COGCC OIL AND GAS FIELD SCOUT CARD

Date	05/02/2016
Document No.	2056203

FIELD NAME	**PARACHUTE**
FIELD NUMBER	**67350**

LOCATION

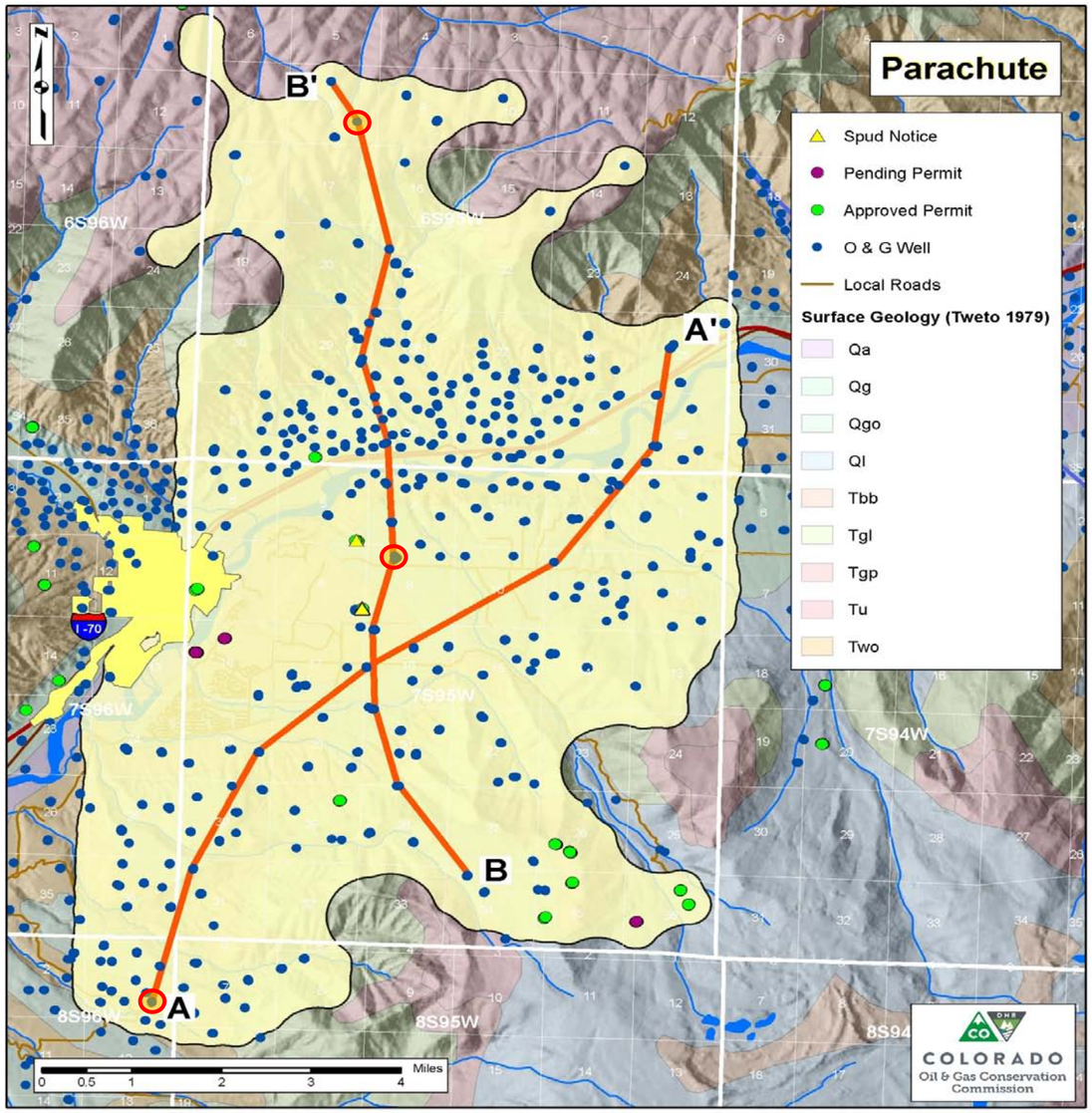
Basin	Piceance
Location-Townships	6S to 8S
Location-Ranges	95W to 96W

SURFACE GEOLOGY

Surface Geology consists of the Uinta Formation overlying the Green River Formation in higher elevation areas to the north (Roan Plateau) and the south (Battlement Mesa). These high-elevation areas are bisected by the Colorado River, which generally flows from northeast to southwest through the northern portion of the field. Landslide deposits are prevalent in areas with steep slopes, primarily on the south side of the valley. Alluvium is prevalent along the Colorado River and tributary creeks, primarily on the south side of the valley. These other Tertiary formations are underlain by the Wasatch Formation, which outcrops at the surface throughout most of the valley at lower elevations.

GEOLOGIC STRUCTURE

None within or near this field on COGCC's 250K GIS Geology layer.



Type Log Wells

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STRATIGRAPHY				A - Southwest						A' - Northeast
			API Number =>	045-13191	045-06301	045-15571	045-15802	045-06549	045-06663	045-14950
			Surface Elevation =>	6,075	6,248	5,532	5,811	6,013	5,243	5,219
All depths are measured depths			Well Type =>	Directional	Vertical	Directional	Directional	Vertical	Vertical	Directional
Group	Formation	Interval/Member	Isolation Concern	Log Top	Log Top	Log Top	Log Top	Log Top	Log Top	Log Top
	Alluvium		Water		0					0
	Landslide Deposit		Water					0		
	Uinta		Water							
	Green River		Water							
	Wasatch	Upper	Shallow Water	0		0	0		0	
	Wasatch	Middle	None							
	Wasatch	G-Sand*	Gas / UIC	1,620/1,780*	1,953/2,153*	1,046/1,193*	1,502/1,680*	1,886/2,072*	1,676/1,782*	1,960/2,081*
	Wasatch	Fort Union*	Water	2,103*	2,463*	1,562*	1,970*		2,130*	2,458*
	Wasatch	Middle	None							
	Wasatch	Lower*	Water	2,802*	3,104*	2,818*	3,320*		3,490*	3,672*
Mesaverde	Williams Fork	Ohio Creek	Water / UIC	2,975*	3,316*	2,988*	3,489*		3,770*	4,055*
Mesaverde	Williams Fork	U. Mesaverde	Water	3,159	3,626*	3,238*	3,774*		4,054	4,381
Mesaverde	Williams Fork	Top of Gas	Gas	4,433		4,159	4,863			
Mesaverde	Williams Fork	Cameo	Gas	5,576	6,122	5,640			6,894	6,845
Mesaverde	Iles	Rollins	Gas	5,946	6,437	6,129			7,504	7,850
Mesaverde	Iles	Cozzette	Gas	6,220	6,716					
Mesaverde	Iles	Corcoran	Gas	6,459	6,960					
	Mancos		Possible Gas	6,573						
	Niobrara		Possible Gas	9,038						
Dakota	Dakota		Possible Gas	10,881						
	Morrison		Possible Gas							

Annotated Type Log for 045-13191: COGCC Document Number 2056084

Stippled cells indicate that the respective log top was not apparent on logs or the top may be covered by a shallower casing string above the logged interval. "Middle Wasatch" is an interval that may include multiple formation members, and therefore, log tops are not presented for the Middle Wasatch.

** COGCC log picks (Operators commonly report the upper interval or the lower interval of the Wasatch G-Sand [as shown above], or some point in between, but not both; the Fort Union is sometimes reported by operators in this field, primarily in the western portion of the field, where it is more prominent on logs; "Lower" Wasatch, as shown herein for water isolation, is not recognized in geologic literature)*
*** Top of Niobrara and Dakota not shown on annotated type log for 045-13191; tops below Mancos are shown as reported by operator; log for lower portion of well is available in COGCC's well file, Document No. 1619663.*

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STRATIGRAPHY				B - South									B' - North
			API Number =>	045-15225	045-14125	045-11944	045-12604	045-06413	045-06496	045-06797	045-08123	045-06694	045-14037
			Surface Elevation =>	8,020	6,424	5,853	5,793	5,709	5,160	5,724	6,116	8,671	8,520
All depths are measured depths			Well Type =>	Directional	Directional	Vertical	Directional	Vertical	Vertical	Vertical	Vertical	Vertical	Directional
Group	Formation	Member	Isolation Concern	Log Top	Log Top	Log Top	Log Top	Log Top	Log Top	Log Top	Log Top	Log Top	Log Top
	Alluvium		Water						0				
	Landslide Deposit		Water	0		0		0					
	Uinta		Water									0	0
	Green River		Water		0						0		
	Wasatch	Upper	Shallow Water				0			0		3,106	3,165*
	Wasatch	Middle	None										
	Wasatch	G-Sand*	Gas / UIC	3,826/4,015*	2,088/2,258*	1,524/1,682*	1,450/1,668*	1,660/1,857*	1,130/1,340*	1,997/2,176*	2,803/3,012*	5,752/5,910*	5,703/5,850*
	Wasatch	Fort Union*	Water	4,352*	2,524*	1,922*	1,960	2,140	1,650*	2,486*	3,333*		6,244*
	Wasatch	Middle	None										
	Wasatch	Lower*	Water	5,307*	3,984*	3,238*	3,075*	3,327*	2,740*	3,630*	4,399*		7,273*
Mesaverde	Williams Fork	Ohio Creek	Water / UIC	5,476*	4,172*	3,520*	3,400*	3,512*	3,016*	3,952*	4,895*		7,733*
Mesaverde	Williams Fork	U. Mesaverde	Water	5,784	4,440*	4,100*	3,964*	3,800	3,360*	4,215*	5,171		8,011*
Mesaverde	Williams Fork	Top of Gas	Gas	6,829	5,574		5,053						
Mesaverde	Williams Fork	Cameo	Gas	8,259						6,600	7,882		11,096
Mesaverde	Iles	Rollins	Gas	8,692		6,896	6,860	6,850					11,521
Mesaverde	Iles	Cozzette	Gas	9,006			7,199	7,168*					
Mesaverde	Iles	Corcoran	Gas	9,245			7,437	7,418*					
	Mancos		Possible Gas	9,675*				7,809					
	Niobrara		Possible Gas										
Dakota	Dakota		Possible Gas										
	Morrison		Possible Gas										

Annotated Type Log for 045-06413: COGCC Document Number 2056083
Annotated Type Log for 045-06694: COGCC Document Number 2056085

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** COGCC log picks (Operators commonly report the upper interval or the lower interval of the Wasatch G-Sand [as shown above], or some point in between, but not both; the Fort Union is sometimes reported by operators in this field, primarily in the western portion of the field, where it is more prominent on logs; "Lower" Wasatch, as shown herein for water isolation, is not recognized in geologic literature)*

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WATER RESOURCE ISOLATION

Alluvium, landslide deposits, Uinta Formation, Green River Formation, Upper Wasatch (weathered portion in which water supply wells are screened), Fort Union, Lower Wasatch, Ohio Creek, and Upper Mesaverde.
Water wells within the field are more prevalent on the south side of the valley. Water wells are typically screened in alluvium or upper, weathered portions of the Wasatch Formation. The deepest water well within the field is 390', and several wells have total depths in the 300's, but of the hundreds of water wells in the field, most are less than 300' deep.

PRODUCING ZONE ISOLATION

Primary Objectives: Wasatch G (productive area generally limited to the southern portion of T6S, R95W and the northern portion of T7S, R95W) and Mesaverde Group (Williams Fork and Iles)
Secondary Objectives: Five wells completed in Mancos / Niobrara (045-12601, 045-13191, 045-15225, 045-22158, and 045-22370) and one well completed in Sego (sandstone member of the Iles Formation, 045-12498)

WASATCH G SAND UIC ISOLATION

Surface casing must be set below the Wasatch G Sand(s) in all wells drilled in the following area, in accordance with agreements between the area operator, BLM, and COGCC dating back to the 1990's, memorialized with COGCC Form 4 Sundry Notice #2055345, approved 11/22/2011: Sections 26-29 and 32-35 of T6S, R95W and Sections 2-5 of T7S, R95W. Additionally, surface casing or intermediate/production casing cement is required across the Wasatch G Sand(s) in Lots 7 and 8 Section 22 of T6S, R95W, as these lots comprise the northern portion of an aquifer exemption area described below the following table. Wasatch G Sand also produces gas in the same area described above. The UIC wells in the area are depleted, former gas-producing wells.

UNDERGROUND INJECTION CONTROL

API Number	Well Name and No.	Type	Zone	Sample Top	Sample Bot.	TDS	Source
045-06583	DOE #1-W-26	Disposal	Wasatch G	2,666	2,728	3,989	WH - 4/8/2013
045-06588	DOE #2-W-29	Disposal	Wasatch G	2,287	2,382	4,108	SEP - 8/6/2012
045-06584	DOE #2-W-27	Disposal	Wasatch G	2,804	2,862	9,906	WH - 4/8/2013
045-06301	Parachute Fed Disposal #1	Disposal	Ohio Creek	N/A	N/A	4,350	White River Field UIC Facility ID 159065[1]
045-22305	Nolte #13D-13	Source	Williams Fork	4,164	5,886	16,479	Reported - 1/28/2015[2]
045-22400	Island Ranch #23A-13	Source	Williams Fork	4,277	6,000	20,810	Reported - 1/28/2015[2]
045-18715	BAT #24B-17-07-95	Source	Williams Fork	4,683	6,397	18,575	WH - 12/2/2009
045-18714	BAT #23D-17-07-95	Source	Williams Fork	4,724	6,455	17,592	WH - 12/2/2009

Aquifer Exemptions: DOE wells area (Wasatch G) Lots 7 and 8 Section 22, Lots 2 through 7, NW/4 SE/4, and N/2 SW/4 Section 26, N/2 and N/2 S/2 Section 27, Lot 4 and W/2 NW/4 Section 28, NE/4 and N/2 SE/4 Section 29, T6S, R95W;
Parachute Fed Disposal #1 (Ohio Creek) S/2 SW/4 Section 30 and NW/4 Section 31, T7S, R95W; SE/4 SE/4 Section 25 and E/2 NE/4 Section 36, T7S, R96W
Data in this table is listed first by zone from shallowest to deepest, then by Sample Top depth.
(1) At the time of the UIC Application, the sample was considered representative of the Ohio Creek Formation. The sample was collected from a well in the White River Dome Field, Rio Blanco County, approximately 50 miles NNW of 045-06301. COGCC staff's opinion in 2016 is that this TDS concentration cannot be considered representative of Ohio Creek water quality in the Parachute Field.
(2) Collection method and sample date not available; date shown was date form submitted to COGCC.

COMMISSION ORDER SUMMARY (Significant Engineering and Spacing Issues)

440-1 (12/16/1985)	Wasatch: Establishes 160-acre drilling and spacing units, 600' from unit line. Minimum 250-foot surface casing requirement and leakoff testing required.
440-11 (2/20/1990)	Wasatch: Establishes 320-acre drilling and spacing units, 600' from unit line, 1200' well-to-well spacing in parts of the field that do not already have 160-acre units. Mesaverde Group: Recognizes all Mesaverde Group formations as a **Common Source** of supply. Establishes 320-acre drilling and spacing units, 600' from unit line, 1200' well-to-well spacing.
440-12 (4/19/1990)	Mesaverde Group: Amends prior orders to allow 3 wells per 640-acre drilling and spacing units in certain parts of the field.
440-13 (4/19/1990)	Mesaverde Group: Amends prior orders to allow 4 wells per 640-acre drilling and spacing units in certain parts of the field.
440-14 (2/22/1994)	Wasatch: Amends prior orders to allow 2 wells per 160-acre drilling and spacing unit, 600' from unit line, 1200' well-to-well spacing. Williams Fork: Amends prior orders to allow 4 wells per 320-acre drilling and spacing units and 8 wells per 640-acre drilling and spacing units, 600' from unit line, 1200' well-to-well spacing.
440-15 (3/18/1994)	Williams Fork: Amends prior orders to change setbacks to 400' from the unit line and 800' well-to-well spacing
440-16 (2/21/1995)	Williams Fork: Amends prior orders to allow 8 wells per 320-acre drilling and spacing units and 16 wells per 640-acre drilling and spacing units, 400' from unit line, 800' well-to-well spacing.
440-19 (10/31/2000)	Williams Fork: Amends prior orders to allow 20-acre spacing, 200' from unit line, 400' well-to-well spacing. Requires compliance with Garfield County Notice to Operators for surface casing setting depth (10% of TVD), formation integrity tests, loss of well control notices to residents within one mile, water sampling, reclamation plans, and air emission controls within 1,000' of occupied buildings, among other requirements.
Various	Williams Fork: Amends prior orders to allow 10-acre spacing, 100' from unit line, 200' from Application boundary line.
Various	Mesaverde Group: Amends prior orders to allow 40-acre spacing in certain parts of the field, 200' from unit line, 400' well-to-well spacing.
Various	Mesaverde Group: Amends prior orders to allow 20-acre spacing in certain parts of the field, 200' from unit line, 400' well-to-well spacing.
440-55 (12/9/2008)	Mesaverde Group: Amends prior orders to allow 10-acre spacing, 100' from unit line, 200' from Application boundary line.

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HISTORIC WELL CONSTRUCTION

Historic surface casing setting depths vary throughout the field as a function of age of the well and ground surface elevation. Older wells drilled during early development of the field commonly have surface casing setting depths in the range of 200' to 350'. Newer wells generally have surface casing set at depths ranging from 2,500' to 3,400' in higher-elevation locations and 750' to 1,750' in lower-elevation locations. Production casing generally terminates in the Iles Formation or the underlying Mancos Formation. Productive Wasatch G wells may terminate shallow in the Wasatch Formation at depths generally ranging from 2,000 feet to 3,500 feet. Production casing cement (or intermediate casing cement, if used) may be limited to coverage of the producing intervals, and coverage may be lacking across parts of the Mesaverde Group and Wasatch Formation.

NEW WELL CONSTRUCTION (effective 05/02/2016)

Minimum surface casing of 10% TVD required for well control and to cover water resources in the upper interval of the Wasatch Formation. Recommend setting depth of at least 50 feet below the Wasatch Formation top for high-elevation wells that must drill through the Unita Formation and/or the Green River Formation (generally 2,500' minimum when drilling on top of the Roan Plateau). Check for deep alluvium on offset logs with wells drilled near the Colorado River (e.g., the induction log for Forshee #W-22-3 [045-06521] shows sandy intervals to 820'), and set surface casing at least 50 feet below alluvium base. Full cement coverage of the Mesaverde Group and Ohio Creek is required in the Piceance Basin through 2015. New standards require cementing intermediate (if used) or production casing from 200' below the base of the Fort Union Formation (for water isolation) to at least 200' above the top of Wasatch G Sand(s) in areas where it is productive (e.g., all of T6S, R95W and the northern third of T7S, R95W). In other parts of the field, New Standards require cementing intermediate (if used) or production casing at least 200' above Lower Wasatch sands, as shown on the annotated type log for this field; cement coverage (stage cement or increased primary cement for intermediate [if used] or production casing) is also required across the Fort Union Formation.

PLUGGING OBJECTIVES

Plug(s) above Mancos and other deeper formations (if penetrated) to address potential future horizontal wells; plug above Mesaverde Group completions; plug above Ohio Creek and across Lower Wasatch (squeeze if no annular cement coverage); plug across Fort Union Formation; Wasatch G plug if productive within one mile (may be combined with Fort Union plug); stray gas isolation squeezes (if no annular cement) or in-casing stabilization plugs (if annular cement present) at 3,000-foot intervals if plugs are not already planned in those intervals as described above; surface casing shoe plug and surface plug. Consider setting plugs from 1,000' to surface for shallow surface casing strings that are less than 1,000 feet deep near the Colorado River for alluvium protection (e.g., the induction log for Forshee #W-22-3 [045-06521] shows sandy intervals to 820').

WELL CONTROL

Except for a rig fire that occurred while drilling 045-09476 on 2/21/2004, well control events summarized below were controlled without incident. Well Control events have been reported in 6S-95W, 7S-95W, and 7S-96W.
Well Control Reports (Form 23s) by Year: 2004 (1), 2005 (1), 2006-2010 (none), 2011 (2), and 2012-2015 (none). Reporting was inconsistent prior to 2009, when requirements for Form 23 reporting was emphasized with the operators.
Form 23s by Formation: Williams Fork (1) and Iles (3)
Uncontrolled gas kick reported for 045-09476 on 2/21/2004 while drilling in the Williams Fork Formation; resulted in a rig fire.
Controlled gas kick reported for 045-13528 on 5/25/2005 while drilling in the Corcoran Member of the Iles Formation.
Controlled gas kick reported for 045-19718 on 2/6/2011 while drilling in the Rollins Member of the Iles Formation.
Controlled gas kick reported for 045-20159 on 6/14/2011 while drilling in the Rollins Member of the Iles Formation.

NOTES

The southeastern portion of the field is in the Project Rulison Sampling and Analysis Plan area. Special requirements and Form 2 Conditions of Approval apply.
The extreme northern portion of the field is located in the Roan Rim Notice to Operators area. Special requirements and Form 2 Conditions of Approval apply.
Outside of Bradenhead Monitoring Area, but operator bradenhead monitoring is recommended (no specific reporting requirement).
Hydrogen Sulfide: Detectable concentrations reported in T6S, R95W (Section 35); T7S, R95W (Sections 2, 3, 5, 12, 26 and 34); T8S, R95W (Sections 7 and 8); and T8S, R96W (Section 1).
Hydrogen Sulfide: Encana detections not shown above (there may be additional locations in this field - difficult to determine specific locations with data submitted by Encana, 6/2012).