



COGCC FORM INSTRUCTIONS

FORM 2 - PERMIT TO DRILL POTENTIAL FLOW ZONE AND CONFINING FORMATION TABLE

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Definition Citations (100-Series Rules)

GROUNDWATER means subsurface waters in a zone of saturation which are or can be brought to the surface of the ground or to surface waters through wells, springs, seeps or other discharge areas.

POTENTIAL FLOW ZONES means formations or zones which have the potential to flow against or are unable to support the hydrostatic pressure exerted by fluid in the well.

Rule Citation

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.

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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.

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.

Purpose

The Casing Program table and the Potential Flow and Confining Formation table collectively form the Casing and Cementing Plan for the Well. This information will allow Engineering Staff to efficiently review the Operator's casing and cement configuration relative to fluids in geologic formations for proper wellbore isolation in accordance with Rule 209 and Rule 317.e.(1). By incorporating these tables into Form 2, they also allow for public transparency by placing this important information directly on the form that the public may review on COGCC's website.

Effective November 2, 2020, the Operator will complete casing and cementing plans with Form 2 to demonstrate how the Operator will isolate potential flow and hydrocarbon bearing zones, and subsurface hazards.

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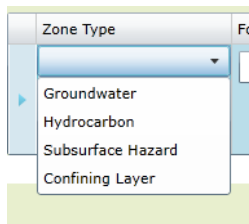
Instructions

eForm Tab Casing & Cementing Plan

Well Name & Contact Info	Well Location	Surface & Minerals	Cultural Setbacks	Spacing & Formations	Drilling & Waste Plans	Casing & Cementing Plan	Offset Wells Evaluation	Operator BMP/COA	Exceptions	Submit	Related Forms	Attachments	Review*	COGCC COAs & Comments*	Status & NTOs*
CASING PROGRAM (All depths in this table are measured depths.)															
Casing Type	Size	Of	Hole	Size	Of	Casing	Grade	Wt/Ft	Csg/Lin Top	Setting Depth	Sacks Cement	Cmt Btm	Cmt Top		
												Add	Remove		
<input type="checkbox"/> Conductor Casing is NOT planned.															
POTENTIAL FLOW AND CONFINING FORMATION															
Zone Type	Formation/Hazard	Top-Measured Depth	Top-true Vertical Depth	Btm-Measured Depth	Btm-True Vertical Depth	TDS(mg/L)	Data Source	Comments							
												Add	Remove		

Potential Flow and Confining Formation Table

Column 1: Zone Type



The image shows a dropdown menu for the 'Zone Type' column. The menu is open, displaying four options: 'Groundwater', 'Hydrocarbon', 'Subsurface Hazard', and 'Confining Layer'. The 'Groundwater' option is currently selected and highlighted with a blue background.

Column 1 is a dropdown with four options: Groundwater, Hydrocarbon, Subsurface Hazard, and Confining Layer. At least one hydrocarbon zone is required for the Form 2 Potential Flow and Confining Formation table. The Operator will identify all known zones that the well will penetrate. COGCC Engineering Staff will review this table for the correct identification of groundwater zones, hydrocarbon zone(s) and confining layers. COGCC

Engineering Staff will resolve any discrepancies with the Operator before passing the engineering task on the form.

Column 2: Formation/Hazard

The Operator will provide the formation name or the subsurface hazard type. This is a required data field for each row, with a 25 character limit.

Column 3: Top-Measured Depth

The Operator will provide their estimated measured depth in feet from surface to the top of the formation or subsurface hazard.

Column 4: Top-true Vertical Depth

The Operator will provide their estimated true vertical depth in feet from surface to the top of the formation or subsurface hazard.

Column 5: Btm-Measured Depth

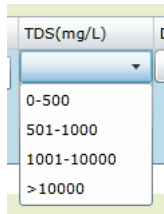
The Operator will provide their estimated measured depth in feet from surface to the bottom of the formation or subsurface hazard.

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Column 6: Btm-True Vertical Depth

The Operator will provide their estimated true vertical depth in feet from surface to the top of the formation or subsurface hazard.

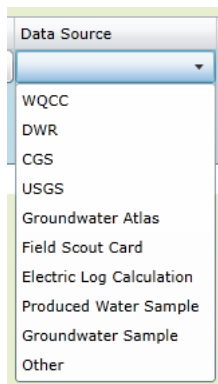
Column 7: TDS (mg/L)



A screenshot of a dropdown menu for TDS (mg/L). The menu is open, showing four options: 0-500, 501-1000, 1001-10000, and >10000. The menu is titled 'TDS(mg/L)'.

Column 7 is only required if the Zone Type is Groundwater. The Operator will provide the actual or estimated total dissolved solids (TDS) in the groundwater in milligrams per liter. A discrete value is not required. This data field is a dropdown list with different ranges of TDS values.

Column 8: Data Source



A screenshot of a dropdown menu for Data Source. The menu is open, showing ten options: WQCC, DWR, CGS, USGS, Groundwater Atlas, Field Scout Card, Electric Log Calculation, Produced Water Sample, Groundwater Sample, and Other. The menu is titled 'Data Source'.

Column 8 is only required if the Zone Type is Groundwater. The Operator will identify the source of data for the TDS value supplied in Column 7.

Column 9: Comments

Column 9 is only required to describe an alternate Data Source if the Zone Type is Groundwater and TDS Data Source is “Other”.

Optionally, the Operator may provide comments related to the corresponding row in the table.

Document Change Log

Change Date	Description of Changes
November 2, 2020	Document Created and Finalized