UNITED STATES DEPARTMENT OF THE INTERIOI
BUREAU OF LAND MANAGEMENT
WASHINGTON, D.C. 20240
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EMS TRANSMISSION 11/27/2006
Instruction Memorandum No. 2007-022
Expires: 09/30/2008

To: All State Directors and Field Officials

From: Assistant Director, Minerals, Realty and Resource Protection

Subject: Policy for Approving Variances Allowing the Use of "Wafer V-Cone Meters" at Federal and Indian Points of Measurement

Program Area: Fluid Minerals

Purpose: To provide Field Offices (FO) with guidance for the approval of variances requesting the installation and use of Wafer V-Cone meters for measuring gas at Federal and Indian points of measurement.

Policy/Action:

1. FOs receiving variance requests for the use of the Wafer V-Cone at Federal or Indian points of measurement should approve the variance with the attached Conditions of Approval (COA). If an FO believes that specific situations require modifications or additions to the attached Conditions, the office should contact WO-310 and discuss the proposed changes before issuing the variance.
2. The Bureau of Land Management (BLM) policy is that the COA apply not only to newly-approved meters, but also apply retroactively to existing meters. If Wafer V-Cones have been previously approved by an office and the approval was less stringent than the attached COA, that office should work with operators to develop reasonable timeframes for compliance. In lieu of retrofitting existing installations, offices may consider variances based on laboratory testing of specific installations. The variance would apply only to the specific installation tested, and the test would have to confirm that the installation does not cause any additional bias or uncertainty over the range of operating conditions listed in the COA. Test results for these types of variances should be submitted to WO-310 for review.

Timeframe: Effective immediately.

Background/ Issue: A number of FOs has received variance requests for the use of Wafer V-Cone meters at Federal and Indian points of measurement. Several offices have approved the variance requests; however, the COAs and policies for approval vary from office to office. This IM requires the use of consistent COAs, which are based on laboratory testing of the Wafer V-Cone per American Petroleum Institute (API) "Chapter 22, Section 2," (API 22.2) August 2005.

The BLM is responsible for ensuring that gas removed from Federal and Indian leases is accurately measured and properly reported. Existing regulatory requirements and standards for gas measurement on Federal and Indian oil and gas leases were published in Onshore Order No. 5 (Order) on February 24,

1989. While the Order only sets standards for flange and pipe tapped orifice plates using chart recorders, alternate primary devices may be approved under section D.1,
if FOs determine that the "proposed alternate gas sales measurement system will meet or exceed the objectives of the applicable minimum standard or do not adversely affect royalty income or production accountability."

The applicable minimum standard in this case is the orifice plate and chart recorder. In other words, to approve the use of a Wafer V-Cone, the BLM must be able to demonstrate that the proposed alternative, the Wafer V-Cone manufactured by McCrometer, Inc. (McCrometer), can meet or exceed the uncertainty (accuracy) and verifiability of an orifice plate and chart recorder. Previously, the uncertainty of an orifice plate and chart recorder operating under the worst-case conditions allowed by the Order was calculated to be ±3 percent.

An orifice plate has the benefit of many decades of research and testing. The accuracy, characteristics, and limitations of an orifice plate are well documented and well understood. It would be impractical to require this same level of testing for alternate devices such as the Wafer V-Cone. However, recently published API 22.2 describes a testing protocol to ascertain the uncertainty and limitations of alternate devices.

API 22.2 describes a test matrix consisting of different combinations of line sizes, Beta ratios, pressures, Reynolds Numbers, upstream and downstream disturbances, and pressure ratios to characterize the meter over a range of sizes, geometries, and operating conditions. The API 22.2 working group consisted of manufacturers, operators, flow labs, and the BLM. We believe that it offers a fair and reasonable approach to testing alternate meters.

McCrometer paid for three independent tests relating to the API 22.2 standard. The first test, done by the National Engineering Laboratory in August 2001, was to determine the gas expansibility equation for the Wafer V-Cone. API 22.2 requires an independent test to determine gas expansibility. In August 2003, Wafer V-Cones were tested by the Colorado Engineering Experiment Station, Inc., (CEESI) in accordance with API 5.7, a forerunner to API 22.2. Finally, in May 2005, the Wafer V-Cones were retested at CEESI in accordance with the final version of API 22.2. The results of all three tests, with emphasis placed on the May 2005 testing, are the basis for BLM's recommended approval of these devices.

Upon thorough review of the API 22.2 testing, the BLM has made the following findings:

1. The testing done on the Wafer V-Cone complies with the requirements of API 22.2;
2. The discharge coefficients provided by McCrometer do not result in any statistically significant bias;
3. Based on the testing, the BLM has determined the uncertainties of the Wafer V-Cone; and
4. The use of the Wafer V-Cone in accordance with the attached COAs meets or exceeds the objectives of an orifice plate and chart recorder and will not adversely affect royalty income or production accountability.

In addition, the BLM believes that the use of this and other alternate devices are in the public interest because these devices typically require smaller and less environmentally-impacting locations, can reduce costs for operators, (thereby extending the economic life of marginal wells), and may be able to measure non-ideal flow, such as wet gas, more accurately than an orifice plate.

This IM is specific to the Wafer V-Cone, manufactured by McCrometer, and does not apply to the McCrometer Precision V-Cone, or any other brand or model of alternate meter. This IM should not be taken as an endorsement for the McCrometer Wafer V-Cone only that the McCrometer Wafer V-Cone meets or exceeds the uncertainty (accuracy) and verifiability of an orifice plate and chart recorder when properly installed and the attached COAs are followed.

Budget Impact: While this policy will require additional time, effort, and administrative support to implement, the policy has no significant budget implications.

Manual/Handbook Sections Affected: None.

Coordination: This IM was coordinated with the Fluid Minerals Division (WO-310), the Wyoming State Office and several FOs.

Contact: Any questions should be referred to William Gewecke at 202-452-0337. Technical questions regarding the Wafer V-Cone or the attached Conditions of Approval should be referred to Rich Estabrook at 707-468-4052.

Signed by:
Thomas P. Lonnie
Assistant Director
Minerals, Realty and Resource Protection

Authenticated by:
Robert M. Williams
Division of IRM Governance, WO-560

1 Attachment
1- Wafer V- Cone Conditions of Approval (2 pp)

WAFER V-CONE CONDITIONS OF APPROVAL

Wafer V-Cones installed at Federal and Indian points of measurement shall comply with the following requirements. The BLM may add, modify, or delete requirements if additional data for the Wafer V-Cone become available.

1. The nominal pipe size shall not be less than 2" or greater than 4".

2. The Beta Ratio shall not be less than 0.45 or greater than 0.65.

3. a. The Wafer V-Cone shall be installed with the following minimum lengths of straight and uninterrupted pipe, expressed in nominal pipe diameters [upstream/downstream]:

Nominal Size	Beta Ratios				
	.45	.50	.55	.60	.65
2"	5/1	5/1	5/1	5/1	5/1
3"	5/2	5/1	5/1	5/1	5/1
4"	5/2	5/1	5/1	5/1	5/1

For example, a 4" Wafer V-cone with a 0.45 Beta Ratio needs to have 20" (5 x 4") of straight and uninterrupted pipe upstream of the meter body, and 8" (2 x 4") of straight and uninterrupted pipe downstream of the meter body.

b. Wafer V-Cones with Beta Ratios of 0.45 may be installed with zero diameters upstream if the upstream piping consists of two out-of-plane, close-coupled (less than 2 diameter separation) 90° elbows, with at least 5 diameters of straight piping upstream of the first elbow. The required length of downstream pipe shall be the same as that specified in the table in Part a, above.

c. Required lengths of straight and uninterrupted pipe shall be free of any protrusions and pipe connections including thermowells, gas sampling ports, welds, and gaskets extending into the pipe inside diameter.

d. Thermowells may be placed upstream or downstream, but shall be placed no closer than the minimum upstream or downstream pipe length shown in Part a, above, and no further than 20 nominal pipe diameters from the meter body.

4. The Wafer V-Cone shall be removed and visually inspected at least once every 6 months. The Wafer V-Cone shall be replaced if any perceptible wear is detected without magnification. During the inspection, the operator shall have available to the BLM a Wafer V-Cone in "new" condition for the purpose of comparison.

5. The Beta Ratio and Discharge Coefficient for each Wafer V-Cone shall be maintained onsite and shall be accessible to the BLM without the need for any special equipment.

6. The Discharge Coefficient shall be determined by testing over the appropriate Reynolds Number range given in Condition 9. Reynolds numbers outside of this range shall not be used in the determination of discharge coefficient.

Attachment 1-1

7. If an Electronic Flow Computer (EFC) is used for secondary and tertiary instrumentation, it shall be subject to the requirements of any NTLs or Orders that apply to Electronic Flow Computers for orifice plates or differential types of meters.

8. If a chart recorder is used for secondary instrumentation, requirements III.C.7 and III.C.12-19 of Order No. 5 will be in full force and effect.

9. The meter installation shall operate within the following Reynolds Number limits [low/high]:

Nominal Size	**Beta Ratios**				
	.45	**.50**	**.55**	**.60**	**.65**
2"	26/302	48/302	90/302	90/302	90/302
3"	50/302	48/302	90/302	90/302	90/302
4"	50/530	48/522	90/522	90/522	90/528

Note: values given are Re/1000

10. For meters flowing more than 100 Mcf/day on a monthly basis:

a. If an EFC is used for secondary and tertiary instrumentation, the meter station (primary, secondary, and tertiary devices) shall be installed, operated, and maintained to achieve an overall meter station uncertainty of ±3% for the majority of the flowing period.

b. EFCs must be used instead of chart records if the Beta Ratio of the Wafer V-Cone is greater than 0.45.

c. If chart recorders are used (less than 0.45 Beta Ratio only), then the pens that record differential and static pressure shall record at or above the percentages of chart range shown in the following table, for the majority of the flowing period:

Beta	2"	3"	4"
0.45	35%	50%	50%

d. The meter installation shall operate at or below the following Differential Pressure to Static Pressure (DP/SP) ratios:

Nominal Size	**Beta Ratios**				
	.45	**.50**	**.55**	**.60**	**.65**
2"	.2682	.1402	.0692	.0546	.0546
3"	.2682	.1402	.0692	.0546	.0546
4"	.2682	.1402	.0692	.0546	.0546

Note: these are dimensionless values