COLORADO
Oil & Gas Conservation Commission
Department of Natural Resources

COGCC OPERATOR GUIDANCE

RULE 303.A.(5).H HYDRAULIC FRACTURING TREATMENT AT DEPTHS 2,000 FEET OR LESS

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303.a.(5).H Hydraulic Fracturing Treatment at Depths 2,000 Feet or Less. If an Operator proposes to drill a Well at a depth less than 2,000 feet true vertical depth (TVD) below the surface that will be subject to hydraulic fracturing treatment, the following requirements apply:

i. Geology and Hydrogeology Assessment. The Operator will characterize and assess the local geology and groundwater resources within 2 miles of the proposed Oil and Gas Well.

ii. Engineering Assessment. The Operator will describe the proposed drilling process, well design, completion process, hydraulic fracturing treatment process, production methods, and facilities. The assessment will identify any risks to geology and hydrogeology and explain how the operator will prevent, minimize, or mitigate any identified risk.

Related Rule Citations

209. ISOLATION OF COAL SEAMS AND GROUNDWATER

In the conduct of oil and gas operations each owner will exercise due care in the isolation of coal seams and groundwater.

Special precautions will be taken in drilling and abandoning wells to guard against any loss of artesian water from the stratum in which it occurs and the contamination of groundwater by produced water, liquid hydrocarbons, or natural gas. Before any oil or gas well is completed, all oil, gas, and groundwater bearing formations above and below the producing formation(s) will be isolated to prevent the intermingling of formation fluids and gases between formations.

303.a.(5).F Casing and Cementing Plan. A Form 2 to drill a Well will include a casing and cementing plan that addresses anticipated groundwater by demonstrating how it

will be isolated, potential flow and hydrocarbon bearing zones, and subsurface hazards. The casing and cementing plan will describe the top and bottom depths and the concentration of total dissolved solids (TDS) in milligrams per liter of all groundwater from the surface to the depth of the bottom hole, and demonstrate compliance with the casing and cementing requirements of Rule 317.e. To identify top and bottom depths and TDS concentrations of groundwater, the Operator will use all available sources of pertinent information, including but not limited to reports from the Water Quality Control Commission, the Division of Water Resources, the Colorado Geological Survey, the United States Geological Survey, the Colorado Groundwater Atlas; peer-reviewed publications; the Commission's Field Scout Cards; electric logs (e.g. resistivity logs); produced water samples; groundwater samples collected to support aquifer exemptions and samples collected from domestic, municipal, agricultural, and industrial water wells. If the top or bottom depth, or TDS concentration cannot be determined using these sources the Operator will comply with Rule 317.e.(5) to ensure isolation of all such groundwater.

303.a.(5).G.i Statewide Offset Well Evaluation. The Form 2 will include an offset well evaluation. The Operator will evaluate the construction and integrity of all offset wells within 1,500 feet of the proposed wellbore. The Operator will provide a plan to address all offset wells within 1,500 feet that do not meet isolation and integrity requirements.

317.e.(1) Drilling Fluid, Casing, and Cement Program to Isolate Hydrocarbon Formations and Groundwater and for Well Control. The casing and cementing plan for each Well will prevent migration of oil, gas, and water within potential flow zones from one formation to another behind the casing.

341.b.(2).A An Operator will confine the placement of all stimulation fluids to the objective formations during hydraulic fracturing treatment to the extent practicable.

Purpose of Rule 303.a.(5).H

Shallow hydraulic fracturing is a common practice in the Raton Basin, though it is rare in other areas of Colorado. When performing Hydraulic Fracturing Treatment in oil and gas formations at depths shallower than 2,000 feet, the Operator will submit information in accordance with Rule 303.a.(5).H. to demonstrate effective isolation, considering the reduced distance separating oil and gas objectives from Groundwater that may serve or has the potential to serve domestic and agricultural uses. There may be fewer or thinner intervening, impermeable geologic strata for isolation, and migration pathways may be more prevalent in shallow formations. Potential pathways

include faults, joints, fractures, volcanic intrusions, steeply dipping bedding, old or abandoned wells, deep water wells, and mining exploration boreholes.

The Commission adopted Rule 303.a.(5).H to ensure that an Operator performs shallow Hydraulic Fracturing Treatment safely to confine the placement of all stimulation fluids to the objective formations during hydraulic fracturing treatment to the extent practicable, pursuant to Rule 341.b.(2).A. Rule 303.a.(5).H requires the Operator to assess geology and hydrology in a 2-mile radius and identify potential isolation risks.

Guidance

Geology & Hydrogeology Assessment:

Operator will characterize and assess the local geology and groundwater resources within a 2 mile area of the proposed oil and gas well. The assessment will supplement information shown on the Form 2, Application for Permit-to-Drill, Deepen, Re-enter or Recomplete and Operate (Form 2) Casing and Cementing Plan that the Operator submits in accordance with Rule 303.a.(5).F. The assessments will narratively describe the following information:

a. Oil & gas objective formation(s) that will receive the Hydraulic Fracturing Treatment
b. Oil or gas surface seeps, if any
c. Groundwater formations and any existing use of groundwater from those formations through wells, springs, seeps, and other discharges
d. Other Potential Flow Zones that flow against or are unable to support the hydrostatic pressure exerted by fluid in the well.
e. The overlying and underlying confining formations capable of limiting the movement of any Hydraulic Fracturing Treatment Fluids, oil, gas, and formation water
f. A stratigraphic chart starting from the surface, down to the proposed total depth of the Well, that includes the geologic formations present, along with the names, descriptions, depths, and thickness of those formations
g. Geologic maps or cross-sections
h. Review of any available fluid analytical data from oil and gas wells, water wells, springs, and seeps

Engineering Assessment:

The Operator will describe how the well's casing and cementing plan will provide proper geologic isolation, in accordance with Rule 209 and Rule 317.e.(1). The Operator will describe how the Hydraulic Fracturing Treatment design will prevent migration of Hydraulic Fracturing Treatment Fluids, oil, gas, and formation water to protect Groundwater in accordance with Rule 341.b.(2).A. The Operator will describe

how their Offset Well Evaluation, submitted pursuant to 303.a.(5).G.i, addresses all offset wells within 1,500 feet in three dimensions from the proposed well that do not meet isolation and integrity requirements.

Engineering Staff Conference:
If requested by the Director, the Operator will meet with Engineering Staff to discuss the Geology, Hydrology, and Engineering assessments.

Permit Conditions:
As reasonable and necessary to protect public health, safety, welfare, the environment and wildlife resources, the Director may apply Conditions of Approval to the Form 2, including:

1. Cement coverage that is more stringent than Rule 317.e
2. Restrictions on Hydraulic Fracturing Treatment to certain pay zones or intervals in the well
3. Groundwater sampling and analysis
4. Oil and gas well fluids sampling and analysis

Document Change Log

Change Date	Description of Changes
October 24, 2014	Document Created and Finalized
November 2, 2020	Document revised for effective date of Wellbore Integrity Rules