APPENDIX B

Statement of Basis, Specific Statutory Authority, and Purpose
New Rules and Amendments to Current Rules of the
Colorado Oil and Gas Conservation Commission, 2 CCR 404-1

Cause No. 1R Docket No. 191200754
Wellbore Integrity Rulemaking

This statement sets forth the basis, specific statutory authority, and purpose for amendments ("Wellbore Integrity Rules") to the Colorado Oil and Gas Conservation Commission ("Commission" or "COGCC") Rules of Practice and Procedure, 2 C.C.R. § 404-1 ("Rules"). In adopting amendments to the Rules, the Commission will rely upon the entire administrative record for this Rulemaking proceeding, which formally began on December 31, 2019, when the Commission submitted its Notice of Rulemaking to the Colorado Secretary of State.

Background

A. Factual Background

Wellbore integrity is a broad term that encompasses a range of practices to ensure that all downhole fluids stay within a wellbore as intended, and that no external fluids unintentionally intrude into the wellbore. Maintaining wellbore integrity ensures that oil and gas operations protect groundwater from potential contamination. Operators maintain wellbore integrity by installing multiple layers of metal casing and cement to isolate the wellbore from the surrounding geological formations. The term "wellbore" broadly refers to the drilled hole and the casing, cement, drilling fluids, casing appurtenances, and fluids used to place the cement.

Another key aspect of maintaining wellbore integrity is regular monitoring and tests to ensure that unintended holes or leaks in the casing or cement that could contribute to flow do not exist or develop over time. Bradenhead monitoring is one such method of verifying wellbore integrity. It is a valuable tool because changes in bradenhead pressure (also called "annular pressure") or fluid flow to surface can be a key indicator of potential wellbore integrity issues. Bradenhead monitoring, which involves reading pressure from surface equipment, is distinct from bradenhead testing, which requires opening the bradenhead and observing changes in pressure over time.

B. Statutory Background.

On April 16, 2019, Governor Polis signed Senate Bill 19-181 into law. Senate Bill 19-181 ensures that oil and gas development and operations in Colorado are regulated in a manner that protects public health, safety, welfare, the environment, and wildlife resources. Senate Bill 19-181's amendments to the Oil and Gas Conservation Act ("Act"), §§ 34-60-101–131, C.R.S., are effective as of April 16, 2019, the date the Governor signed the bill into law. Senate Bill 19-181 amends, among other provisions of the Act, § 34-60-106(18), C.R.S., directing:

The commission shall promulgate rules to ensure proper wellbore integrity of all oil and gas production wells. In promulgating the rules, the commission shall consider incorporating recommendations from the State Oil and Gas Regulatory Exchange and shall include provisions to:

(a) Address the permitting, construction, operation, and closure of production wells;

(b) Require that wells are constructed using current practices and standards that protect water zones and prevent blowouts;

(c) Enhance safety and environmental protections during operations such as drilling and hydraulic fracturing;

(d) Require regular integrity assessments for all oil and gas production wells, such as surface pressure monitoring during production; and

(e) Address the use of nondestructive testing of weld joints.

C. Historical Background

Because of the importance of wellbore integrity to protecting groundwater and preventing waste, the Commission has long been concerned with ensuring that its Rules are adequate to preserve wellbore integrity. In 2017, the Commission asked the State Oil and Gas Regulatory Exchange ("SOGRE") to conduct a peer assessment of Colorado's wellbore integrity regulations, and identify regulatory gaps or inefficiencies. SOGRE is a joint project of the Interstate Oil and Gas Compact Commission and the Ground Water Protection Council ("GWPC"). SOGRE experts reviewed the Commission's regulations, technical literature, other states' regulations, and GWPC's Well Integrity Regulatory Elements for Consideration (2016). SOGRE recommended specific improvements to Colorado's rules, tied to the 132 elements in GWPC's 2016 report. Based on this review, in 2019, SOGRE released its Peer Assessment of Colorado's wellbore integrity regulations, which included Commission Staff ("Staff") responses. Many components of the Wellbore Integrity Rules respond to specific recommendations in SOGRE's 2018 Peer Assessment Report.

Stakeholder and Public Participation

The Wellbore Integrity Rules are the product of a unique stakeholder process, initiated by diverse stakeholders coming together and developing a proposal to strengthen the Commission's wellbore integrity rules. In the fall of 2019, a group of stakeholders cooperatively developed a joint regulatory proposal to implement the SOGRE Report's recommendations and submitted the proposal to the Director. Staff worked with this stakeholder group to refine the proposal, which ultimately became the draft of the proposed Wellbore Integrity Rules. The stakeholders also made a joint presentation to the Commission at its December 16, 2019 hearing about the technical basis for ensuring wellbore integrity. The Commission commends this unique cooperation among diverse stakeholders, and encourages all its stakeholders to continue to work together, recognizing

that input from stakeholders with a range of perspectives is crucial to developing protective, enforceable, and technically achievable regulations.

On December 16, 2019, the Commission announced it would undertake the rulemaking for the Wellbore Integrity Rules in February 2020. On December 31, 2019, it issued a draft of the proposed rules with its Notice of Rulemaking. On January 14, 2020, the Commission hosted its first stakeholder meeting for the Wellbore Integrity Rules, to explain the proposed rules and solicit stakeholder comments. In the Notice, the Commission invited stakeholders to participate formally as parties or informally by submitting oral or written comments. The Commission also created online portals through which anyone could submit written comments regarding the Wellbore Integrity Rules.

Statutory Authority

In addition to the specific language quoted above from Section 34-60-106(18), C.R.S., the Commission's authority to promulgate amendments to the Rules is derived from the following sections of the Act and other statutes:

- Section 25-8-202(7)(a), C.R.S. (Commission shall be an implementing agency that protects present and future beneficial uses of groundwater)
- Section 34-60-105(1), C.R.S. (Commission has the power to make and enforce rules necessary to enforce the Act);
- Section 34-60-106(1)(c), C.R.S. (Commission may regulate the drilling, casing, operation, and plugging of seismic holes or exploratory wells to prevent the escape of oil or gas from one stratum to another, the intrusion of water, the pollution of fresh water, and to prevent blowouts);
- Section 34-60-106(2), C.R.S. (Commission may regulate the drilling, production, and plugging of wells and all other operations for the production of oil or gas, and the stimulating and chemical treatment of wells);
- Section 34-60-106(2.5)(a), C.R.S. (Commission will regulate oil and gas operations in a reasonable manner to protect and minimize adverse impacts to public health, safety, and welfare, the environment, and wildlife resources and protect against adverse environmental impacts on any air, water, soil, or biological resource resulting from oil and gas operations);
- Section 34-60-107, C.R.S. (Commission has a duty to regulate oil and gas operations so as to prevent waste of oil and gas); and
- Section 34-60-108, C.R.S. (Commission has authority to prescribe rules and procedure to adopt rules).

Identification of New and Amended Rules

Consistent with its statutory authority and its legislative mandates, and in accord with the administrative record, the Commission added or amended the following rules:

- 100 Series Rules (Annular Over-Pressurization, Annulus, Protected Water, Potential Flow Zones, and Stimulation);
- Rules 201, 207, and 209;
- Rules 301, 303, 308A, 308B, 311, 314, 316C, 317, 319, 321, and 341; and
- Rules 603 and 608.

Overview of Purpose and Intent

The Wellbore Integrity Rules implement Senate Bill 19-181's directives to consider the recommendations of the SOGRE Report. The Wellbore Integrity Rules also implement the Commission's statutory directive to protect public health, safety, welfare, and the environment, § 34-60-106(2.5)(a), C.R.S., by ensuring that protected groundwater will be isolated to prevent contamination by oil, gas, and produced water. And the Wellbore Integrity Rules implement the Commission's statutory directive to prevent waste, *id.* § 34-60-107, by ensuring that hydrocarbons remain within the wellbore and reach production equipment and by protecting hydrocarbon formations not targeted for development from intermingling with non-native fluids.

The Wellbore Integrity Rules have six major components. First, consistent with Senate Bill 19-181's directive to require regular integrity assessments, including surface monitoring, the Rules update the Commission's current bradenhead monitoring and testing rules by establishing more frequent monitoring and tests statewide, setting standards for a successful test, and requiring immediate action to remedy annular over-pressurization.

Second, consistent with Senate Bill 19-181's directive to require that well construction protect water zones, the Rules define "Protected Water" and set standards to ensure that operators isolate Protected Water from oil, gas, and produced water. The Rules also adopt a new Formation Integrity Testing requirement to document surface casing integrity for well control and Protected Water isolation from producing formations.

Third, consistent with Senate Bill 19-181's directive to enhance safety and environmental protections during drilling and hydraulic fracturing operations, the Rules codify requirements for evaluating offset wells to safeguard Protected Water from potential contamination due to stimulation communication. Well communication, sometimes known as "frack hits," can potentially pose safety risks, and lead to groundwater or surface water contamination when one well's stimulation process (typically hydraulic fracturing) "communicates with" (intersects or enters) an existing well. The rules also expand existing requirements for real-time monitoring of wells during the hydraulic fracturing process.

Fourth, consistent with Senate Bill 19-181's directive to address construction and operation of production wells, the Rules strengthen standards for cementing and casing to ensure that wells withstand downhole pressures and maintain integrity throughout their life cycles.

Fifth, consistent with Senate Bill 19-181's directive to require that wells are constructed using current practices and standards to prevent blowouts, the Rules update standards for using blowout preventer systems to incorporate current best practices and technology.

Sixth, consistent with Senate Bill 19-181's directive to address well closure, the Rules update well plugging standards to ensure integrity and safety of plugged wells.[1]

Amendments and Additions to Rules

Throughout the Wellbore Integrity Rules, the Commission made minor edits, conforming changes, and clarifications, including consistently using the term "will," eliminating passive voice, changing spelled-out numbers to numerals, and eliminating typographic errors.

Definitions – 100 Series Rules.

The Commission created a new definition of "Annular Over-Pressurization" to describe the condition in which fluids within an annulus are pressurized sufficiently to potentially cause unintended migration of fluids or gases out of the annular space.

The Commission created a new definition of "Annulus" to describe the space between the borehole and casing, or layers of casing.

The Commission created a new definition of "Protected Water" to condense and streamline existing references to "fresh water," "groundwater," "water-bearing formations," and "artesian water." Previously, these terms were used somewhat interchangeably, creating confusion about what water operators must protect. The new definition clarifies what waters must be protected by using an objective, numerical standard of 10,000 milligrams per liter of total dissolved solids and several other objective conditions. The Commission chose this numerical standard to protect all currently usable groundwater, and groundwater that may be usable in the future due to technological advancements and increasing water scarcity. The new definition excludes groundwater that could not be used, now or in the future, because it is of insufficient quantity to supply a public water system, is a hydrocarbon formation, or is situated more than 3,000 feet deep. The Commission chose the 3,000 foot depth because there are currently very few waters wells in Colorado deeper than 2,500 feet. However, due to increased water consumption and climate change causing increased water scarcity, many parts of the state are likely to become more reliant on deeper groundwater supplies in the future. Consistent with its statutory authority, § 25-8-202(7)(a), C.R.S., the Commission built in a buffer to ensure that waters that are deeper and more saline than those currently being used are protected for use in the future. The new definition also allows the Director to designate any zone that does not automatically

[1] Senate Bill 19-181 directs the Commission to "[a]ddress the use of nondestructive testing of weld joints." § 34-60-106(18)(e), C.R.S. Although this instruction appears in Senate Bill 19-181's wellbore integrity section, the Commission instead considered this statutory requirement in its recent Flowline Rulemaking. Pre-existing Commission Rules already required "[n]on-destructive testing of welds for newly constructed steel off-location flowlines or steel crude oil transfer lines." Rule 1102.d.(3).A. Because off-location flowlines typically contain several welds, testing their weld joints is an important safety measure. By contrast, there are no downhole welds to test, and typically only one weld on the casinghead at the surface of a well. As a result, the Commission did not address weld joint testing in the Wellbore Integrity Rules.

meet the definition of Protected Water as Protected Water pursuant to Rule 209.

Presently, the Director has detailed information about the location of Protected Water formations. For example, Staff have compiled detailed Field Scout Cards with formation fluid types, depth, and salinity data for several fields in the Piceance and North Park Basins, and have nearly completed similar Field Scout Cards for portions of the San Juan and Raton Basins. In the Denver-Julesburg Basin, Staff have detailed data on Protected Water formation depths from a variety of sources, including the Colorado Groundwater Atlas, baseline groundwater surveys, conductivity and resistivity logs, and consultation with other expert state agencies. To provide additional clarity to operators and the public about which water formations meet the definition of Protected Water, Staff will continue adding to the publicly available information about the locations, depths, and water quality of Protected Waters through narrative descriptions, and, as applicable in coordination with the State Engineer's Office, potentially through a publicly-accessible GIS database.

The Commission defined "Potential Flow Zones" to describe over- or under-pressed zones that have the potential to allow unintentional flow of fluids from the surrounding strata into the wellbore, or flow of fluids from the wellbore into the surrounding strata.

The Commission defined "stimulation" to describe the types of treatments that can be performed to improve a well's productivity. As described by Schlumberger's Oilfield Glossary, there are two main categories of stimulation: hydraulic fracturing and matrix treatments. Stimulation in shale formations typically takes the form of hydraulic fracturing, which is performed above the fracture pressure of the reservoir formation and creates a highly conductive flow path between the reservoir and the wellbore. By contrast, matrix treatments, such as acidizing, are performed below the reservoir formation fracture pressure and are generally designed to restore a reservoir's natural permeability.

Rule 201.

SOGRE element 63 recommends that COGCC establish a standard for operator oversight and responsibility. In response, the Commission amended Rule 201 to clarify that operators are responsible for ensuring compliance with all applicable Commission regulations, including compliance by their contractors and subcontractors. Prior to the Commission adopting the Wellbore Integrity Rules, operators were already responsible for ensuring compliance with all Commission regulations, including compliance by their contractors and subcontractors. The addition of this language does not absolve any operator of pre-existing compliance obligations, but rather clarifies existing expectations of operator responsibility.

Rule 207.

The Commission revised Rule 207.b to clarify the procedures for designating a field as a bradenhead test area. Senate Bill 19-181 creates a new, Professional Commission that will be seated on July 1, 2020, unless certain rules become effective earlier. *See* § 34-60-104(1)(b), C.R.S. The changes to Rule 207 contemplate the forthcoming transition to the Professional Commission, which will be equipped to consider which fields present more concerns about ensuring wellbore integrity and thus warrant additional bradenhead

testing. The revised Rule 207.b provides a clearer process for the Director to propose designating a field as a bradenhead test area, for operators to protest the proposal, and the Commission to approve the proposal. Rule 341 continues to provide the baseline standard for times when bradenhead testing or monitoring is generally required. However, Rule 207 allows the Director to designate areas, i.e., fields, where additional bradenhead testing is warranted to protect public health, safety, welfare, the environment, or wildlife resources. When a field is designated as a bradenhead test area, the Commission's order making the designation will describe the substantive standards for the testing and monitoring required.

Rule 209.

Consistent with its Senate Bill 89-181 authority as an implementing agency to "protect present and future beneficial uses of water," § 25-8-202(7)(a), C.R.S., the Commission revised Rule 209 to incorporate the newly-defined term, "Protected Water." The Commission codified an existing practice that the Director may designate any water-bearing formation as Protected Water based on consultation with one or more agencies with expertise in groundwater quality. The Commission also clarified that Protected Water must be isolated from specific categories of potential contaminants: produced water, liquid hydrocarbons, and natural gas. Finally, the Commission strengthened and clarified the requirement to avoid waste by requiring that all hydrocarbon formations not targeted for production must be isolated to prevent the intermingling of fluids.

Rule 301.

The Commission updated Rule 301 to clarify that operators must transfer all records related to wellbore integrity to subsequent owners. Previously, the regulatory language instructed subsequent owners to maintain such records, but did not specifically instruct the original operator to transfer the records. This clarification ensures that all operators are aware of their responsibilities to maintain records relevant to ensuring wellbore integrity.

Rule 303.

To implement Senate Bill 19-181's directive to "[a]ddress the permitting . . . of production wells," § 34-60-106(18)(a), C.R.S., the Commission revised Rule 303.a.(5) by adding several new requirements for Form 2, Applications for Permits to Drill.

First, the Commission moved a requirement formerly found in Rule 321 to Rule 303.a.(5).E., requiring operators to include the top of the productive zone and the bottom hole location on all wellbore plats for every section penetrated by the wellbore.

Second, Rule 303.a.(5).F. requires operators to submit casing and cementing plans identifying how the operator will address anticipated subsurface hazards, flow zones, and protected water through best management practices or otherwise. This information will allow the Commission to ensure that operators comply with all cementing and casing requirements, and that operators design casing and cementing to maintain wellbore integrity. This responds to SOGRE element 10, which recommends that COGCC approve a casing and cementing plan identifying how anticipated hazards will be addressed.

Third, Rule 303.a.(5).G. requires all operators, statewide, to submit an offset well evaluation. This partially codifies two existing policies, the Statewide Interim Policy for Horizontal Offset (Feb. 2014) and the DJ Basin Policy for Horizontal Offset (Dec. 2013). The purpose of offset well evaluation and mitigation is to avoid safety and environmental risks associated with well communication during well stimulation. Operators must identify and evaluate all existing wells within a 1,500 foot radius of the wellbore, and ensure that the identified wells can withstand the anticipated pressures encountered during a well communication event. Staff may require improving well construction or equipment, as necessary, as permit conditions. The Commission further required operators to provide notice to all offset well operators 90 days prior to commencing stimulation of a well. This responds to SOGRE elements 6 and 13, which recommend that COGCC codify its statewide horizontal offset policy, and that operators prevent unintended migration of stimulation fluids or gas. As required by Rule 317.y, in situations where an operator (the "Stimulating Operator") seeks to stimulate a well within 150 feet of wells that are under the ownership of another operator (the "Offset Operator"), and the Stimulating Operator obtains consent from the Offset Operators prior to submitting their Form 2, the Stimulating Operator must attach that consent to their Form 2.

Fourth, Rule 303.a.(5).H. requires operators to submit geology and engineering information about wells that will be stimulated at shallow depths. Rule 303.a.(5).H. largely codifies existing Guidance, Stimulation at Depths 2,000 Feet or Less (Oct. 24, 2014). Shallow hydraulic fracturing has contaminated Protected Water in other states. Shallow hydraulic fracturing is a common practice in the Raton Basin, though it is rare in other areas of Colorado. The Commission adopted Rule 303.a.(5).H. to ensure that wherever shallow hydraulic fracturing occurs, it is conducted safely. The Rule requires operators to assess geology and hydrology in a 2-mile radius and identify risks to Protected Water. This information will allow Staff to ensure that Protected Water is isolated during shallow hydraulic fracturing processes. This responds to SOGRE elements 13 and 76, which recommend that COGCC ensure that confining layers prevent migration of contaminants into Protected Water, and adopt standards for wells with limited intervening zones.

Rule 308A.

To facilitate effective Staff review of cement jobs and codify existing policies, the Commission clarified the types of information that operators must submit to verify cementing on Form 5, Drilling Completion Reports. Operators must include all cement reports and charts related to cement placement with their Form 5, Drilling Completion Reports, using a digital, rather than paper format.

Consistent with changes to Rule 341.b, the Commission also required operators to report bradenhead threshold monitoring values on Form 5, Drilling Completion Reports.

Rule 308B.

The Commission added a new subsection, Rule 308B.b., to clarify that operators must report the parameters necessary to understand that well completion occurred according to design on their Form 5A, Completed Interval Reports.

Rule 311.

To implement Senate Bill 19-181's directive to "[a]ddress the . . . closure of production wells," § 34-60-106(18)(a), C.R.S., the Commission added a new requirement, Rule 311.b.(2), that the Director review Form 6 Subsequent Reports of Abandonment and related information to ensure that the operator properly conducted abandonment and plugging. The Commission further empowered the Director to require operators to take any action necessary to remedy deficiencies, and to impose formal corrective plan requirements if operators do not comply. This responds to SOGRE element 132, which recommends that COGCC establish criteria for plugging approval and ensure that COGCC can compel operators to take action to address failed plugs.

Rule 314.

The Commission revised Rule 314 to conform to changes made to Rule 341, and to clarify that bradenhead test results may be submitted through any method approved by the Director or Commission.

Rule 316C.

Consistent with changes to Rule 341, the Commission removed the requirement for operators to submit a Form 42, Field Operations Notice of Bradenhead Test.

The Commission added a new requirement that operators submit a Form 42, Notice of Start of Plugging Operations to give at least 48 hours advanced written notice prior to starting to plug a well. This is consistent with changes to Rule 311 and 319 and will facilitate efficient Staff review and inspection of planned plugging operations.

Rule 317

To implement Senate Bill 19-181's directive to "[r]equire that wells are constructed using current practices and standards that protect water zones and prevent blowouts," § 34-60-106(18)(b), C.R.S., the Commission revised Rule 317 to strengthen drilling, casing, and cementing standards, and codify existing guidance, policies, and conditions of approval on these topics.

Rule 317.a.

The Commission clarified that operators must keep wells under control in all circumstances including when re-entering, recompleting, workovers, and plugging wells. This responds to SOGRE element 20, which recommends that COGCC establish blowout prevention requirements to control maximum anticipated pressure that may be encountered during drilling operations because it expands existing blowout prevention requirements to cover all potential scenarios. The Commission also clarified that protests may be filed pursuant to the 500 Series protest process when the Commission designates specific areas as requiring certain blowout prevention equipment.

Rule 317.e.

In Rule 317.e.(1), the Commission updated its standards for isolating Protected Water and

non-producing formations by clarifying that operators must prevent migration of oil, gas, and water by isolating potential flow zones, and by using the new definition of "Protected Water." This responds to SOGRE elements 33, 34, and 35, which recommend that COGCC more clearly define which zones must be isolated, and isolate potentially productive zones.

To ensure that Protected Water is not contaminated by drilling fluids, in Rule 317.e.(2), the Commission codified currently-applied conditions of approval requiring that drilling above the base of a Protected Water zone be done with air, fresh water, or fresh water-based mud. This responds to SOGRE element 41, which recommends that COGCC codify its guidance for appropriate drilling fluids in Protected Water, and prohibit additives that could harm Protected Water quality.

In Rule 317.e.(3), the Commission specified that all casing cemented in a well must be made of steel. This responds to SOGRE element 42, which recommends that COGCC consider enhancing its casing quality standards.

In Rule 317.e.(4), the Commission added a new requirement for operators to test casing integrity before placing it downhole, using one of several specified methods. This responds to SOGRE element 42, which recommends that COGCC establish criteria for casing quality based on anticipated completion factors, including appropriate safety factors.

Rule 317.f.

In Rule 317.f.(1), the Commission adopted new, specific standards for cementing. Proper cementing is crucial to isolating Protected Water and ensuring that oil, gas, and produced water remain inside the wellbore and do not commingle with non-producing zones.

In Rule 317.f.(2), the Commission specified the width of the annular space to be filled with cement for different types of casing. This responds to SOGRE element 55, which recommends that COGCC establish baseline standards for minimum annular offset between the wellbore and casing to ensure effective cementing that can be verified by a test or log. By using the phrase "[u]nless the Director approves otherwise," the Commission intends for staff to approve or deny exceptions to Rule 317.f.(2)'s requirements through the permitting process, rather than requiring operators to follow the Rule 502.b. variance process.

Rule 317.f.(3) creates new requirements for proper cement placement and to verify that wells are cemented properly. This responds to SOGRE element 53, which recommends that COGCC clarify methods for effective cement placement behind intermediate and production casing.

In Rule 317.f.(4), the Commission required operators to use a cement slurry that isolates Protected Water, hydrocarbon formations, and other zones that could interfere with wellbore integrity. This responds to SOGRE elements 49 and 50, which recommend that COGCC require the use of cement blends designed to isolate problematic zones, such as hydrogen sulfide bearing formations, and natural gas flow zones.

Rule 317.f.(5) sets standards for cement slurry composition. This responds to SOGRE

elements 45, 46, 48, and 54, which recommend that COGCC set standards for cement quality, preparing cement slurry, mix water quality, free water separation, and density.

Under Rule 317.f.(6), operators must test representative samples of cement mixtures every six months or whenever conditions change, whichever is more frequent. This responds to SOGRE element 47, which recommends that COGCC set standards for cement slurry tests.

Rule 317.g.

The Commission adopted new requirements for centralizing casing to facilitate effective standoff, mud removal, cement circulation, and casing installation. This responds to SOGRE elements 44 and 56, which recommend that COGCC require casing centralization plans and codify standards for centralizing casing.

Rule 317.h.

The Commission adopted new requirements for operators to clean and condition wellbores before cementing to control gas flow, foster cement displacement, and ensure cement bonds to the wellbore. This responds to SOGRE elements 51 and 52, which recommend that COGCC establish standards for wellbore conditioning and circulation before cementing.

Rules 317.i & 317.j.

The Commission revised its requirements for surface casing to extend below all usable groundwater by using the newly defined term, "Protected Water," and by requiring Director approval for surface casing depth. Extending surface casing below all Protected Water is crucial for preventing contamination of Protected Water by oil, gas, and produced water. Requiring Director approval allows Staff to verify that operators are correctly isolating Protected Water. In areas where subsurface conditions are unknown, surface casing must be run to at least a minimum depth of 10% of True Vertical Depth of the deepest point of the well unless required otherwise by Commission order. In areas where subsurface conditions are known, surface casing must be run to a depth approved by the Director to isolate all protected water. This responds to SOGRE elements 14, 15, 16, 17, and 18, which recommend that COGCC use all available to data to set protected groundwater depths.

Rule 317.k.

Consistent with Senate Bill 19-181's change to the definition of "minimize adverse impacts," § 34-60-103(5.5), C.R.S., the Commission changed regulatory language that previously allowed alternate aquifer protection using stage cementing where cementing deep surface casing was "uneconomical."

Rule 317.l.

The Commission changed references to "fresh water" to the newly defined term, "Protected Water," and clarified confusing language. The Commission also expanded situations where operators must take remedial action to address cementing issues to include any situation where there is inadequate cement coverage, rather than only situations where surface casing cement levels fall below the surface. This ensures Staff oversight over any

inadequate cementing to rectify errors that could otherwise lead to the contamination of Protected Water or wasteful commingling of oil, gas, or produced water with non-producing formations. Although the Commission added requirements for remedial cementing to Rule 317.w, it intends operators to comply with both Rule 317.l and Rule 317.w as appropriate.

Rule 317.m.

The Commission expanded the list of zones where cement is required behind production casing. This responds to SOGRE elements 74 and 75, which recommend that COGCC codify requirements to isolate hydrocarbon-bearing zones, flow zones, corrosive zones, and lost circulation zones, to prevent annular over-pressurization. The Commission also eliminated redundant cement testing requirements and replaced them with a cross-reference to Rule 317.k.

Rules 317.n., 317.o, and 317.p

In Rules 317.n, 317.o, and 317.p, the Commission adopted new pressure testing requirements for surface, intermediate, and production casing, respectively, to ensure that casing has adequate mechanical integrity to meet well design objectives. Casing integrity is crucial for isolating Protected Water and preventing waste. The criteria for a "successful" casing pressure test are found in Rule 317.q. This responds to SOGRE element 78, which recommends that COGCC establish standards for pressure testing prior to drilling to verify casing integrity and cement displacement.

In Rule 317.p, the Commission specifically required that production casing and stimulation string which will undergo hydraulic fracturing must withstand anticipated pressures during hydraulic fracturing, rather than maximum anticipated surface pressure. Operators must also monitor bradenhead pressure while pressure testing production casing. This responds to SOGRE elements 87, 88, and 89, which recommend that COGCC add appropriate safety factors for pressure tests based on the test objectives.

Rule 317.q.

The Commission adopted standards for a successful casing pressure test to provide clear, quantitative metrics for whether casing maintains integrity, based on changes in surface and bradenhead pressure. To ensure that operators take effective remedial action when a pressure test is not successful, the Commission forbid operators from conducting hydraulic fracturing treatments on any well that no longer has mechanical integrity. The Commission also adopted reporting requirements to keep staff updated on changes made to a well's casing and cementing system to remediate the cause of lost mechanical integrity.

Rule 317.v.

The Commission specified that submitted cement bond logs must include variable density displays.

Rule 317.w.

The Commission clarified that if cement coverage does not satisfy the requirements of Rule

317.e., the Director may require the use of a cement bond log or other cement evaluation tool prior to an operator continuing reentering, recompleting, or deepening operations. This responds to SOGRE elements 77 and 79, which recommend that COGCC clarify its authority to require reporting of defective cement and appropriate corrective action, and to define when cement evaluation logs or other methods are required to assess integrity.

Rule 317.y.

The Commission clarified language in Rule 317.y, which specifies that wells that will be treated by hydraulic fracturing may not be located within 150 feet of an existing wellbore, unless the operator seeking to perform hydraulic fracturing treatment receives consent from the operator of the well being encroached upon.

Rule 317.z.

The Commission codified parts of its existing Horizontal Offset Statewide Interim Policy by requiring operators seeking to stimulate a well to provide notice to the operators of all wells within 1500 feet at least 90 days prior to stimulation.

Rule 317.aa.

The Commission codified parts of its existing Horizontal Offset Statewide Interim Policy and its DJ Basin Horizontal Offset Policy by requiring operators to ensure that all wells within 1,500 feet have protections in place to prevent and minimize safety and environmental risks that could arise from well communication. By codifying existing policies for offset wells, the Commission intends to mitigate potential ground and surface water contamination if well communication occurs by ensuring that offset wells are constructed to withstand potential pressures. This responds to SOGRE elements 4, 5, 6, 7, and 13, which recommend that COGCC codify its existing offset well policies, and ensure that there are adequate confining layers to prevent migration of stimulation fluids.

Rule 317.bb.

The Commission added new requirements to ensure that offset well owners comply with all necessary evaluation requirements. The Commission required offset well owners to cooperate with the operator of a well that will be stimulated if the latter operator conducts an offset well evaluation that reveals the need to remediate the offset well to ensure adequate isolation in the event of offset stimulation. This ensures that offset wells are adequately evaluated and remediated in situations where they are owned by a different entity than the entity that seeks to stimulate a well. The Commission has determined that adequately mitigating offset wells to withstand potential well communication is necessary to prevent potential surface and/or groundwater contamination that could adversely impact public health, safety, welfare, the environment, and wildlife resources.

Rule 317.cc.

The Commission added a new requirement that operators take all prudent measures to prevent communication between a formation targeted for stimulation and a protected water source. Although offset well evaluations are an effective tool to prevent wellbore

communication between two wellbores, communication may also be possible along other conduits. The broader requirements in Rule 317.aa are intended to ensure that operators prevent any known conduits from allowing contamination of protected waters.

Rule 317.dd.

To ensure an appropriate safety factor and prevent fluid losses and surface spills, the Commission adopted a requirement for operators to pressure test surface equipment that will be exposed to hydraulic fracturing treatment pressure before commencing hydraulic fracturing. Surface equipment integrity is also crucial to ensuring that well stimulation does not result in unintentional fluid releases or safety hazards. This responds to SOGRE element 90, which recommends that COGCC establish standards for surface equipment integrity verification prior to starting hydraulic fracturing operations.

Rule 317.ee.

To implement Senate Bill 19-181's directive to "[e]nhance safety and environmental protections during . . . hydraulic fracturing," § 34-60-106(18)(b), C.R.S., the Commission added a new requirement that operators monitor and record several parameters during hydraulic fracturing operations. As required by Rule 308B, operators must report these values on their Form 5A, Completed Interval Reports. This responds to SOGRE elements 92 and 93, which recommend that COGCC codify existing guidance, and adopt new requirements for monitoring and reporting of several parameters during hydraulic fracturing operations.

Rule 319.

To implement Senate Bill 19-181's directive to "[a]ddress the . . . closure of production wells," § 34-60-106(18)(a), C.R.S., the Commission updated its plugging and abandonment rules.

In Rule 319.a.(1), the Commission updated its standards for plugging and abandoning wells by requiring operators to isolate all zones identified by Rules 311.b.(2) and 317.e. This responds to SOGRE element 123, which recommends that COGCC define zones requiring isolation during plugging operations. The Commission also simplified its requirements for the cement slurry used in plugging operations by replacing the prior, complex definition with a cross-reference to Rule 317.f's cement slurry standards. This responds to SOGRE element 126, which recommends that COGCC establish standards for cement mix water quality.

In Rule 319.a.(6), the Commission clarified that operators must cap or seal wells between 5 and 90 days after placing the last plug. The 5-day period allows time for cement cure, to ensure that no channeling occurs in the cement, and to allow monitoring for successful plugging.

In Rule 319.a.(7), the Commission required that operators must use tagging to verify that the plug at the base of the deepest protected water stratum is proper placed. This responds to SOGRE element 129, which recommends that COGCC codify current conditions of approval requiring tagging of isolation plugs.

In Rule 319.b.(3), the Commission clarified that temporary abandonment requirements apply to dry holes. This partially responds to SOGRE element 117, which recommends establishing timeframes for plugging dry holes.

Rule 321.

The Commission revised Rule 321.a by specifying that operators must file deviated drilling plans with three-dimensional data, and by requiring Director approval of the format for deviated drilling plans. This will facilitate efficient and effective Staff review of Deviated Drilling Plans.

The Commission revised Rule 321.b by requiring operators to perform directional surveys for deviated wellbores and file them with the Director in a three-dimensional format. Obtaining three-dimensional data on wellbore locations will assist Staff in accurately understanding well locations to mitigate the risks of well communication, plotting well locations accurately, and avoiding potential collisions. This responds to SOGRE element 8, which recommends that COGCC revise its regulations to allow digital mapping of wellbore locations.

The Commission also added new Rule 321.c, which requires operators perform inclination surveys for vertical (non-deviated) wells, and specifies the format for operators to submit the data gathered in these surveys to the Director. Previously, the Commission only required operators to submit detailed wellbore location information for deviated wellbores. However, the Commission needs accurate location data about vertical wellbore locations for the same reasons it needs accurate location data about deviated wellbores, and inclination surveys are an effective way of obtaining this information. This responds to SOGRE element 8, which recommends that COGCC require inclination surveys for vertical wells.

Rule 341.

The Commission substantially revised its bradenhead monitoring and testing requirements to implement Senate Bill 19-181's directive to "[r]equire regular integrity assessments for all oil and gas production wells, such as surface pressure monitoring during production." § 34-60-106(18)(d), C.R.S. Bradenhead monitoring is a form of surface pressure monitoring.

Prior to the Wellbore Integrity Rulemaking, the Commission required bradenhead monitoring, testing, and reporting through Rules 207.b, 314, 316C.g, 316C.l, 341, and 608.e, conditions of approval, and through orders, policy, and guidance for the Greater Wattenberg Area and the Buzzard, Mamm Creek, and Rulison Fields. The Commission streamlined and strengthened these standards by setting statewide standards for bradenhead monitoring, testing, and reporting during all stages of oil and gas operations in Rule 341.

The Commission's revisions to Rule 341 respond to SOGRE elements 106, 108, and 109, which recommend that COGCC expand its bradenhead monitoring requirements to apply statewide, adopt more specific protocols and pressure thresholds for bradenhead pressure testing, require additional tests and periodic monitoring, and improve reporting. These recommendations are intended to ensure that COGCC has adequate information about wellbore integrity, especially during the production phase.

In Rule 341.a, the Commission required operators to equip bradenhead access on all wells and to allow COGCC staff to visually inspect the equipment at all times. This may require operators to retrofit existing wells that lack appropriate equipment.

In Rule 341.b, the Commission adopted a schedule of bradenhead monitoring at multiple stages during a well's lifecycle and set thresholds for maximum bradenhead pressure at each stage. The Commission maintained Rule 341's existing requirement that operators keep bradenhead monitoring records for a minimum of five years.

Under Rule 341.b.(1), prior to stimulation, operators must monitor bradenhead pressure monthly, and may not commence stimulation if pressure exceeds 30% of true vertical depth of the surface casing shoe without Director approval. This ensures that wellbores have integrity before any stimulation, including hydraulic fracturing, occurs.

Under Rule 341.b.(2), the Commission maintained Rule 341's existing requirements for continuous bradenhead pressure monitoring and recording during stimulation, but strengthened and expanded the requirements for monitoring nearby wells and for taking corrective action. Continuous pressure monitoring is warranted during well stimulation because the high pressures and volumes of fluids associated with some stimulation techniques, such as hydraulic fracturing, pose risks to wellbore integrity. The Commission added a requirement that operators monitor bradenhead pressure at all wells within 300 feet of the wellbore being treated as a precaution to detect potential well communication. In response to SOGRE elements 94 and 95, the Commission required operators to terminate hydraulic fracturing treatment and notify the Director within 24 hours if bradenhead pressure exceeds the surface casing shoe pressure threshold during well stimulation. Operators must diagnose and correct the problem that led to the elevated annular pressure and obtain Director approval prior to continuing hydraulic fracturing stimulation operations.

The Commission provided a range of diagnostic processes and specified necessary actions for a range of potential outcomes, including false positive tests where additional diagnostic testing indicates that there is no downhole failure or migration pathway into Protected Water. Operators must submit a Sundry Notice, Form 4, 15 days after the high pressure is identified explaining its cause and any corrective measures taken. Operators must submit the Sundry Notice, Form 4 even if additional diagnostic testing indicates that there is no downhole failure or migration path into Protected Water. This information allows Staff to verify that any potential wellbore integrity issues have been appropriately resolved.

The Commission intends for Staff to issue guidance about the specific circumstances that require operators to contact Staff, and when Staff approval is required before stimulation activities can proceed. For example, the Commission does not intend to require Staff approval to re-commence stimulation operations if the cause of the bradenhead pressure spike was monitoring equipment failure, rather than an actual downhole condition. Staff will endeavor to provide the same reliable, swift response that they provide in other time-sensitive matters.

Under Rule 341.b.(3), after stimulation or completion, operators must monitor annular

casing pressures at least daily for 30 days.

Under Rule 341.b.(4), after the conclusion of the monitoring performed in compliance with Rules 341.b.(1), (2), and (3), operators statewide must monitor and record bradenhead pressure at least monthly at all wells, including shut-in wells, until plugging occurs. If pressure exceeds 30% of the true vertical depth of the surface casing shoe, operators must notify the Director with a Form 17, Bradenhead Test, pursuant to Rule 314. Operators must immediately remedy the cause of the annular over-pressurization. Operators must also perform diagnostic testing to determine whether the annular casing pressure is sustained. If it is, they must notify the Director with a Sundry Notice and implement a pressure management plan.

In Rule 341.c., the Commission codified and extended statewide existing guidance requiring annual bradenhead testing, which previously applied only in the Denver-Julesburg Basin pursuant to Order No. 1-232 and in the Piceance Basin's Rulison, Mamm Creek, and Buzzard Fields pursuant to Order Nos. 1-107, 139-56, 191-22, and 369-2. As discussed below, there is an exception to this rule for coalbed methane wells, which will continue conducting biennial bradenhead testing, as already required by Rule 608. The purpose of annual testing is to provide a universal "health check" on every well in the state, to ensure that wellbore integrity is monitored throughout the life cycle of every well.

Finally, in Rule 341.d, the Commission required operators to immediately correct deficiencies identified in a bradenhead test, and clarified that the Director may require operators to take specific actions through remediation plans. A pressure management plan, as required by Rule 341.b.(4).C., is an acceptable form of remediation plan. If operators are unable to repair the deficiency or implement a pressure management plan, they must plug and abandon the well within six months.

Rule 603.e.

To implement Senate Bill 19-181's directive to "[e]nhance safety and environmental protections during operations such as drilling," § 34-60-106(18)(c), C.R.S., the Commission updated statewide well control and safety standards by adding several new standards for drilling fluid in Rule 603.e.(1). These drilling standards are intended to prevent blowouts, ensure well control, and ensure that drilling fluid has sufficient weight. The Commission also adopted requirements to ensure well control when wells are drilled with air, nitrogen, or foam (light fluids).

Pursuant to Rule 603.e.(2), operators must maintain (and provide access to the Director, upon request) records of drilling fluids, including density, fluid type, viscosity, fluid loss control, and rheological properties, for a period of five years.

In response to SOGRE element 20, the Commission updated the edition of API Standard 53: Well Control Equipment Systems for Drilling Wells incorporated by reference into Rule 603.e.(6) to the 5th edition, published in 2018.

The Commission revised Rule 603.e.(9) to require operators to equip wellhead assemblies to monitor annulus pressure. This responds to SOGRE element 29, which recommends that

COGCC specify that all annuli should be capable of being monitored.

In response to SOGRE elements 106, 108, 109, and 110, the Commission added a new requirement that operators inspect and service the wellhead, tree, and surface control equipment to ensure that surface control is maintained throughout a well's lifetime.

The Commission moved and revised the casing pressure standards that were formerly found in Rule 603.e.(7) (now 603.e.(12)) to Rule 317.

In Rule 603.e.(10), the Commission specified that blowout prevention equipment may include annular preventers and blind rams.

In order to effectively manage emergency situations, the Commission adopted a new requirement in Rule 603.e.(18) that operators have a functioning emergency response plan. The term "functioning" indicates the Commission's intent that operators share their plans, and any updates to their plans, with Staff and appropriate local government and first response agency officials, including, but not limited to, the County Local Emergency Planning Committee ("LEPC"), local Emergency Management contacts, and Fire Marshals.[2] This responds to SOGRE element 30, which recommends that COGCC establish standards or formalized agreements for emergency response planning for incidents that pose immediate threats to human health and safety, including first responder coordination and coordination on blowouts, spills, fires, and uncontained releases.

Finally, the Commission adopted a new requirement for operators to conduct formation integrity tests ("FIT") at specific times during and in other applicable situations. Operators only must conduct FITs in areas where the fracture gradient of a formation at the casing shoe is unknown to the operator or Staff. FITs provide crucial information to Staff and operators about the ability of the surface casing to assist with well control and any potential risks of contaminating Protected Water formations before drilling down to formations targeted for hydrocarbon production. This responds to SOGRE element 27, which recommends that COGCC add requirements for FITs in areas where fracture gradients are unknown.

Rule 608.e.

The Commission moved most of Rule 608.e's requirements for bradenhead monitoring and testing at coalbed methane wells to Rule 341. However, Rule 608.e clarifies that coalbed methane wells remain subject to biennial bradenhead testing while in production. Existing COGCC guidance already requires coalbed methane wells to be cemented to the surface, limiting the potential for contaminating Protected Water. The Commission also clarified that coalbed methane bradenhead tests must be at least 12 months apart. If biennial testing occurred on a calendar-year basis, operators could potentially conduct back-to-back tests in December and January, thereby subverting the purpose of requiring periodic testing.

[2] LEPC contacts are listed on the Colorado Division of Homeland Security and Emergency Management's website, https://www.colorado.gov/pacific/dhsem/local-lepc-contacts.

Conforming Changes

All conforming changes are described in the "Amendments and Additions to the Rules" section above.

Effective Date

The Commission adopted the proposed amendments during its hearing on February 26–27, 2020. These amendments will become effective, per § 24-4-103, C.R.S., twenty days after publication in the Colorado Register.