value / Total Facility Volume =  
Stream Differential (WADF)