

**BLUESTEM PIPELINE LLC
MEASUREMENT PROCEDURES
September, 2020**

1. General

- (A) Installation, operation, testing and maintenance of primary measurement elements, recording devices, sampling equipment, data transmission equipment and analysis of samples shall be in accordance with the latest edition of the API Manual of Petroleum Measurement Standards (API MPMS) and GPA Midstream Association (GPA) standards. Industry standards and publications referenced herein shall mean the latest revision. Revision of an industry standard will apply on the effective date of the revised standard. A detailed list of standards and publications is provided at the end of this document.
- (B) Measurement Basis. The Product measured at the Measurement Point shall be measured by using mass measurement techniques.
- (C) Limitation to Revisions. Revisions to such API MPMS and GPA standards and publications shall apply to computations and operation of measurement stations but shall not be construed to require major modifications to, or replacement of, said equipment.
- (D) Flow Metering. A custody measurement station will, in Carrier's sole discretion, be comprised of:
 - 1. A Coriolis meter, and microprocessor
- (E) Analysis Determination. Carrier's primary method for analysis determination will be based on a composite sample obtained and analyzed for every batch. Carrier will also install an online chromatograph at the custody measurement station..
- (F) Definitions.
 - 1. "Measurement Point" shall be any Origin or Destination set forth in the Tariff
 - 2. "Pound" shall mean 16 ounces avoirdupois.
 - 3. "Product" shall mean "NGLs", as defined in the Tariff.
 - 4. "Standard Conditions" shall mean Product at a temperature of 60 degrees Fahrenheit and at the equilibrium vapor pressure of the liquid being measured.
 - 5. "Tariff. The Bluestem Pipeline LLC's FERC ICA Oil Tariff that may be amended from time to time in Bluestem's sole discretion.
- (G) Capitalized Terms. With the exception of references to technical publications, unless specifically provided otherwise, all capitalized terms used herein have the same meaning as provided in the Tariff.

2. Responsibility

- (A) Custody Transfer Point. The point of custody transfer for Product shall be the Measurement Point.
- (B) Custody Transfer Party. Carrier, or its designee, will measure and account for the quantity and quality of the Product flowing at the Measurement Point.

3. Equipment

- (A) Design Pressure. The custody measurement stations shall be capable of measuring Product flowing hereunder at pressures up to 1,440 psig.
- (B) Microprocessor. The measurement station shall include a microprocessor meeting the requirements of API MPMS Chapter 21.2 and capable of continuously integrating

metered quantities and reporting in gross Pounds and gross Barrels as applicable for the Product.

- (C) Analysis and Composition. The metering facility for Product shall include an on-line gas chromatograph to obtain a representative sample of the Product. The on-line gas chromatograph data will be collected to produce an analysis at the end of each metering period that is in proportion to the metered quantity. The analysis of the liquids shall be secured throughout the entire metering period. Carrier, at its sole discretion, will compare the on-line gas chromatograph results to those from the composite sampler for validation purposes.
- (D) Quantity. The equipment used in the meter station (as applicable) shall conform to the following standards and publications.
 - 1. Coriolis Meter(s) shall be installed and operated in accordance with API MPMS Chapter 5, Section 6 and manufacturer's recommendations.

4. **Operation**

- (A) Flow Meter Backpressure. The metering backpressure will be a minimum of the sum of 1.25 times the stream bubble point pressure at flowing temperature plus two times the differential pressure across the meter at flowing conditions.
- (B) Densitometer. The densitometer will measure density in grams per cubic centimeter at flowing conditions.

5. **Proving & Calibration**

- (A) Pressure and Temperature Devices. Instrumentation, including static pressure, temperature and any chart recorders, shall be tested and accuracy verified at least quarterly with a full calibration performed at least annually. Instrument calibration and repairs shall be made when the test results exceed the tolerances specified by Carrier's measurement procedures.
- (B) Quantity Devices. The flow and density meter(s) (where applicable) will be proven no less frequently than every batch or monthly during the delivery period. Carrier or its designee will prove the meter(s) at the metering stations
 - 1. Coriolis. The meter correction factor shall be established at flowing conditions in accordance with API MPMS Chapter 4 and Chapter 5.6 with a targeted run uncertainty of +/-0.027% or less as defined in API MPMS Chapter 4.8. A Coriolis meter shall not be removed from service for maintenance without first proving such meter. The meter correction factor so determined shall be used in accordance with Paragraph 8(A) herein, Factor Deviation.
 - 2. Densitometer. If a densitometer is used to determine mass indirectly either at the meter or prover, then the accuracy of the densitometer shall be verified Monthly by calibrating and proving the instrument in accordance with API MPMS Chapter 9, Section 4 and the manufacturer's recommendations. Three (3) provings shall be performed to establish the densitometer correction factor. The determined densitometer correction factor thus obtained shall be applied to the daily registered meter reading. The average of the three provings shall be taken as the densitometer correction factor if the three provings are within 0.05% of each other. A densitometer shall not be removed from service for maintenance without first proving such densitometer. The densitometer correction factor so determined shall be used in accordance with Paragraph 8(A) herein, Factor Deviation.

- (C) Unscheduled Calibrations. Either Party may ask for an unscheduled flow meter or densitometer calibration at any time. The Party requesting the unscheduled proving shall bear the expense of the special proving if the correction factor deviates less than 0.25% from the previous factor. However, in order to have a meter ticket adjustment, the Parties shall follow the procedures in Paragraph 7(A) herein, Objections and Challenges.

6. Calculation

(A) Mass Measurement.

1. Quantity. Where the Tariff specifies a mass measurement basis, the quantity of Product measured at the Measurement Point shall be calculated by mass measurement procedures in accordance with API MPMS and GPA standards. The determined mass in Pounds shall be converted to component barrels by applying the flow-weighted analysis for the flow period in accordance with GPA Standard 8173 using weight-in-vacuum factors from GPA Standard 2145.
2. Analysis. Samples of Product will be analyzed using gas chromatography methods in accordance with GPA Standard 2177, latest edition. The composition of the representative sample(s) of Product for each metering period shall be applied proportionately to the quantity measured during the period covered by the sample(s). The values of nitrogen, carbon dioxide and natural gas hydrocarbons C₁ through C₆₊ shall be determined.
 - a) GPA 2145 Constants. The conversion constants for nitrogen, carbon dioxide, propylene and C₁ through C₅ shall be in accordance with GPA Standard 2145, latest revision.
 - b) Hexane and Heavier Characterization. Where hexane and heavier components are present, the individual components of C₆₊ shall be analyzed and used to determine the weighted average molecular weight and density of the hydrocarbons from a representative sample. GPA Standard 2186 shall be used for extended analysis to quantify C₆₊ or C₇₊ composition. Physical properties contained in GPA Standard ~~Technical Publication~~ 2145 shall be used in the calculation of the averages. The average determination shall be made once per quarter for on-line analysis and once per sample for each composite sample.

7. Objections and Challenges

- (A) Volume and/or Mass. Shipper, within one Month after the end of the measurement period, may challenge the ticketed volume and/or mass by submitting a written objection to Carrier. Using the methods described in Paragraph 8(D) of this Exhibit, the Parties may agree to a volume, an average temperature, an average pressure, and/or an average density during the time of the measurement disagreement, and the meter ticket may be adjusted according to Paragraph 8(B) herein. If the Parties cannot agree, either Party may ask for an unscheduled flow meter or densitometer calibration and the meter ticket may be adjusted according to Paragraph 8(B) herein.
- (B) Analysis. Shipper, within fifteen (15) Days after the end of the measurement period, may challenge the analysis by submitting a written objection to Carrier. If Shipper and Carrier cannot agree on the analysis for a measurement period, the remaining portion of the sample from an installed composite sampler shall be sent to a mutually agreeable outside laboratory for analysis and that analysis utilized for the measurement period. Charges for such referee analysis shall be borne by the Party

requesting the referee analysis, if the referee analysis indicates the original analysis is within tolerances specified in the appropriate GPA standards. If there is no sample available for analysis, Shipper and Carrier shall follow the procedures in Paragraph 8(C) herein, Error Correction.

8. Error Correction

(A) Factor Deviation.

1. Less than +/- 0.25%. If the meter or densitometer correction factor deviates less than +/-0.25% from one scheduled proving to the next, the effective date of the correction factor shall be the date of the proving and shall remain in effect until the next proving.
2. More than +/- 0.25%. If the meter or densitometer correction factor deviates more than +/-0.25% corrective action may need to be performed on the meter. It shall be the decision of Carrier as to the scope of any corrective action to be taken, if any. The effective date of the new correction factor shall be the date on which an event occurred which is known to have changed the correction factor, or if such date is not known, then the affected metering period is determined in accordance with Paragraph (B) herein.
3. More than +/- 0.50%. Should the new meter correction factor deviate more than +/-0.50%, and in addition to Paragraph 2 of this section, Carrier shall proceed with diligence to effect maintenance, repair or replacement of the meter. A new turbine element will not be proved before a 24-hour break-in period. The proving after the break-in period will provide the meter correction factor which will be effective the date of the new element installation. This factor will be used until the next scheduled proving.

(B) Mass & Volume. If, upon calibration or proving, the meter does not meet requirements given, then any previous recording of such equipment shall be corrected for any period which is known or agreed upon, but in case the period is not known or agreed upon, such correction shall apply to one-half (½) the total volume measured since the date of the last calibration (proving). However, this correction shall not exceed one Month.

(C) Analysis. If the on-line chromatograph and/or composite sampler should fail or is out of service, or the analysis is not representative of the liquid metered at the custody transfer station, the composition shall be determined from one of the following methods in the order stated:

1. By using the composition from Carrier's on-line gas chromatograph equipment typically used for custody transfer; or
2. By using the composition of the composite sample as determined by Carrier's 3rd party lab; or
3. By using the sample from properly operating check measuring equipment; or
4. By using the composition of the most recent accurate and representative sample; or
5. Alternatively, by agreement of Shipper and Carrier.

(D) Error Resolution. If the meter should fail or is out of service, the quantity for the measurement period while the meter is out of service will be determined by the following methods in the order stated:

1. By using data recorded by any properly operating check measuring equipment; or

2. By correcting the error if the percentage of error can be ascertained by calibration test or calculation; or
3. By comparison with deliveries during earlier periods under similar conditions when the meter was registering accurately; or
4. Alternatively, by agreement of Carrier and Shipper.

9. Technical Publications

- (A) API Manual of Petroleum Measurement Standards (MPMS), American Petroleum Institute, Washington, D.C.:
1. Chapter 1, Vocabulary, Second Edition
 2. Chapter 4, Proving Systems, Section 2, Displacement Provers
 3. Chapter 4, Proving Systems, Section 8, Operation of Proving Systems
 4. Chapter 5, Metering, Section 3, Measurement of Hydrocarbon Liquids by Turbine Meters
 5. Chapter 5, Metering, Section 4, Accessory Equipment for Liquid Meters
 6. Chapter 5, Metering, Section 6, Measurement of Liquid Hydrocarbons by Coriolis Meters
 7. Chapter 9, Section 4, Continuous Density Measurement Under Dynamic (Flowing) Conditions
 8. Chapter 11, Section 2, Part 4 Temperature Correction for the Volume of NGL and LPG (Tables 23E, 24E, 53E, 95E, and 60E.
 9. Chapter 12, Calculation of Petroleum Quantities, Chapter 2, Calculation of Liquid Petroleum Quantities Measured by Turbine or Displacement Meters
- (B) Standards of the GPA Midstream Association (GPA), Tulsa, Oklahoma:
1. GPA Standard 2145, Table of Physical Properties for Hydrocarbons and Other Compounds of Interest to the Natural Gas and Natural Gas Liquids Industries
 2. GPA Standard 2174, Obtaining Liquid Hydrocarbon Samples
 3. GPA Standard 2177, Analysis of Demethanized Hydrocarbon Liquid Mixtures Containing Nitrogen and Carbon Dioxide by Gas Chromatography
 4. GPA Standard 2186, Method for Extended Analysis of Hydrocarbon Liquid Mixtures
 5. GPA Standard 8173, Standard for Converting Mass Natural Gas Liquids or Vapors to Equivalent Liquid Volumes
 6. GPA Standard 8182, Mass Measurement of Natural Gas Liquids and Other Hydrocarbons