

**BLACK HILLS GAS DISTRIBUTION, LLC D/B/A BLACK HILLS ENERGY**  
**GAS METER SAMPLING PROGRAM**

Public Utilities Commission of the State of Colorado ("Commission") Rules provide regulatory requirements and parameters for gas meter sampling programs. A gas meter sampling program is required to be at least as effective as the schedule set forth in Commission Rules. This Black Hills Gas Distribution, LLC d/b/a Black Hills Energy ("BHGD" or "Company") Gas Meter Sampling Program ("Sampling Program") satisfies applicable Commission requirements while maintaining accuracy levels at a reasonable cost. This Sampling Program sets forth the minimum sampling protocols.

**A. Types of Meters Subject to the Sampling Program**

Only the following diaphragm meters are subject to the Sampling Program, classed as follows:

<b>Diaphragm Meter Definition</b>	<b>Capacity (cf/hour)</b>
Domestic Diaphragm Meter	0 – 500 cf/hour
Intermediate Diaphragm Meter	501 – 1000 cf/hour

**B. Frequency of Testing Meters Subject to the Sampling Program**

Diaphragm meters will be subject to testing on the frequency set forth in the table below. However, this is the minimum testing frequency protocol and the Company may choose to test on a shorter frequency.

<b>Diaphragm Meter</b>	<b>Testing Frequency*</b>	<b>Testing Type</b>
Domestic Diaphragm Meter	Sampling beginning 15 years after Manufacture Year	Statistical sampling
Intermediate Diaphragm Meter	Sampling beginning 10 years after Manufacture Year	Statistical sampling

\* As of the date of this Sampling Program, the Company has approximately 1,861 meters for which the Manufacture Year is unknown. This represents only approximately 1.9% of the total population of BHGD meters as of January 2017. These meters will be placed in separate lots by meter type, make and model, with each lot subject to testing beginning in 2017 under this Sampling Program. As the meters fail and are removed, the replacement meters will be grouped in accordance with this Sampling Program.

### C. Sampling Procedures

The procedures to be used for the sampling under the Sampling Program are as follows:

Topic	Standard
Statistical Sampling Procedure	ANSI/ASQ Z1.9: Sampling Procedures and Tables for Inspection by Variables For Percent Nonconforming, Double Specification Limit, Variable Unknown, and Standard Deviation Method, Normal Inspection: Level II, and Acceptance Quality Limit (AQL) 6.5 for upper and lower specification (Tables A2, B3 and B5)
Minimum Lot Size	Minimum lot size is 3 meters; minimum sample size is 3 meters except for rejected lots
Homogenous Lots	Determined by meter manufacturer, type, capacity, Manufacture Year, and any other meter attribute(s) that may be needed for analysis. If, during the course of sampling, a meter pulled as part of a homogenous lot is identified as not belonging in that lot, it will be placed in the appropriate homogenous lot
Exclusions	Damaged or inoperative meters Meters tested outside of the Sampling Program

### D. Meter Test Method

The following meter test method is used under the Sampling Program:

Topic	Standard
Testing Standard - Domestic	Applicable ANSI standard. Currently generally conforms to ANSI B109.1 –Diaphragm-Type Gas Displacement Meters (Under 500 Cubic Feet Per Hour Capacity), Part IV In-Service Performance and Part VII Test Methods and Equipment
Testing Standard – Intermediate	Applicable ANSI standard. Currently generally conforms to ANSI B109.2 - Diaphragm-Type Gas Displacement Meters (500 Cubic Feet per Hour Capacity and Over), Part IV In-Service Performance and Part VII Test Methods and Equipment
Testing Method	Open rate (approx. 100% of badged capacity) and check rate (approximately 20% of badged capacity)
Testing Location	Either physically removed from the meter set and transported to a meter shop location for testing or tested in the field



**E. Accuracy of Testing and of the Sampling Program**

1. Accuracy Parameters

Under the Sampling Program, meters are tested to the following accuracy levels:

Topic	Standard
Calculated Accuracy	Open rate (approx. 100% of badged capacity) and check rate (approximately 20% of badged capacity), and the weighted average percentage accuracy is calculated as ((open rate accuracy x 4) + check rate accuracy)/5
Specification Limit	+/- 2% average error or 102%/98% accuracy

2. Determining Failed Lots

Based upon the above accuracy parameters, an AQL of 6.5 will be applied to determine whether a lot passes or fails. If a lot fails, the entire lot will be subject to removal over a five-year period, as described in Section 3 below.

3. Five-Year Removal Process for Failed Lots

If a lot fails under the Sampling Program, the subsequent testing and removal process will proceed as follows:<sup>1</sup>

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<sup>1</sup> Meters in failed lots will continue to be tested as part of the Sampling Program as well. In addition, the removal process may be accelerated at the Company's discretion.

FAILED LOTS – FIVE-YEAR REMOVAL PROCESS		
Time Period	Status under Sampling Program	Result/Removal
First calendar year following lot failure	Lot failed prior calendar year	Remove approximately 20% of failed lot
Second calendar year following continued lot failure	If under Sampling Program during first calendar year following lot failure:	<i>Lot fails again:</i> Remove approximately 25% of the remaining lot
		<i>Lot passes:</i> None removed; lot returned to Sampling Program
Third calendar year following continued lot failure	If under Sampling Program during second calendar year following lot failure:	<i>Lot fails again:</i> Remove approximately 33% of the remaining lot
		<i>Lot passes:</i> None removed; lot returned to Sampling Program
Fourth calendar year following continued lot failure	If under Sampling Program during third calendar year following lot failure:	<i>Lot fails again:</i> Remove approximately 50% of the remaining lot
		<i>Lot passes:</i> None removed; lot returned to Sampling Program
Fifth calendar year following continued lot failure	If under Sampling Program during fourth calendar year during lot failure:	<i>Lot fails again:</i> Remove remainder of lot
		<i>Lot passes:</i> None removed; lot returned to Sampling Program

## F. Records and Reporting

BHGD will maintain records of gas meter tests under this Sampling Program as required. In addition, no later than April 30 of each year, BHGD will file an annual report with the Commission including narrative and tables which will include, but not be limited to, identification and test results of each lot, evaluation and analysis of the data, and any corrective action taken (“Annual Meter Sampling Program Report”). A courtesy copy of the Annual Meter Sampling Program Report will be provided to Commission Trial Staff (“Staff”) and the Office of Consumer Counsel. Further, unless otherwise agreed, BHGD and Staff will meet to discuss each Annual Meter Sampling Program Report.