COLORADO
Oil & Gas Conservation Commission
Department of Natural Resources

OPERATOR GUIDANCE FOR ORDER NO. 1-232 BRADENHEAD PRESSURE MONITORING AND REPORTING

Document Control:

Created Date:	January 3, 2019
Last Updated Date:	January 13, 2020
Last Updated By:	Diane McCoy
Review Cycle:	Yearly Review
Systems Used:	None
Document Owner:	Dave Andrews
Work Units:	Engineering

This guidance was developed to promote consistency with bradenhead pressure testing and reporting procedures for all wells subject to COGCC Order No. 1-232. The Commission on December 17, 2018, established this Bradenhead Monitoring Area (BMA) in Adams, Arapahoe, Boulder, Broomfield, Denver, Jefferson, Larimer, and Weld counties, approved the Order.

The effective date of the Order No. 1-232 was January 1, 2019.

The following summarizes the order requirements for all wells within the BMA:

Equipment Requirements

An operator is to equip the bradenhead access to the annulus between the production and surface casing, as well as any intermediate casing, to above ground level with approved fittings to allow safe and convenient determination of annular pressure and fluid flow on all wells.

Fittings and valves needed to conduct annular pressure monitoring must remain exposed to allow for COGCC inspection at all times. A rigid housing may be used to protect the fittings and valves, provided the housing can be easily opened or removed. A pressure gauge with an appropriate range is to be used to measure the bradenhead (surface and intermediate casing) pressure(s).

If the bradenhead valve cannot be easily accessed at the wellhead (i.e., located in a vault), operators shall notify COGCC staff of this condition and

accommodate access in a timely and reasonable manner upon request by COGCC staff.

Testing Requirements

1. For newly drilled wells: Bradenhead tests are to be performed and reported according to the following schedule with a Form 17 submitted within 10 days of each test.
    a. An initial test within 60 days of rig release and prior to stimulation and
    b. If a delayed completion, at least 6 months after rig release but prior to stimulation.
    c. A post-production test within 60 days after first sales, as reported on the Form 10, Certificate of Clearance.

For a. and b. – those wells with 200 psig or greater during pre-stimulation test, contact area engineer for approval of mitigation plan prior to hydraulic stimulation. It is suggested that all pre-stimulation Bradenhead tests are performed to allow for a COGCC response if required.

2. For existing wells: Operators are to perform an annual bradenhead test on all wells. Wells that have delayed completions over a year should have annual bradenhead tests conducted.

Testing and Reporting Requirements

For all wells, including drilled uncompleted, newly completed and existing, operators are to conduct a Bradenhead Test annually by measuring the pressure on the bradenhead annulus and then opening the valve to inspect for gas or liquid flow. A sample is to be collected when the flow is continuous.

Pressure mitigation actions will be taken based on the following criteria with several general cases defined below. For wells with the surface casing below the bedrock aquifer[1], 50 psig will be the notification threshold. For wells with a surface casing shallower than 455 feet deep[2], the threshold is calculated using surface casing setting depth time a pressure gradient of 0.11 psi/ft[3].

[1] These are rule-defined criteria for surface casing depth, regulated by Rules 317.f., 317.g. and 317.A.b.

[2] 455 feet times 0.11 psig/ft. equals 50 psig

[3] Pressure threshold = (SF*TVD*(FG-MWG))*DT =0.8*TVD(0.60 psi/ft-0.433 psi/ft))*0.8
= TVD*0.11 psi/ft

SF=safety factor, FG=fracture gradient, MWG=mud weight gradient, DT= diagnostic threshold

- Case 1: For all wells with short surface casing having an exposed aquifer below the surface casing setting depth, operator is required to submit an eForm Form 17, Bradenhead Test Report.

- Case 2: If the measured pressure is less than the 50-psig threshold, the surface casing is below the known aquifers and the surface casing shoe is greater than 455 feet deep, annual bradenhead test results can be submitted with the approved spreadsheet upload or through an eForm Form 17, Bradenhead Test Report.

- Case 3: For wells with surface casing shallower than 455 feet deep, the threshold is calculated using the surface casing setting depth times 0.11 psi/ft. If the measured pressure is greater than the calculated threshold value, notify COGCC and proceed to mitigate the Bradenhead pressure. Operator is required to submit an eForm Form 17, Bradenhead Test Report and submit a Form 4 Sundry Notice within 60 days of the bradenhead test. The sundry notice should describe actions the operator has taken and plans to mitigate and/or remediate the bradenhead pressure. If the measured pressure is less than the calculated threshold value, annual bradenhead test results can be submitted with the approved spreadsheet upload or through an eForm Form 17, Bradenhead Test Report.

- Case 4: For all wells with a pressure over 50 psig, the operator is to contact COGCC area engineer with a mitigation plan and schedule to mitigate the bradenhead pressure. Operator is required to submit an eForm Form 17, Bradenhead Test Report and submit a Form 4 Sundry Notice within 60 days of the bradenhead test. The sundry notice should describe actions the operator has taken and plans to mitigate and/or remediate the bradenhead pressure.

- Case 5: For any well with a sustained gas or liquid flow from the Bradenhead annulus, the operator is to notify COGCC, collect a gas or liquid sample and proceed to mitigate the Bradenhead pressure. Operator is required to submit eForm Form 17, Bradenhead Test Report and submit a Form 4 Sundry Notice within 60 days of the bradenhead test. The sundry notice should describe actions the operator has taken and plans to mitigate and/or remediate the bradenhead pressure.

Operators should be prepared to collect a fluid sample prior to opening the bradenhead valve. When there is sufficient gas or liquid flow to collect an environmental sample, sampling is required. After collecting a sample, proceed with the bradenhead test, notify COGCC and mitigate the bradenhead pressure. If liquids discharge as a mist or spray, but does not continuously flow, then the operator is not expected to collect a liquid sample. A sample collection and reporting procedure is in Appendix A of COGCC's Bradenhead Testing and Reporting Instructions on COGCC website page *Regulation/Operator Guidance (http://cogcc.state.co.us)*. Sample analyses is to be reported with an eForm 43.

Mitigation and Remediation

Cases 1 and 2: The Operator is to report to COGCC through annual test reporting. The Director has the authority to require remedial actions for wells that have bradenhead pressures.

Cases 3, 4 and 5: Determine the appropriate strategy to maintain pressure below the threshold and eliminate gas or liquid flow from the Bradenhead by using an acceptable mitigation strategy, including, but not limited to the following:

- Use a bleed off strategy for wells in compliance with COGCC and CDPHE regulations.
- Use a Bradenhead pressure abatement system that combusts bradenhead gas, or that routes bradenhead gas to sales.
- Use a remediation strategy that eliminates or reduces the bradenhead pressure by means of a downhole intervention (i.e. cement squeeze or other technology).

Annual Reporting Requirements

Operators should attempt to schedule and conduct annual Bradenhead testing for a portion of their wells each month such that by December 31st all annual bradenhead tests have been completed and submitted for that calendar year.

All annual reporting is to be completed by December 31st of each calendar year.

Document Change Log

Change Date	Description of Changes
January 3, 2019	Document created and finalized

January 13, 2020	Clarification edits