



ENVIRONMENTAL UNIT -- GROUND WATER SAMPLING

COGCC requires Oil & Gas Operators to sample groundwater (or, in some cases, surface water such as a spring) near a new oil and gas location both before and after a well is drilled. Colorado was the first state in the country to require water sampling both before and after drilling, and is still one of only a few states to require such sampling. All water quality data obtained through the required sampling programs must be provided to COGCC and is entered into the agency's groundwater database where the sample results may be viewed by the public.

The purpose of pre-drilling sampling is to obtain baseline water quality data. Post-drilling samples allow comparison to baseline conditions and may aid in determining whether oil and gas operations have resulted in adverse impacts to water. Post-drilling sampling may also lead to early detection of water impacts should they occur. Water sources that may be sampled include wells registered with the Colorado Division of Water Resources, including household, domestic, livestock, irrigation, municipal/public, and commercial wells; permitted or adjudicated springs; and monitoring wells installed specifically for sampling to meet COGCC requirements. The owner of a water source must consent to the source being sampled and to the sample data being made available to the public.

The pre-drilling sample must be analyzed for a full array of water quality indicators, as well as total petroleum hydrocarbons (TPH), BTEX¹ compounds, and dissolved gases. The intent is to provide an understanding of the existing water quality in the area near new oil and gas activity. A narrower suite of constituents more closely related to oil and gas activities, including dissolved gases, TPH and BTEX, is required for post-drilling samples.

The sampling requirements vary for coalbed methane (CBM) wells (in southern Colorado); for wells in the Greater Wattenberg Area (GWA); and for the rest of the state. The Commission or Director may require an operator to conduct water sampling at any time in response to observed changes in water quality or where contamination has been alleged. In addition, the Commission will sample domestic water wells upon request if an owner believes their well may have been impacted by oil and gas operations.

Rule 609: Statewide. An operator must sample up to four available water sources within one-half mile of a proposed new well (including injection wells) both prior to

¹ Benzene, toluene, ethylbenzene, and xylenes

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and after drilling. If four or fewer water sources are available, the operator must sample all of them. If more than four water sources are available the operator must select four wells based on specific criteria, such as proximity to the proposed oil and gas well, depth of aquifer, and type of water source (with a preference given to domestic water wells). Each water source must be sampled prior to drilling (not more than 12 months prior); again six to twelve months after a well is completed; and finally between five and six years after the well is completed.

Rule 608.b Coalbed Methane Wells. If a CBM well is proposed within $\frac{1}{4}$ mile of a conventional gas well or a plugged and abandoned (P&A) well, an operator must sample the two closest water wells within $\frac{1}{2}$ mile of the conventional or P&A well. If no conventional or P&A well is within $\frac{1}{4}$ mile of the proposed CBM well an operator must sample the two closest water wells within $\frac{1}{4}$ mile of the proposed CBM well. If there are not two water wells within $\frac{1}{4}$ mile, an operator must sample at least one well if there is one within $\frac{1}{2}$ mile. Operators are to obtain an initial baseline water sample prior to drilling, and post-completion samples one, three, and six years after completion of the well.

Rule 318A.e.(4) GWA. In the Greater Wattenberg Area an operator must sample one available water source in the governmental quarter-quarter section in which a new well is proposed. If a sampling point has been established within the quarter-quarter section and sampled within the prior 60 months, the operator may rely on that sample for baseline data. If no water source is available in the quarter-quarter section an operator must sample a water source within a quarter-quarter section within $\frac{1}{2}$ mile of the proposed oil and gas well. A pre-drilling sample and one post-drilling sample six to twelve months after drilling are required.

COGCC Groundwater Database

In 2011, COGCC, in partnership with the Groundwater Protection Council (GWPC), initiated a project to design a comprehensive environmental database and then migrate existing analytical data to the new SQL-server based database. Together, COGCC and GWPC identified and developed new processes to allow for electronic submission in a standardized electronic data deliverable (EDD) format of analytical data required by a variety of rules, orders, investigations, spill/release responses, remediation activities, Conditions of Approval, and voluntary sampling programs, including, but not limited to, those described above. The interface for entering field data, location data, and facility information is similar to the e-Form applications used for other electronic submittals and allows operators and COGCC staff to input data to the database directly.

The analytical data and other information within the COGCC Water Quality Database are a compilation of data collected by COGCC staff, data submitted to COGCC from third parties, and historical data. The data is made publically

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available through COGCC's online map system and anyone may download the entire groundwater database for further study and analysis. COGCC provides water sample results to the local government in which the samples were collected on request.

As of September 19, 2014, there are approximately 26,650 water quality samples in the database. These samples include over 23,000 "migrated" samples, 330 samples collected under Rule 318A, 651 collected under Rule 608, 333 collected under Rule 609, and nearly 2,000 collected for other purposes, including voluntary by Operators, as required by Permit condition, and those collected by COGCC staff. In addition to the water quality samples there are approximately 4,495 gas samples in the database. The gas samples contain data collected from production wells, bradenhead samples, and dissolved gas samples from water wells.