



## GIBSON ENERGY INFRASTRUCTURE PARTNERSHIP

### SCHEDULE 1

ISSUED: February 2<sup>nd</sup>, 2021

### **CRUDE PETROLEUM SPECIFICATIONS**

Without limiting the provisions of Section 7 Crude Petroleum Specifications of the Rules and Regulations, all Tendered Crude Petroleum shall meet the following specifications using the latest version of the indicated standard or test method, unless otherwise agreed to in writing. Where more than one standard or test method is shown for a specification, the standard or test method to be used in each situation shall be at the sole discretion of Gibson. The following specifications in conjunction with Tables 1 & 2 provide the required test methods, applicability to the Crude Petroleum type, and the acceptable range of each parameter for crude tendered at the Hardisty and Edmonton terminals. Obtaining a sample of Crude Petroleum for Quality determination shall be carried out utilizing an appropriate ASTM sampling procedure as specified by Gibson or referenced as part of the test method. In the instance whereby Crude Petroleum is received and such Crude Petroleum does not fall within the predefined stream Quality Parameters, Gibson will evaluate the acceptability of the Crude Petroleum.

Where a downstream facility or pipeline may have more stringent Crude Petroleum Specification(s), it is the Shipper's responsibility to ensure their product quality meets the downstream specification(s).

For the purpose of Quality determination Gibson reserves the right to utilize online real-time measurement devices. Such devices may be utilized provided their performance is within a tolerance acceptable to Gibson and consistent with general industry practice.

**Density:** ASTM D1298 or D5002.

The following density requirements apply to Crude Petroleum types. For Crude Petroleum that is nominated or received that does not fall within the below density ranges applicable to the defined streams, Gibson shall direct the related volume using its own discretion. Product density will be held to the following limitations on receipt unless Gibson has specified other location-specific limits in writing.

- The Diluent stream density shall be less than or equal to 775 kg/m<sup>3</sup>, and greater than or equal to 600 kg/m<sup>3</sup>.
- The Mixed Sweet stream and Medium Sour stream density shall be less than 876 kg/m<sup>3</sup>, and greater than 799 kg/m<sup>3</sup>.
- The Heavy Sour stream density shall be less than or equal to 940 kg/m<sup>3</sup>, and greater than 904 kg/m<sup>3</sup>, exclusive of receipts by truck.



**Sulphur Content:** ASTM D4294 or D2622

The maximum sulfur content for the Mixed Sweet stream for crude tendered shall be:

- a) at the Hardisty Terminal less than or equal to 0.45wt%,
- b) at the Edmonton Terminal less than or equal to 0.50wt%.

**Vapour Pressure (VPCR 4:1, T<sub>m</sub> 37.8C):** ASTM D6377

The maximum vapour pressure shall be:

- a) 100 kPa on the diluent stream
- b) 95 kPa on the mixed sweet and medium sour streams
- c) 76 kPa on the heavy stream during the period of December 1<sup>st</sup> – April 30<sup>th</sup>
- d) 70 kPa on the heavy stream during the period of May 1<sup>st</sup> – November 30<sup>th</sup>

If Tendered Crude Petroleum is received having a vapour pressure in excess of this specification, at Gibson's sole discretion a penalty adjustment equal to the Tendered volume multiplied by a penalty factor may be deducted. The penalty factor, expressed as a percentage, shall be equal to 20% of the amount by which the vapour pressure exceeds the vapour pressure specification.

**Sediment & Water (Volume Percentage):** ASTM D4007 or D4807 and D4377 or D4928

When ASTM D4377 or D4928 methods, which determine only the water content, are used ASTM D4807 or ASTM D4007 may be used to determine the sediment content and the two results shall be added together.

The maximum Sediment & Water ("S&W") content shall be 0.50%. If the Tendered Crude Petroleum has a S&W content in excess of this specification, at Gibson's sole discretion a penalty adjustment equal to the amount that the S&W content is in excess of the specification multiplied by the Tendered volume may be deducted in addition to the deduction for the full amount of the S&W content.

**Sulphate Reducing Bacteria:** ASTM D4412

Test results shall be negative.

**Organic Halides:** ASTM D4929

The test shall be conducted on the Naphtha fraction as prescribed in the test method. Crude Petroleum shall be free of organic halides and undetectable within the test limits.



**Phosphorous in Volatile fraction:** ICP AES

Phosphorus quantification is based on the D86 Naphtha cut test method, as developed between Maxxam Analytics and the Canadian Crude Quality Technical Association by Inductively Coupled Plasma analysis. Crude Petroleum shall not contain phosphorous levels greater than 1.0 mg/kg.

**Cracked Materials (Olefins):** HNMR

Crude Petroleum shall be free of cracked material within the limitations of the test method.

**Total Acid Number (TAN):** ASTM D664

Crude Petroleum Tendered into the Gibson Hardisty Terminal, the Gibson Edmonton Terminal, or into the Gibson Pipelines shall have a Total Acid Number (TAN) not greater than:

- a) 1.0 mg KOH/g for the Heavy Sour stream, or
- b) 0.5 mg KOH/g for the Medium Sour stream.

If Tendered Crude Petroleum has a TAN in excess of these specification, at Gibson's sole discretion, a volumetric penalty calculated by the formula below may be applied

TAN Volumetric Penalty = Gross Standard Volume \* (TAN Specification Exceedance \* 0.038)

**Temperature:** MPMS Chapter 7

For receipts into the Gibson Pipelines the temperature of Tendered Crude Petroleum shall not be more than 38°C, unless Gibson has specified other location-specific limits in writing, and shall be of sufficient temperature to enable the Tendered Crude Petroleum to flow readily to Gibson's LACT Equipment.

For pipeline receipts into the Gibson Hardisty Terminal, or the Gibson Edmonton Terminal the temperature of Tendered Crude Petroleum shall not be more than 38°C, unless Gibson has specified other stream-specific limits in writing.

For receipts into the Gibson Hardisty Truck Terminal the temperature of Tendered Crude Petroleum shall not be more than:

- a) 38°C if the density is less than 775 kg/m<sup>3</sup>, or
- b) 85°C if the density is equal to or greater than 775 kg/m<sup>3</sup> unless Gibson has specified other location-specific limits in writing.

For receipts into the Gibson Edmonton Truck Terminal the temperature of Tendered Crude Petroleum shall not be more than:

- a) 38°C if the density is less than 775 kg/m<sup>3</sup>, or
- b) 50°C if the density is equal to or greater than 775 kg/m<sup>3</sup> unless Gibson has specified other location-specific limits in writing.



**Viscosity:** ASTM D7042

The following viscosity limits will be applied to receipts into the Hardisty and Edmonton terminals by pipeline:

- The viscosity of mixed sweet and medium sour streams will be at minimum 2cSt and at maximum 20cSt measured at Enbridge mainline reference temperature.
- The viscosity on the heavy sour stream will be at minimum 100cSt and at maximum 350cSt measured at Enbridge mainline reference temperature.
- The viscosity on the diluent stream will be at maximum 2cSt measured at Enbridge mainline reference temperature.

**Blending Shrinkage:** API 2509C

Where applicable the method to be used to determine the quantity of blending shrinkage for all streams shall be the method described in API 2509C. When iterative procedures are used to determine the volume of diluent required or allocated, the number of iterations used shall be consistent with standard industry practice. Gibson may use alternate industry accepted shrinkage methods at Gibson's sole discretion.

**Hydrogen Sulphide (H<sub>2</sub>S):** UOP-163

The maximum content of Hydrogen Sulphide (H<sub>2</sub>S) contained in the liquid phase of Tendered Crude Petroleum is as follows:

- a) 400 mg/kg for Crude Petroleum with a density >775 kg/m<sup>3</sup> received by pipeline
- b) 100 mg/kg for Crude Petroleum with a density >775 kg/m<sup>3</sup> received by truck.
- c) 20 mg/kg for Crude Petroleum with a density ≤775 kg/m<sup>3</sup> received by truck.

Tendered Crude Petroleum with levels in excess of the above prescribed amounts may be accepted at Gibson's sole discretion and may be subject to other conditions including but not limited to additional testing, volume limits, time of delivery windows, etc.

If an H<sub>2</sub>S Scavenger additive has been utilized, it must be of a chemical type which has been industry endorsed and accepted.

**Total Filterable Solids:** ASTM D4807

The maximum content of filterable solids of Tendered Crude Petroleum with a density ≤775 kg/m<sup>3</sup> is less than or equal to 200 mg/kg.



**Micro Carbon Residue:** ASTM D4530

The maximum micro carbon residue content of Tendered Crude Petroleum shall be:

- a) less than or equal to 0.5% by mass for the Diluent stream,
- b) less than or equal to 6.0% by mass for the Medium Sour stream,
- c) unless Gibson has specified other location-specific limits in writing.

**Oxygenates: ASTM D6729 PONAOX**

The maximum oxygenates content of Tendered Crude Petroleum with a density  $\leq 775\text{kg/m}^3$  shall be less than or equal to 100ppm.

**Deleterious Materials**

Tendered Crude petroleum shall be free of deleterious materials outside of qualities specified above, as evaluated and accepted by Gibson.

**Table 1 – Summary of Crude Petroleum Specifications Hardisty Terminal<sup>1</sup>**

Quality Parameter <sup>2</sup>	Unit of Measure	Test Method	Petroleum Crude			
			Heavy Sour	Medium Sour	Mixed Sweet	Diluent <sup>3</sup>
Density	kg/m <sup>3</sup>	ASTM D5002, D1298	≥ 904 ≤ 940 <sup>4</sup>	< 876 > 799	< 876 > 799	≤ 775 ≥ 600
Vapour Pressure (VP)	kPa	ASTM D6377 @ V:L ratio of 4:1	< 76 Dec-Apr < 70 May-Nov	≤ 95	≤ 95	≤ 100
Sediment and Water	Volume %	ASTM D4007	≤ 0.5	≤ 0.5	≤ 0.5	≤ 0.5
Water	Volume %	ASTM D4377, D4928	≤ 0.5	≤ 0.5	≤ 0.5	≤ 0.5
Total Filterable Solids	mg/kg	ASTM D4807 Procedure 'C'	N/A	N/A	N/A	≤ 200
Hydrogen Sulfide (Pipeline receipt) Hydrogen Sulfide (Truck receipt)	mg/kg	UOP-163	≤ 400 ≤ 100	≤ 400 ≤ 100	≤ 400 ≤ 100	≤ 20 ≤ 20
Organic Halides	mg/kg	ASTM D4929	< 1	< 1	< 1	< 1
Olefins	Weight %	HNMR	< 1	< 1	< 1	< 1
Phosphorus	mg/kg	ICP-AES	< 1.0	< 1.0	< 1.0	< 1.0
Total Acid Number (TAN)	mg KOH/g	ASTM D664	≤ 1.0	≤ 0.5	N/A	N/A
Viscosity	cSt	ASTM D7042 at reference temperature	≥ 100 ≤ 350	> 2 ≤ 20	> 2 ≤ 20	≤ 2
Sulfur	Weight %	ASTM D4294	N/A	N/A	≤ 0.45	≤ 0.50
Micro Carbon Residue	Mass %	ASTM D4530	N/A	≤ 6.0	N/A	≤ 0.5
Receipt Temperature Terminal or Pipeline	°C	API MPMS 7	≤ 38 or per agreement	≤ 38	≤ 38	≤ 38
Receipt Temperature Trucked	°C	API MPMS 7	≤ 85	≤ 85	≤ 85	≤ 38
Oxygenates	wppm	ASTM D6729	N/A	N/A	N/A	< 100

<sup>1</sup> Table 1 is included as a summary to Schedule 1; in the event of a discrepancy between the Schedule and the Table, the parameters within the Schedule shall take precedence.

<sup>2</sup> Quality Parameters are referenced at standard conditions of 15°C and 101.325 kPa, or as specified in the respective Test Method(s).

<sup>3</sup> For the purposes of Table 1, Diluent is defined as any hydrocarbon composition meeting the requirements of the Diluent Column.

<sup>4</sup> Exclusive of receipts by truck.

**Table 2 – Summary of Crude Petroleum Specifications Edmonton Terminal<sup>5</sup>**

Quality Parameter <sup>6</sup>	Unit of Measure	Test Method	Petroleum Crude			
			Heavy Sour	Medium Sour	Mixed Sweet	Diluent <sup>7</sup>
Density	kg/m <sup>3</sup>	ASTM D5002, D1298	≥ 904 ≤ 940 <sup>8</sup>	< 876 > 799	< 876 > 799	≤ 775 ≥ 600
Vapour Pressure (VP)	kPa	ASTM D6377 @ V:L ratio of 4:1	< 76 Dec-Apr <70 May-Nov	≤ 95	≤ 95	≤ 100
Sediment and Water	Volume %	ASTM D4007	≤ 0.5	≤ 0.5	≤ 0.5	≤ 0.5
Water	Volume %	ASTM D4377, D4928	≤ 0.5	≤ 0.5	≤ 0.5	≤ 0.5
Total Filterable Solids	mg/kg	ASTM D4807 Procedure 'C'	N/A	N/A	N/A	≤ 200
Hydrogen Sulfide (Pipeline receipt) Hydrogen Sulfide (Truck receipt)	mg/kg	UOP-163	≤ 400 ≤ 100	≤ 400 ≤ 100	≤ 400 ≤ 100	≤ 20 ≤ 20
Organic Halides	mg/kg	ASTM D4929	< 1	< 1	< 1	< 1
Olefins	Weight %	HNMR	< 1	< 1	< 1	< 1
Phosphorus	mg/kg	ICP-AES	< 1.0	< 1.0	< 1.0	< 1.0
Total Acid Number (TAN)	mg KOH/g	ASTM D664	≤ 1.0	≤ 0.5	N/A	N/A
Viscosity	cSt	ASTM D7042 at reference temperature	≥ 100 ≤ 350	> 2 ≤ 20	> 2 ≤ 20	≤ 2
Sulfur	Weight %	ASTM D4294	N/A	N/A	≤ 0.5	≤ 0.5
Micro Carbon Residue	Mass %	ASTM D4530	N/A	≤ 6.0	N/A	< 0.5
Receipt Temperature Terminal or Pipeline	°C	API MPMS 7	≤ 38 or per agreement	≤ 38	≤ 38	≤ 38
Receipt Temperature, Trucked	°C	API MPMS 7	≤ 50	≤ 50	≤ 50	≤ 38
Oxygenates	Wppm	ASTM D6729	N/A	N/A	N/A	< 100

<sup>5</sup> Table 2 is included as a summary to Schedule 1; in the event of a discrepancy between the Schedule and the Table, the parameters within the Schedule shall take precedence.

<sup>6</sup> Quality Parameters are referenced at standard conditions of 15°C and 101.325 kPa, or as specified in the respective Test Method(s).

<sup>7</sup> For the purposes of Table 2, Diluent is defined as any hydrocarbon composition meeting the requirements of the Diluent Column.

<sup>8</sup> Exclusive of receipts by truck.