

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

Administrative Process: Those administrative processes that a Facility operator uses to calculate the equalization for such Facility.

Allowance Price: Condensate and Heavy Allowance Price provided monthly to the Equalization Steering Committee by Enbridge. The pricing is calculated as per Enbridge's "Practice Applicable to Automatic Balancing."¹ Additional considerations in relation to the ratio of thermal and conventional oil within the equalization model are detailed in Attachment 2.

Butane (C4): For the purposes of equalization, the sum of the volume % of each of two isomers of a hydrocarbon, C₄H₁₀.

C3: For the purposes of condensate equalization, the sum of the volume % of methane plus volume % of ethane, plus volume % of propane contained in condensate.

Deemed Butane: For the purposes of condensate equalization, Deemed Butane is defined as the sum of the volumetric content of Butane plus three times the volumetric content of C₃, i.e.
Deemed Butane = (volume % Butane + (3 x volume % C₃))

COLC: The Crude Oil Logistics Committee - see <https://colcomm.com>.

Condensate: For the purposes of equalization, Condensate is a light hydrocarbon stream that is commingled into a combined stream for transport through a pipeline. Condensate has the general properties identified under Condensate Blend (CRW) Pool Quality Specifications in the most current version of the Enbridge Quality Pooling Specification Package.

Crude: For the purposes of equalization, Crude is defined as light or medium grades of crude that are commingled into a combined stream for transport through a pipeline. Light or medium grades of crude can be approximately defined as commingled crude streams that have a density between 800 kg/m³ and 900 kg/m³.

¹ Current document refers to section 9 (d) Automatic Balancing Price Determination. Section number may change from time to time.

Enbridge: For the purposes of this document, Enbridge refers to the mainline system operated by Enbridge Pipelines Inc.

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 average quality of the received stream at that Equalized Facility. 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 *Facility* where *Equalization* is applied.

Facility: A Facility is defined as a pipeline, battery, or terminal handling crude oil or condensate.

Feeder Pipeline: A Feeder Pipeline is defined as a pipeline that delivers crude oil and/or condensate to a local market, to a pipeline terminal connected to Trunk Line or to a Trunk Line.

Reference Condensate: As such term is defined in Attachment 7.

Reference Crude: As such term is defined in Attachment 7.

Settlement Date: The business day on or closest to the 25th 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.

Trunk Line: A trunk line is defined as a pipeline that transports crude oil and/or condensate from feeder pipelines, pipeline terminals and/or refineries to downstream markets.

Unequalized Facility: An Unequalized Facility is defined as a *Facility* delivering crude oil or condensate to an *Equalized Facility* but which has not been equalized itself.

Voting Shipper: A Voting Shipper is defined as the corporate entity that represents all Shippers in which it holds a > 50% ownership stake. A Shipper with multiple owners may be a Voting Shipper in the event all owners have < 50% ownership in the Shipper

WADF: Weighted Average Differential Factor. For crude, a value assigned to each crude receipt into an equalized facility based on its Sulphur content and Density, and which reflects its economic value relative to a reference crude quality (see Attachment 7). For condensate, a value assigned to each condensate receipt into an equalized facility based on its Sulphur Content, Density, and Deemed Butane Content, and which reflects its economic value relative to a reference condensate quality. For an equalized facility, the WADF is the volume weighted average of the WADF for each crude or condensate delivered to that facility.

EQUALIZATION PROCEDURES GUIDE

Streams of Light Crude, Medium Crude and Condensate produced in Canada are usually commingled to be transported by pipeline to market. Since individual receipts into a commingled stream may differ in quality, the pipeline Shippers have developed an equalization system that adjusts the value of each receipt to reflect that quality difference.

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 an equalized facility compared with the average quality of all crude oils or condensates, delivered into that system within the same time period.

The procedures contained in this Equalization Procedures Guide (Guide) provide a mechanism for determining the penalty values and the procedures for utilizing those penalty values. The procedures are relevant to all equalized facilities (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.

While the balance of this Equalization Procedures Guide provides a mechanism for Equalization, it is recognized that a Facility that is equalized in accordance with these procedures may have a unique Administrative Process applicable to their respective Equalized Facility.

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.

1 GUIDING PRINCIPLES OF EQUALIZATION

1.1 Equalization Principles

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

- 1) The price of crude oil and condensate will primarily be set by a value of a transaction between a buyer and the seller of the crude or condensate. The actual delivery of most Canadian crude and condensate is done through a commingled stream of individual receipts that all comply with the corresponding quality pool specification. As a result, inevitably there will be deliveries of crude or condensate individual streams into the commingled stream that are of slightly better or worse quality than the average quality of the blended stream for a specific period. The equalization process is intended to slightly enhance the value of individual receipts that exceed the stream average quality and to slightly reduce the value of individual receipts that are less than the stream average quality.
- 2) It is the intention of the equalization system to be “zero sum” between credits and debits in a specific period. The value of all the credits that are paid out for any blended stream will be always equal the value of all funds collected from lower quality receipts.
- 3) The equalization penalty scales are intended, to the extent possible, reflect “market value”. For the purpose of equalization, market value for crude oil is determined by using the methodology described in Attachment 1: Crude Oil Equalization. Market value for condensate is determined by using the methodology described in Attachment 2: Condensate Equalization.
- 4) It is not the intention of the equalization process to create or distort market opportunities or activities.
- 5) 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 Voting Shippers have the right to vote on any equalization issue before it becomes part of the equalization process. It is the responsibility of each Voting Shipper to identify themselves and their authorized contact as a Voting Shipper if they wish to be included in the voting process.

The Equalization Committee shall be responsible for maintaining the list of eligible Voting Shippers.

- 2) Voting shall take place by ballot, signed by the Voting Shipper's designated representative.
 - a. If the vote is related to the process of equalization, the results of the ballot will be reflected in the Equalization Procedures Guide.
 - b. If the vote is related to the annual committee membership nomination process, the results of the vote shall be conclusive and binding.

Attachment 6: Voting outlines the form of ballot that shall be used for the voting process.

- 3) If a Voting Shipper elects not to vote or abstain from voting on any matter, the voting record shall show such Voting Shipper as having abstained or failed to vote.
- 4) Any Voting Shipper may withhold its vote on any issue affecting equalization; however, the results of the vote will be binding upon that Voting 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 favourable vote by Voting 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 at least three new representatives each year, thus providing continuity as at least three representatives will be serving their second year while at least three new ones will be in their first year. The Equalization Steering Committee will structure the ballot for the election of new committee members to achieve a balance between committee members who represent condensate, medium and light crude producers, heavy crude producers, refiners, and marketers each of which 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 the 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 at least two representatives from pipeline operators as non-voting participants. A third-party consultant will also have a non-voting representative on the Committee.

Each year the Equalization Steering Committee representatives will select two co-chairs. Where it is feasible, one Co-chair will be in the second year of their term on the committee and the other Co-chair will be in the first year of their term with the expectation that the new Co-chair will continue in that role in their second year providing continuity to the committee.

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.
 - a. For crude oil, the Equalization Steering Committee will provide the revised quality adjustment scale 15 days prior to the effective date – see Attachment 1: Crude Oil Equalization for further information on the crude equalization scale.
 - b. 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: Condensate Equalization.
- 3) Drafting updates to the equalization procedures as necessary and presenting these revised procedures to Shippers for acceptance.
- 4) 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 act as liaison between the Industry Technical Committee (ITC), the industry group that provides funding for the Equalization Steering Committee's activities, and the Equalization Steering Committee

1.5 Role of Consultant

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

- 1) Maintain the industryeq.ca website, the Equalization Steering Committee's site where various types of information related to equalization will be made available to the public.
- 2) Do the monthly calculation of condensate equalization penalties and submit those penalties to the Equalization Committee Co-chairs for their approval

- 3) Provide the monthly condensate penalties to interested parties who require the information
- 4) Together with the Committee co-chairs, establish agendas for the monthly Equalization Steering Committee meetings
- 5) Provide an information package at each Equalization Steering Committee meeting that allows the Committee members to fulfil their due diligence role.
- 6) Advise the Equalization Steering Committee on technical matters related to the equalization process.
- 7) 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) If there are changes of Crude equalization scale, estimate a recalculated equalization for the month prior to implementing a new scale.
- 5) The upstream equalized facility will ensure that the WADF from an un-equalized facility is calculated properly based on the actual quality of the stream receipts. The upstream equalized facility will ensure their stream WADF is calculated in accordance with these procedures.
- 6) Each Equalized Facility must establish its sampling protocols
- 7) All downstream facilities are responsible to measure qualities for upstream facilities at frequent intervals to enable comparison

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 monthly the Condensate Quality Equalization Scale and as necessary, and with industry approval, the Equalization Steering Committee will publish updates to the Crude Quality Scale.

The Equalization Steering Committee will maintain a webpage, www.industryeq.ca that contains 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.

1.9 Finance

All costs, such as consulting fees and studies, will be shared by Shippers through the Industry Technical Committee funding system.

2 CRUDE OIL EQUALIZATION PROCEDURES

2.1 Methodology

The methodology used for equalization across all systems is:

- 1) Each Equalized Facility will calculate its WADF in accordance with the process defined in Attachment 7 Weighted Average Differential Factor (WADF's). It will then pass on its calculated WADF and the associated quality characteristics (density and sulphur) for the total stream to the Downstream Level. In turn, the Downstream Level will incorporate this calculated upstream WADF directly into its equalization. See Attachment 7: Weighted Average Differential Factor (WADF's) for a full description of the 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: Sample of Crude Oil Equalization Statement.

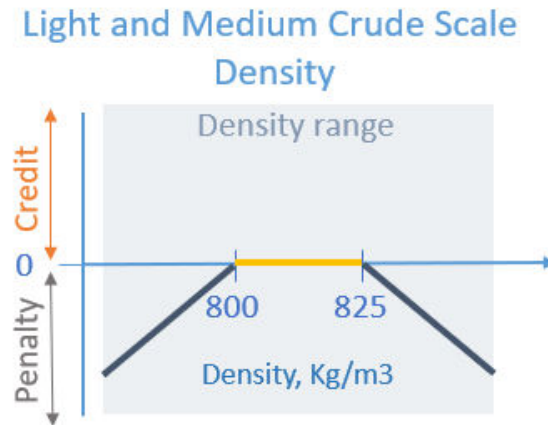
Timely is defined as follows:

- All Equalized Facilities except Trunk Line: statements are to be received by Shippers within one month of the production month.
 - Trunk Line: 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 WADF's from feeder pipelines into the Trunk Line 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 Penalty Scales

Penalty Scale will be calculated in accordance with the methodology presented in Attachment 1. Scale updates will be issued by e-mail to Shippers and they will be published on the Equalization website, www.industryeq.ca.

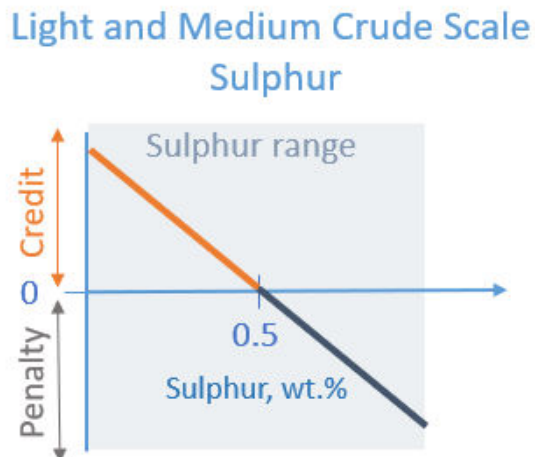
The following schematic depicts the density scale:



As shown above, for the density scale:

- If density is less than 800 kg/m³, the density penalty will increase for lighter crudes;
- If density is equal or greater than 800 kg/m³ but less than or equal to 825 kg/m³, there will be no density penalty;
- If the density is greater than 825 kg/m³, the penalty will increase for heavier crudes.

The following schematic depicts the sulphur scale:



As shown above, 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”.

- Level 1 (L1) Facility – An Equalized Facility which flows into an equalized Trunk Line 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 defined as 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) Forecasting Calendar* to determine its deadline(s) for each month. Please refer to <http://www.colcomm.com/calendars.aspx> for specific dates.

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 the Trunk Line 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.
- Trunk Line 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.
- Trunk Line 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

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

- 1) For all Facilities except Trunk Line:
 - 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.
 - 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.
 - 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 the Trunk Line :
 - a) Each Shipper owing money into the equalization must submit a payment, which will be received by the Trunk Line on or before the 5th business day before the last business day in Month 3.
 - b) Trunk Line will wait until all payments have been received before issuing any payments. Subject to this, the Trunk Line will issue payments to Shippers on the last business day in Month 3.
 - c) In the event that all payments have not been received, the Trunk Line 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 and its associated quality characteristics (density and sulphur) are not submitted to the Downstream Level by the required reporting deadline, the Downstream Level may apply a Default WADF. The Default WADF will be based on the weighted rolling average of the three most recent actual qualities from the subject Upstream Level and the corresponding Equalization penalties to enable it to proceed with its necessary calculation.

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

For a new delivery, during the initial months, if the three previous actual qualities are unavailable, the most recent actual measured quality or, failing that, a default penalty that is consistent with the standard of the Downstream Level.

Following is a calculation example of a weighted rolling average quality and Default WADF where an Upstream Level has failed to provide its stream equalization WADFs to a Downstream Level:

In this example, quality information is available for March, April and May, the Default WADF is calculated for the month of June.

EQ Scale penalty for the production months of March, April, May and June is:

- Density Penalty: 0.00 Cdn \$/m³ per Kg/m³ for density between 800-825 Kg/m³ and 0.49 Cdn \$/m³ per Kg/m³ for Density < 800 Kg/m³ or Density > 825 Kg/m³
- Sulphur Penalty: 1.38 Cdn \$/m³ per 0.1 wt.% sulphur. If the sulphur is greater than 0.5 wt.% the penalty will increase, if the sulphur is less than 0.5 wt.%, the penalty reverts to a credit.

Production Month	Volume Delivered (m ³)	Actual Density, kg/m ³	Actual Sulphur, %w	* Actual Upstream WADF, Cdn/m ³	Volume x Density, kg	(Volume x Density x Sulphur %) ÷ 100, kg
Mar	20,000	825.7	0.86	5.33	16,514,693.9	142,026.4
Apr	18,000	827.4	0.97	7.66	14,893,200.0	144,464.0
May	<u>21,000</u>	824.9	0.94	6.07	<u>17,323,151.6</u>	<u>162,837.6</u>
Total	59,000				48,731,045.4	449,328.0

*Actual Upstream WADF is calculated based on the current month EQ penalties. It is shown for reference and its value does not impact the calculation of the Default WADF.

June Default Quality (weighted average)

$$\begin{aligned}
 \text{Density, kg/m}^3 &= 48,731,045.4 \div 59,000 \\
 &= 825.9 \text{ Kg/m}^3 \\
 \text{Sulphur, \%w} &= 449,328.0 \div 48,731,045.4 \times 100 \\
 &= 0.92\%w
 \end{aligned}$$

June Default WADF = \$6.29/m³ (based on Default Quality – 825.9 Kg/m³ and 0.92%w sulphur content and the June EQ Scale)

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.

2.4.5 Procedure for Weighted Average Differential Factor (WADF) Discrepancies

The onus is on the Upstream Level to ensure the WADF is calculated in accordance with these procedures, and accurately represents the actual quality of the stream receipts. This will be achieved through application of best sampling practices, monitoring of actual receipts against Shipper reported quality, and integration of all receipt quality data into determination of stream WADF at all Equalized Facilities which are receiving Shipper volumes. Refer to the Testing Laboratory quality procedures in Attachment 4: Sampling and Testing Laboratory.

At the Downstream Level the WADF may not exactly match the receipt stream quality due to the inherent non-linearity of the WADF calculation process and the sampling infrastructure limitations.

The Equalization Steering Committee will monitor WADF's and available stream quality data to assess the overall performance of the equalization system. This monitoring will include collection of available quality data from downstream levels, comparison of an inferred WADF from that data to the reported WADF of the stream, and identification of variances between this inferred WADF and the reported WADF.

If this WADF variance is considered to be consistently outside of the range of values that can be explained by the various factors that can reasonably create WADF variances, the Equalization Steering Committee will initiate discussions with the upstream level to try to resolve the discrepancy.

Factors used by the Equalization Steering Committee to assess the reasonableness of variances will include:

- Variability of feeder streams into the upstream level
- Potential impact of non-linear quality variables on the WADF calculation – for example the potential effect of the non-linear nature of the density penalty when streams above and below 825 kg/m³ density are blended at the upstream level.
- Constraints in sample data availability at the downstream level.

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 Definitions Used in Timing Procedures, it shall, immediately process the revision and notify the Downstream Level and the Trunk Line. All affected Equalized Facilities will revise their equalization values in month 3. For example, a revision to the December 2021 WADF will only be accepted until the January 2022 shipper balance deadline of February 18th, 2022. 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 average sulphur and density. 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: Sampling and Testing Laboratory.

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 sampling at the source for 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 following the sampling protocol as per Attachment 4.

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

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) 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 who deliver volumes to an Equalized Facility.

The receipt point reporting requires the level of detail described in Section 2.8.2 Receipt Point Reporting and Attachment 8a. Specifically it should provide the Shipper the calculation of the differential for each facility where the Shipper has volume delivered to the Equalized Facility. Additionally, it should provide the total stream volume, and

calculated Density, Sulphur, and the Equalized Facilities WADF. The calculation of the WADF is described in Attachment 7- Weighted Average Differential Factor WADF's.

If there are concerns with the disclosure of this level detail providing sufficient verification of the accuracy of the WADF, an alternative method of verification may be arranged between shippers and the Equalization administrator.

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. Headings should confirm units, with density expressed in kg/m³ 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/m³ density.
- 4) Calculated quality differential \$/m³.
- 5) Test date and data source: The format for each inlet location is as follows:

xyymm

Where **x** is the data source and where **yymm** 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 \$/m³. Instances where a default quality (rolling average quality) 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.

2.8.3 Report Calculations

- 1) Weighted averages for density by volume and sulphur by weight² for the total stream. Required to periodically test the accuracy of quality data.
- 2) Total volume for both Equalized Facility and Shipper.
- 3) Total dollar value of quality reductions for both the 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.

2.8.4 Report Packaging³

- 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) Each page of the report should indicate the equalization month and system name.

² An example of a sulphur calculation is included in Attachment 7

³ A sample Crude Equalization statement is shown in Attachment 8a

2.9 Expenses

It is not intended that the administrator will profit in any way from the administration of the equalization process. 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 must be agreed upon between the system and its Shippers.

3 CONDENSATE EQUALIZATION PROCEDURES

3.1 Methodology

The methodology used for equalization across all systems is:

- 1) Each Equalized Facility will calculate its WADF in accordance with the process defined in Attachment 7 Weighted Average Differential Factor (WADF's). It will then pass on its calculated WADF and the associated quality characteristics (density, sulphur, C3- and total C4 content) for the total stream to the downstream facility. In turn, the downstream facility will incorporate this calculated upstream WADF directly into its equalization (see Attachment 7: Weighted Average Differential Factor (WADF's) 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: Sample of Condensate Equalization Statement

Timely is defined as follows:
 - All Equalized Facilities except Trunk Line : Statements are to be received by Shippers within one month of the production month.
 - Trunk Line: Statements are to be received by Shippers within six weeks of the production month. The two-week extension is allowed to facilitate incorporation of WADF's from feeder pipelines into the Trunk Line equalization statement.
 - See Section 3.4 Timing, for details.

- 3) If the calculated WADF 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 Penalty Scales

Scales will be calculated in accordance with the approved methodology as presented in Attachment 2: Condensate Equalization. Monthly scale updates will be issued by e-mail to all interested parties and they will be published on the www.industryeq.ca.

The following schematic depicts the density scale:

Condensate Scale - Density

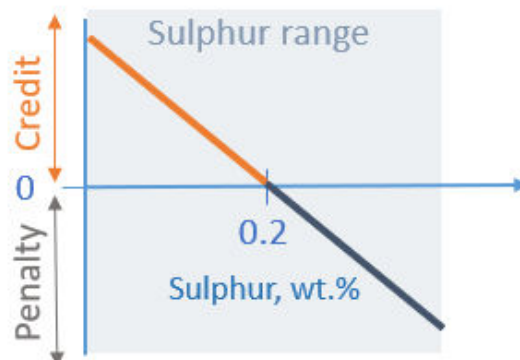


As shown above, the density scale:

- If density is less than 750.0 kg/m³, the density penalty reverts to a credit for lighter condensates;
- If density is greater than 750.0 kg/m³, a penalty per density point above 750 kg/m³ will be imposed.

The following schematic depicts the sulphur scale:

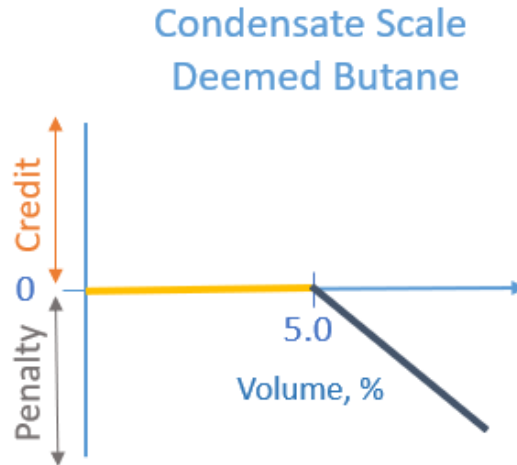
Condensate Scale - Sulphur



As shown above, 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.

The following schematic depicts the Deemed Butane scale:



As shown above, the Deemed Butane Penalty Scale:

For Deemed Butane greater than 5.0%vol the first 5.0%vol of the Deemed Butane will receive condensate price, and the portion over 5.0%vol will receive no value.

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”.

- Level 1 (L1) Facility – An Equalized Facility which flows into an equalized Trunk Line 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 defined as 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) Forecasting Calendar* to determine its deadline(s) for each month. Please refer to <http://www.colcomm.com/calendars.aspx> for specific dates.

- 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 the Trunk Line 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.
- Trunk Line 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.
- Trunk Line 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

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

- 1) For all Facilities except Trunk Line :
 - 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.
 - 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 in Month 3.
 - 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 the Trunk Line :
 - a) Each Shipper owing money into the equalization must submit a payment, which will be received by the Trunk Line on or before the 5th business day before the last business day in Month 3.

- b) Trunk Line will wait until all payments have been received before issuing any payments. Subject to this, the Trunk Line will issue payments to Shippers on the last business day in Month 3.
- c) In the event that all payments have not been received, the Trunk Line 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 and its associated quality characteristics (density, sulphur, C3-, and total C4 content) are not submitted to the Downstream Level by the required reporting deadline, the Downstream Level may apply a Default WADF. The Default WADF will be based on the weighted rolling average of the three most recent actual qualities from the subject Upstream Level and the corresponding EQ penalties to enable it to proceed with its necessary calculation.

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

For a new delivery, during the initial months, if the three previous actual qualities are unavailable, the most recent actual measured quality or, failing that, a default penalty that is consistent with the standard of the Downstream Level.

The following following is a calculation example of a weighted rolling average quality and Default WADF where an Upstream Level has failed to provide its stream equalization WADFs to a Downstream Level:

In this example, quality information is available for March, April and May, the Default WADF is calculated for the month of June.

EQ Scale penalties are:

EQ Scale	Density \$Cdn / m3 per kg/m3	Sulphur Cdn \$/m3 per 0.1 wt. %	C5 Allowance Price \$Cdn / m3
Mar	0.24	1.38	496.39
Apr	0.27	1.38	501.29
May	0.22	1.38	501.57
Jun	0.22	1.38	537.06

Production Month	Volume Delivered (m3)	Density, kg/m3	Sulphur, %w	C3-Content, %vol	C4 Content, %vol	Deemed Butane, %vol	* Actual Upstream WADF, Cdn/m3
Mar	20,000	725	0.08	0.050	5.200	5.350	\$ (5.92)
Apr	18,000	715	0.07	0.066	4.800	4.998	\$ (11.24)
May	21,000	720	0.08	0.050	4.600	4.750	\$ (8.26)

*Actual Upstream WADF is calculated based on the current month EQ penalties. It is shown for reference and its value does not impact the calculation of the Default WADF.

Production Month	Volume Delivered (m3)	Volume x Density, kg	Volume x Density x Sulphur % ÷ 100, kg	Volume x C3-Content, %vol	Volume x C4 Content, %vol	Volume x Deemed Butane, %vol
Mar	20,000	14,500,000.0	11,600.0	1,000.0	104,000.0	107,000.0
Apr	18,000	12,870,000.0	9,009.0	1,188.0	86,400.0	89,964.0
May	21,000	15,120,000.0	12,096.0	1,050.0	96,600.0	99,750.0
Total	59,000	42,490,000.0	32,705.0	3,238.0	287,000.0	296,714.0

June Default Quality (weighted average)

$$\begin{aligned} \text{Density, kg/m3} &= 42,490,000.0 \div 59,000 \\ &= 720.2 \end{aligned}$$

$$\begin{aligned} \text{Sulphur, \%w} &= 32,705.0 \div 42,490,000.0 \times 100 \\ &= 0.08 \end{aligned}$$

$$\begin{aligned} \text{C3- Content, \%vol} &= 3,238.0 \div 59,000 \\ &= 0.055 \end{aligned}$$

$$\begin{aligned} \text{C4 Content, \%vol} &= 287,000.0 \div 59,000 \\ &= 4.864 \end{aligned}$$

$$\begin{aligned}\text{Deemed Butane, \%vol} &= 296,714.0 \div 59,000 \\ &= 5.029\end{aligned}$$

June Default WADF = \$(8.10) Cdn/m³ (based on Default Quality and EQ Scale for the production month of June)

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.

3.4.5 Procedure for Weighted Average Differential Factor (WADF Discrepancies)

The onus is on the Upstream Level to ensure the WADF is calculated in accordance with these procedures, and properly represents the actual quality of the stream receipts. This will be achieved through application of best sampling practices, monitoring of actual receipts against Shipper reported quality, and integration of all receipt quality data into determination of stream WADF at all Equalized Facilities which are receiving Shipper volumes. Refer to the Testing Laboratory quality procedures in Attachment 4: Sampling and Testing Laboratory.

At the Downstream Level, the WADF may not exactly match the receipt stream quality due to the inherent non-linearity of the WADF calculation process and the sampling infrastructure limitations.

The Equalization Steering Committee will monitor WADF's and available stream quality data to assess the overall performance of the equalization system. This monitoring will include collection of available quality data from downstream levels, comparison of an inferred WADF from that data to the reported WADF of the stream, and identification of variances between this inferred WADF and the reported WADF.

If this WADF variance is considered to be consistently outside of the range of values that can be explained by the various factors that can reasonably create WADF variances, the Equalization

Steering Committee will initiate discussions with the upstream level to try to resolve the discrepancy.

Factors used by the Equalization Steering Committee to assess the reasonableness of variances will include:

- Variability of feeder streams into the upstream level
- Potential impact of non-linear quality variables on the WADF calculation – for example the potential effect of the non-linear nature of Deemed Butane penalty when streams above and below 5 % are blended at the upstream level.
- Constraints in sample data availability at the downstream level.

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 3.4.1 Definitions Used in Timing Procedures), it shall, immediately process the revision and notify the Downstream Level and the Trunk Line. All affected Equalized Facilities will revise their equalization values in month 3. For example, a revision to the December 2021 WADF will only be accepted until the January 2022 shipper balance deadline of February 18th, 2022.

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 average Sulphur, Density, C3-, and total C4 content. 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: Sampling and Testing Laboratory.

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 sampling at the source for any quality tests performed on field receipts and for deliveries from a non- equalized facility for equalization purposes on condensate 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.

- i) Unless otherwise agreed to by Shippers, equalization shall incorporate all condensates shipped through the system as a commingled stream.
- ii) 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 who deliver volumes to an Equalized Facility.

The receipt point reporting requires the level of detail described in Section 3.8.2 Receipt Point Reporting and Attachment 8b. Specifically it should provide the Shipper the calculation of the differential for each facility where the Shipper has volume delivered to the Equalized Facility. Additionally, it should provide the total stream volume, and calculated Density, Sulphur, C4, C3-, Deemed Butane, and the Equalized Facilities WADF. The calculation of the WADF is described in Attachment 7- Weighted Average Differential Factor WADF's.

If there are concerns with the disclosure of this level detail providing sufficient verification of the accuracy of the WADF, an alternative method of verification may be arranged between shippers and the Equalization administrator

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 should show Operator code, field/facility name and code, legal description, and field and battery codes.
- 2) Density, sulphur measurements, total Butane, and lighter volume composition (C3-, and total C4 content). Headings should confirm units, with density expressed in kg/m³, sulphur in weight percent and light ends in volume percent.
- 3) Qualities used in equalization calculations and reports should be rounded to the nearest 0.01% sulphur, to the nearest 0.1 kg/m³ density. Total Butane and lighter volume composition expressed in liquid volume percent rounded to the nearest 0.01%.
- 4) Deemed Butane expressed in volume percent. This value will be calculated by multiplying the C3 and lighter content by 3 and adding this value to the total C4 content.

$$\text{Deemed C4} = (\text{Volume \% of C3-} \times 3) + \text{Volume \% total Butane}$$

- 5) Calculated quality differential \$/m³.
- 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 \$/m³. Instances where a default quality (rolling average quality) 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) Weighted averages for Butane and lighter components (butane, propane, ethane, methane), and density by volume and sulphur by weight⁴: 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 packaging⁵

- 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) Each page of the report should indicate the equalization month and system name.

⁴ An example of a sulphur calculation is included in Attachment 7

⁵ A sample Condensate Equalization statement is shown in Attachment 8b.

3.9 Expenses

It is not intended that the administrator will profit in any way from the administration of the equalization process. 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 must be agreed upon between the system and its Shippers.

Attachment 1: Crude Oil Equalization

The crude density and sulphur penalties were initially established using a regression technique for estimating a value for each variable.

As the North American markets have become more volatile, it has become increasingly difficult to estimate directly the relative contribution of sulphur and density to short-term price variations in the crude markets. As a result, in recent years the density and sulphur penalties have been maintained at a fixed value that is based on a historical penalty that was calculated using the methodology below in a period when the market was more stable.

In 2014 the Shippers agreed that the penalties will remain at these values but that the Equalization Steering Committee would annually review the penalties to ensure that the continue to be fair to shippers and provide a reasonable basis for equalization penalties. The Equalization Steering Committee review consists of some or all of the following:

- A review of whether the Committee has received any concerns from Shippers about the magnitude of the penalty values
- Ongoing review of the behaviour of the industry to ensure that the penalties are not distorting the market

At the end of each calendar year, the Equalization Steering Committee advises the Shippers of its conclusions regarding the continuing acceptability of the current penalty values.

In 2024 the Shippers agreed to maintain the crude scale fixed indefinitely without the need for the Equalization Steering Committee annual review unless an industry concern is presented to the committee

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 Deemed Butane 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 Deemed Butane 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.

Deemed Butane 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 Deemed Butane content that is used for equalization purposes.

For equalization it is assumed that Deemed Butane 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 Deemed Butane 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 Deemed Butane content greater than 5.0%vol, the first 5.0%vol of the Deemed Butane will receive condensate price and the portion over 5.0%vol will receive no value.

For the purpose of calculating Deemed Butane content, the calculation will be rounded to the nearest 0.01 vol% of Deemed Butane.

The Equalization Steering Committee will provide Shippers and Pipelines with monthly values for condensate for use in the calculation of the Deemed Butane penalty. The Condensate Price will be the Condensate Allowance Price at Edmonton as provided monthly to the Equalization Steering Committee by Enbridge. In the event that the Condensate Allowance price is negative, the C4- penalty will be set at zero for that month.

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 behaviours 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, a weighted average of a variety of various Enbridge heavy crude allowance prices, 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 Allowance Price is calculated by weighted average of a conventional heavy allowance oil price and a thermal heavy allowance oil price. This ratio is consistent with other applications of the thermal to conventional ratio within the model. The conventional and thermal heavy allowance oil prices are calculated from the volume-weighted average of a variety of streams approved by Shippers. Allowance prices are provided monthly to the Equalization Steering Committee by Enbridge.
- 2) The Condensate Allowance Price is provided monthly to the Equalization Steering Committee by Enbridge.
- 3) 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.
- 4) Blending Efficiency penalty is determined by calculating the change of condensate value that is required as density varies to maintain the same bitumen realization
- 5) Blend Value penalty is determined by calculating the increase in value of the diluted blend as the amount of condensate in the blend increases.
- 6) Density Penalty Slope is calculated by adding the Blending Efficiency penalty and the Blend Value penalty.
- 7) The Diluent Density is the weighted average density for all condensate volumes received by Enbridge at Edmonton.
- 8) 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.
- 9) The Density Penalty Slope and Average Enbridge Condensate Density used in the equalization process are provided to pipelines monthly by the Equalization Steering Committee.

In the event that the calculated Diluent Density Penalty for any month is a negative value, the Diluent Density Penalty for that month will be set at \$0.00/m³ per kg/m³.

The density model is provided on the Equalization Steering Committee's website, www.industryeq.ca.

Heavy Allowance Oil Price

The heavy allowance oil price is calculated using the following:

- **HEAVY ALLOWANCE OIL PRICE_{Thermal}**: the thermal heavy allowance oil price is calculated from the volume weighted heavy allowance price for the Cold Lake and Enbridge Dilbit pool in Edmonton (currently the volume weighted price for AWB, BHB, CDB, KDB, SH, and WDB).
- **HEAVY ALLOWANCE OIL PRICE_{Conventional}**: the conventional heavy allowance oil price will be calculated from the volume-weighted average of the allowance oil price for the LLB, LLK, and Fosterton streams.

Heavy Allowance Oil Price: is calculated by averaging the price for a conventional heavy allowance oil price and a thermal heavy allowance oil price based on 84% of the thermal heavy price and 16% of the conventional heavy price.

This ratio was previously developed based on the western Canadian shipped heavy crude oil volumes and it is consistent with other applications of the thermal to conventional ratio within the model:

Heavy Allowance Oil Price

$$\begin{aligned} &= (\text{Heavy allowance oil price}_{\text{THERMAL}}) * 0.84 \\ &+ (\text{Heavy allowance oil price}_{\text{CONVENTIONAL}}) * 0.16 \end{aligned}$$

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 whenever the crude sulphur penalty is updated by the Equalization Steering Committee.

Reference Basis

The reference basis for the Condensate 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/m³

Sulphur: 0.2 wt%

Application of New Methodology Approved by Industry for 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.

**Attachment 3: Illustration of Level Reporting Deadlines for Crude Stream WADF's
[DELETED]**

Attachment 4: Sampling and Testing Laboratory

Sampling

Samples of streams entering an Equalized Facility should be taken periodically depending on the volume (large volumes sampled more frequently compared to smaller volumes) and historical quality fluctuations (unstable streams being tested more often than stable streams). Where available, composite samplers should be used to collect samples over a period of time. Where composite samplers are not installed, spot samples shall be taken. Best practices indicate that while crude samples can be collected in tin cans and plastic bottles for the determination of density and sulphur, condensate samples should be taken in pressurized cylinders to minimize the loss of light ends.

The collection of samples should follow API 8.1 Standard Practice for Manual Sampling of Petroleum and Petroleum Products and API 8.2 Standard Practice for Automatic Sampling of Petroleum and Petroleum Products.

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 or condensate) 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 light ends measurement to verify the accuracy/bias of results (using crude test samples 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 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

While it is recognized that the equalization process is based on the receipt quality at the first point of introduction into an equalized pipeline system, and while it is further recognized that the non-linear volumetric behaviour of certain aspects of the equalization system makes it unlikely that quality measured at a downstream location will match the WADF calculated at the upstream location, 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 because it is outside a reasonable level of variation.

Phase one of the process is to identify whether the differences between the Shipper'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's)

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/m³ density and 0.5 wt% sulphur for crude (Reference Crude) or 750 kg/m³ density, 0.2 wt% sulphur and 5.0%vol Deemed Butane for condensate (Reference 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 B and C under this attachment for an illustration of the WADF calculation.

Quality Calculations:

Density

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

Sulphur

The calculation of the weighted average sulphur is based on a mass weighted average of the individual receipt sulphur levels (a weight fraction). (see Table A below)

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. 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: Weighted Average Density and Sulphur Calculation

Example

	Volume, m3	Density, kg/m3	Sulphur, %w	Oil mass (Vol x Density), kg	Sulphur mass (Oil mass x Sulphur %w) / 100, kg
Battery 1	1,000.0	835.0	0.25%	835,000.0	2,087.5
Battery 2	2,000.0	825.0	0.34%	1,650,000.0	5,610.0
<u>Battery 3</u>	<u>3,000.0</u>	<u>830.0</u>	<u>0.12%</u>	<u>2,490,000.0</u>	<u>2,988.0</u>
TOTAL	6,000.0			4,975,000.0	10,685.5

Density:

$$\begin{aligned} \text{Total Oil mass/Total volume} &= 4,975,000.0 \div 6,000.0 \\ &= 829.17 \text{ kg/m}^3 \end{aligned}$$

Sulphur content:

Correct Method: calculating sulphur content as weighted average by mass

$$\begin{aligned} \text{Total Sulphur mass} \div \text{Total Oil mass} \times 100 &= 10,685.5 \div 4,975,000.0 \times 100 \\ &= 0.21\%w \end{aligned}$$

Incorrect Method: calculating sulphur content as a weighted average by volume. The following shows an illustration of the calculation done by the simpler, but inaccurate method of calculating the sulphur based on the crude volume.

	Volume, m3	Vol x Sulphur %w / 100
Battery 1	1,000.0	2.5
Battery 2	2,000.0	6.8
<u>Battery 3</u>	<u>3,000.0</u>	<u>3.6</u>
TOTAL	6,000.0	12.9

$$\begin{aligned} \text{Incorrect: Volume x Sulphur \% mass} \div \text{Total volume} \times 100 &= 12.9 \div 6,000.0 \times 100 \\ &= 0.22\% \end{aligned}$$

TABLE B illustration of the WADF calculation for Crude

In this example, EQ Scale penalty for the production month is:

- Density Penalty: 0.00 Cdn \$/m³ per Kg/m³ for density equal or greater than 800 kg/m³ but less than or equal to 825 kg/m³ and 0.49 Cdn \$/m³ per Kg/m³ for Density less than 800 Kg/m³ or Density greater than 825 Kg/m³
- Sulphur Penalty: 1.38 Cdn \$/m³ per 0.1 wt.% sulphur. If the sulphur is greater than 0.5 wt.% the penalty will increase, if the sulphur is less than 0.5 wt.%, the penalty reverts to a credit.

Example Crude	Company B 08-24-078-10W6	Comments
Density, kg/m ³	806.4	The density is greater than 800 kg/m ³ and less than 825 kg/m ³ . Density penalty is zero
Sulphur content, %w	0.26	
Differential Density Component	-	Differential Density Component = 0
Differential Sulphur Component	<u>(3.31)</u>	Differential Sulphur Component = 1.38 x 10 x (0.26 - 0.5) = (3.31)
Differential, (\$/M3)	(3.31)	Differential = Differential Density Component + Differential Sulphur Component = 0 + (3.31) = (3.31)

Example Crude	Company D 05-24-075-9W6	Comments
Density, kg/m ³	860.0	The density is greater than 825 kg/m ³ . Density penalty is 0.49 Cdn \$/m ³ per Kg/m ³
Sulphur content, %w	0.61	
Differential Density Component	17.15	Differential Density Component = 0.49 x (860.0 – 825.0) = 17.15
Differential Sulphur Component	<u>1.52</u>	Differential Sulphur Component = 1.38 x 10 x (0.61- 0.5) = 1.52
Differential, (\$/M3)	18.67	Differential = Differential Density Component + Differential Sulphur Component = 17.15 + 1.52 = 18.67

**Level 1 Equalized Facility
WADF Calculation**

Equalization Month: MMM-YY
 Feeder Pipeline : Level 1 Equalized Facility - 01
 Shipper: All
 Stream/Product: Y

Value = Differential x Volume

Operator	Location	Density (KG/M3)	Sulphur (%/W)	Differential (\$/M3)	Volume (M3)	Value (\$)
Company A	08-32-078-09W6	831.7	0.22	(0.58)	1,000.00	(581.00)
Company B	06-22-078-10W6	825.6	0.37	(1.50)	1,586.70	(2,380.05)
Company C	08-07-073-16W5	851.9	0.16	8.49	299.99	2,546.62
Company D	03-27-075-09W6	845.8	0.48	9.92	600.03	5,949.90
Company B	08-24-078-10W6	806.4	0.26	(3.31)	15,000.01	(49,680.03)
Company B	09-24-078-10W6	820.0	0.50	-	309.56	-
Company C	09-09-073-16W5	833.5	0.40	2.79	12,900.00	35,926.50
Company D	08-24-075-09W6	826.0	0.50	0.49	1,687.89	827.07
Company D	08-19-075-09W6	823.0	0.46	(0.55)	312.11	(172.28)
Company D	05-24-075-09W6	860.0	0.61	18.67	9,515.61	177,637.41

Level 1 Equalized Facility
 Aggregate Weighted Average and Totals:

829.4	0.40	3.94	43,211.90	170,074.12
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EQ Scale
 Density \$0.49
 Sulphur \$1.38

Facility WADF is calculated by dividing the total of the value column by the total volume. Applying the penalty scales to the stream average density and sulphur will not produce the correct WADF

TABLE C: illustration of the WADF calculation for Condensate

In this example, EQ Scale penalty for the production month is:

- Density Penalty: 0.33 Cdn \$/m3 per Kg/m3. If the density is greater than 750.0 kg/3, the penalty will increase, if the density is less than 750.0 kg/3, the penalty reverts to a credit. If the density is equal to 750.0 kg/m3, the penalty is zero.
- Sulphur Penalty: 1.38 Cdn \$/m3 per 0.1 wt.% sulphur. If the sulphur is greater than 0.2 wt.%, the penalty will increase, if the sulphur is less than 0.2 wt.%, the penalty reverts to a credit.
- C5 Allowance: 595.88 Cdn \$/m3. If Deemed C4 is greater than 5.0%vol the first 5.0%vol of the butane Deemed Butane will receive condensate price, and the portion over 5.0%vol will receive no value.

Example Condensate	Company B 06-22-078-10W6	Comments
Density, kg/m3	680.4	
Sulphur content, %w	0.08	
C3-, %vol	0.11	C3 and lighter components
C4, %Vol	3.74	Total C4 content = normal butane (nC4) + iso Butane (iC4)
Deemed C4, %Vol	4.07	Deemed C4 = 3 x C3- + C4 = 3 x 0.11 + 3.74 = 4.07
Differential Density Component	(22.97)	Differential Density Component = 0.33 x (680.4 – 750.0) = (22.97)
Differential Sulphur Component	(1.66)	Differential – Sulphur Component = 1.38 x 10 x (0.08 - 0.2) = (1.66)

Differential Deemed C4 Component	-	Deemed C4 is less than 5.0% Vol, therefore there is no penalty
Differential, (\$/M3)	(24.62)	Differential = Differential Density Component + Differential Sulphur Component + Differential Deemed C4 Component = (22.97) + (1.66) + 0 = (24.63)

Example Condensate	Company D 03-27-075-09W6	Comments
Density, kg/m3	758.4	
Sulphur content, %w	0.21	
C3-, %vol	1.19	C3 and lighter components
C4, %Vol	5.86	Total C4 content = normal butane (nC4) + iso Butane (iC4)
Deemed C4, %Vol	9.43	Deemed C4 = 3 x C3- + C4 = 3 x 1.19 + 5.86 = 9.43
Differential Density Component	2.77	Differential Density Component = 0.33 x (758.4 – 750.0) = 2.77
Differential Sulphur Component	0.14	Differential Sulphur Component = 1.38 x 10 x (0.21 - 0.2) = 0.14
Differential Deemed C4 Component	26.40	Differential Deemed C4 Component = C5 Allowance x (Deemed C4 – 5.0) ÷ 100 = 595.88 x (9.43 – 5.0) ÷ 100 = 26.40
Differential, (\$/M3)	29.31	Differential = Differential Density Component + Differential Sulphur Component + Differential Deemed C4 Component = 2.77 + 0.14 + 26.40 = 29.31

Level 1 Equalized Facility
WADF Calculation

Equalization Month: MMM-YY
Feeder Pipeline : Level 1 Equalized Facility - 01
Shipper: All
Stream/Product: Y

Value = Differential x Volume

Operator	Location	Density (KG/M3)	Sulphur (%/W)	C3- (% Vol)	C4 (%Vol)	Deemed C4 (%Vol)	Differential (\$/M3)	Volume (M3)	Value (\$)
Company A	08-32-078-09W6	722.4	0.17	0.49	4.43	5.90	(4.159)	1,050.00	(4,367.03)
Company B	06-22-078-10W6	680.4	0.08	0.11	3.74	4.07	(24.624)	2,450.00	(60,328.80)
Company C	08-07-073-16W6	765.9	0.11	0.71	4.51	6.64	13.777	1,250.00	17,221.79
Company D	03-27-075-09W6	758.4	0.21	1.19	5.86	9.43	29.307	1,900.00	55,684.22
Company E	08-07-073-16W6	672.8	0.02	0.09	3.18	3.45	(27.960)	1,150.00	(32,154.00)

Level 1 Equalized Facility
Aggregate Weighted Average and Totals:

717.6	0.12	0.52	4.39	5.94	-3.07	7,800.00	-23,943.82
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EQ Scale

Density 0.33
Sulphur 1.38
C5 Allowance 595.88

Facility WADF is calculated by dividing the total of the value column by the total volume. Applying the penalty scales to the stream average Deemed butane, density and sulphur will not produce the correct WADF

Attachment 8a: Sample of Crude Oil Equalization Statement

Level 1 Equalized Facility Shipper inputs (1)

Equalization Month: MMM-YY
 Feeder Pipeline : Level 1 Equalized Facility - 01
 Shipper: ABC Company
 Stream/Product: Y

Operator	Location	Density (KG/M3)	Sulphur (%/W)	Differential (\$/M3)	Volume (M3)	Value (\$)
Company A	08-32-078-09W6	831.7	0.22	(0.58)	829.80	(482.11)
Company B	06-22-078-10W6	825.6	0.37	(1.50)	1586.70	(2380.05)
Company C	08-07-073-16W5	851.9	0.16	8.49	232.50	1973.69
Company D	03-27-075-09W6	845.8	0.48	9.92	499.10	4949.08
Shipper Weighted Average and Totals:		832.4	0.33	1.29	3,148.10	4,060.60
Level 1 Equalized Facility						
Aggregate Weighted Average and Totals:		829.4	0.40	3.94	43,211.90	170,074.12

2.8.1 (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

2.8.1 (2) Shippers are not entitled to data on crude input into an equalized system by another shipper, except on aggregate Detail on Aggregate Stream can validate stream WADF

EQ Scale
 Density \$0.49
 Sulphur \$1.38

Level 1 Equalized Facility Example of Equalization Invoice (2)

Shipper: ABC Company
 Equalization Month: MMM-YY
 Feeder Pipeline: Level 1 Equalized Facility - 01
 Feeder Pipeline WADF (L1 WADF): 3.94
 Shipper WADF: 1.29

	(L1 WADF) Stream WADF (\$/M3)	Shipper WADF (\$/M3)	Shipper Volume (M3)	Amount (\$)	Tax (\$)	Total (\$)
Invoice Total	3.94	1.29	3148.10	(8329.74)	(416.49)	(8746.23)

Level: Mainline Equalization Invoice

Stream Group:
 Shipper: ABC Company
 Equalization Month: MMM-YY
 Effective Date: mmm/dd/yy
 Pipeline Stream WADF 6.05

Feeder	Pipeline		Shipper		Stream WADF Applied Amount (\$)	Gross (\$)	Tax (\$)	Total (\$)	
	Feeder WADF (\$/M3)	Receipt Volume (M3)	Total Amount (\$)	Receipt Volume (M3)					Total Amount (\$)
Level 1 Equalized Facility - 01	3.94	43,211.90	170,074.12	3,148.10	12,390.34	19,041.04	(6,650.70)	(332.53)	(6,983.23)
Level 1 Unequalized Facility - 01	5.15	48,546.00	250,011.90	-	-	-	-	-	-
Level 1 Unequalized Facility - 02	8.17	63,587.00	519,505.79	-	-	-	-	-	-
Totals:	6.05	155,344.90	939,591.81	3,148.10	12,390.34	19,041.04	(6,650.70)	(332.53)	(6,983.23)

Attachment 8b: Sample of Condensate Equalization Statement

Level 1 Equalized Facility Shipper Inputs (1)

Equalization Month:
Feeder Pipeline :
Shipper:
Stream/Product:

MMM-YY
Level 1 Equalized Facility - 01
ABC Company
Y

Operator	Location	Density (KG/M3)	Sulphur (%/W)	C3- (% Vol)	C4 (% Vol)	Deemed C4 (% Vol)	Differential (\$/M3)	Volume (M3)	Value (\$)	
Company A	08-32-078-09W6	722.4	0.17	0.49	4.43	5.90	(4.159)	200.00	(831.82)	
Company C	08-07-073-16W5	765.9	0.11	0.71	4.51	6.64	13.777	750.00	10,333.07	
Company D	03-27-075-09W6	758.4	0.21	1.19	5.86	9.43	29.307	1500.00	43,961.23	
Shipper Weighted Average and Totals:		757.8	0.18	0.99	5.33	8.29	21.82	2,450.00	53,462.48	
Level 1 Equalized Facility Aggregate Weighted Average and Totals:		717.6	0.12	0.52	4.39	5.94	-3.07	7,800.00	-29,943.82	
EQ Scale		Density 0.33	Sulphur 1.38							CS Allowance 995.88

3.8.1 (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

3.8.1 (2) Shippers are not entitled to data on crude input into an equalized system by another shipper, except on aggregate

Level 1 Equalized Facility Example of Equalization Invoice (2)

Shipper

ABC Company

Equalization Month

MMM-YY

Feeder Pipeline

Level 1 Equalized Facility - 01

Feeder Pipeline WADF (L1 WADF)

-3.07

Shipper WADF

21.82

Invoice Total	(L1 WADF)		Shipper Volume (M3)	Amount (\$)	Tax (\$)	Total (\$)
	Stream WADF (\$/M3)	Shipper WADF (\$/M3)				
	(3.07)	21.82	2,450.00	60,983.30	3,049.17	64,032.47

Level: Mainline Equalization Invoice

Stream Group:

ABC Company

Shipper:

MMM-YY

Equalization Month

mmm/dd/yy

Effective Date:

-1.40

Pipeline Stream WADF

Feeder	Pipeline			Shipper		Stream WADF			
	Feeder WADF (\$/M3)	Pipeline Receipt Volume (M3)	Total Amount (\$)	Receipt Volume (M3)	Total Amount (\$)	Stream WADF Applied Amount (\$)	Gross (\$)	Tax (\$)	Total (\$)
Level 1 Equalized Facility - 01	(3.07)	7,800.00	(23,943.82)	2,450.00	(7,520.82)	(3,436.36)	(4,084.45)	(204.22)	(4,288.68)
Level 1 Equalized Facility - 02	-6.05	48,546.00	(293,703.30)	-	-	-	-	-	-
Level 1 Equalized Facility - 03	2.35	63,587.00	149,429.45	-	-	-	-	-	-
Totals:	-1.40	119,933.00	(168,217.67)	2,450.00	(7,520.82)	(3,436.36)	(4,084.45)	(204.22)	(4,288.68)