

SERIES SAFETY REGULATIONS

609. STATEWIDE GROUNDWATER BASELINE SAMPLING AND MONITORING:

Except coalbed methane wells, which are subject to Rule 608, new Oil and Gas Locations shall be subject to the following groundwater baseline sampling and monitoring requirements:

a. **Sampling locations:** Initial baseline samples and subsequent monitoring samples shall be collected from two (2) groundwater sources or springs within a one (1) mile radius of the proposed Oil and Gas Location. Sampling locations shall be selected by the operator based on the following criteria:

- (1) Proximity to the proposed Oil and Gas Location. Water features closest to the proposed Location are preferred.
- (2) Type of water feature. Domestic water wells are preferred over other water features. Springs may be sampled when no water wells are available.
- (3) Local topography and hydrogeology. Groundwater and surface water flow directions should be assessed in selecting sampling locations.
- (4) Orientation of locations with respect to the Oil and Gas Location. Where possible, the sampling locations should be on opposite sides of the Oil and Gas Location.
- (5) Multiple identified aquifers available. Where multiple defined aquifers are present, the sampling locations should attempt to sample from different aquifers when possible.
- (6) Existing sample locations. Water wells for which the Commission has existing data may be selected.

b. **Denial of access to sampling locations.** Where the owners of all suitable sampling locations refuse to grant access despite an operator's best efforts to obtain consent to conduct sampling, the Director may modify or waive the requirements of this Rule 609.

c. **Timing of initial sampling:** Initial sampling shall be conducted:

- (1) Prior to commencement of drilling or, on Oil and Gas Locations where no wells are planned, prior to commencement of installation of an Oil and Gas Facility on the Location; and
- (2) Prior to re-stimulation of a well if more than twelve (12) months have passed since the initial, pre-drilling sampling event or the most recent re-stimulation sampling event was conducted.

d. **Subsequent monitoring sampling:** Subsequent monitoring sampling shall be conducted:

- (1) Not less than 12 months, nor more than 18 months, following any well completion or facility installation; and
- (2) Not less than sixty (60) months, nor more than seventy-eight (78) months, after the last sampling event performed pursuant to Rule 609.d.i(1).
- (3) Additional "post-completion" test(s) may be required if changes in water quality are identified during follow-up testing.

(4) The Director may require further water well sampling at any time in response to complaints from water well owners.

e. Sampling procedures and analytical:

(1) Sampling and analysis shall be conducted in conformance with an accepted industry standard as described in Rule 910.b.(2).

(2) The initial baseline testing described in this section shall include pH, specific conductance, total dissolved solids (TDS), dissolved gases (methane, ethane, propane), alkalinity (total bicarbonate and carbonate as CaCO₃), major anions (bromide, chloride, fluoride, sulfate, nitrate and nitrite as N, phosphorus), major cations (calcium, iron, magnesium, manganese, potassium, sodium), other elements (barium, boron, selenium and strontium), presence of bacteria (iron related, sulfate reducing, slime and coliform), total petroleum hydrocarbons (TPH) and BTEX compounds (benzene, toluene, ethylbenzene and xylenes). Hydrogen sulfide shall also be measured using a field test method. Field observations such as odor, water color, sediment, bubbles, and effervescence shall also be included. The sample location shall be surveyed in accordance with Rule 215. COGCC recommends that the latest version of EPA SW 846 analytical methods be used where possible and that analyses of samples be performed by laboratories that maintain state or national accreditation programs.

(3) If free gas or a dissolved methane concentration greater than 1.0 milligram per liter (mg/l) is detected in a water well, gas compositional analysis and stable isotope analysis of the methane (carbon and hydrogen – ¹²C, ¹³C, ¹H and ²H) shall be performed to determine gas type. If test results indicated thermogenic or a mixture of thermogenic and biogenic gas. If the methane concentration increases by more than 5.0 mg/l between sampling periods, or increases to more than 10. mg/l, the operator shall notify the Director and the owner of the water well immediately.

(4) Copies of all test results described above shall be provided to the Commission and the water well owner within three (3) months of collecting the samples. The analytical data and surveyed well locations shall also be submitted to the Director in an electronic data deliverable format.