

**GEOLOGIC & DRILLING PROGNOSIS**

Prepared: 23-Oct-25 CMW

**WELL NAME:** FED RGU 521-12-298  
Directional from the pad RGU 44-1-298

**API:** 05-103-12665  
**STATE:** CO  
**COUNTY:** RIO BLANCO  
**BOTTOM HOLE LOCATION:** Sec. 1 T 2S R 98W  
**TYPE OF UNIT:** FED  
**FEDERAL EA:** Yes  
**HARDLINE:** No

**ELEVATION (ft):**  
**PAD (ft):** 6282  
**GROUND (ft):** 6282  
**KELLY BUSHING (ft):** 6312

**RIG INFORMATION:**  
**RIG NAME:** HP 522  
**KB HEIGHT (ft):** 30

**ESTIMATE TOPS:**

<u>Formation</u>	<u>TVD</u>	<u>MD</u>	<u>Formation Resource Notes</u>
Uinta	30	30	Potentially Useable Water
Green River	700	703	Potentially Useable Water
A Groove	850	855	Potentially Useable Water
B Groove	1050	1062	Potentially Useable Water
Dissolution Surface	1350	1379	Possible Lost Circ Zone
Garden Gulch	2250	2359	Potentially Useable Water
Orange Marker	2420	2545	Potentially Useable Water
Upper Wasatch	2500	2632	Potentially Useable Water
Top of "G" Sand	5110	5477	Possible Lost Circ Zone
Fort Union	5370	5760	Gas and Limited Use and Quality Water
Lower Wasatch	6160	6620	Potentially Useable Water
Ohio Creek	6616	7097	Possible Lost Circ Zone
Upper Measaverde	7336	7825	Gas and Limited Use and Quality Water
Approx. Top Gas	8136	8625	Gas and Limited Use and Quality Water
Cameo Coals	9706	10195	Gas, Coal, and Limited Use and Quality Water
Rollins SS	10436	10925	Gas and Limited Use and Quality Water
Cozzette	10586	11075	Gas and Limited Use and Quality Water
Corcoran	10911	11400	Gas and Limited Use and Quality Water
Upper Sego	11171	11660	Gas and Limited Use and Quality Water
Lower Sego	11416	11905	Gas and Limited Use and Quality Water
<b>TD</b>	<b>11916</b>	<b>12405</b>	

**MUD LOGGING:** Type: (Optional) Remote Gas Unit  
Interval: Base of surface casing to TD with total gas only

**OPEN HOLE LOGS:** Specifics: (Optional) Triple-Combo (DIL-GR-SP-Neutron Density)  
Interval: (Optional) GR from TD to surface, DIL-SP and Neutron Density from TD to 100' inside surface casing

**CASED HOLE LOGS:** Cement Eval: CBL

**CSG & CEMENT PROGRAM: SHOE TEST REQUIRED**

	<u>Csg Size (in)</u>	<u>Depth Set (tvd)</u>	<u>Depth Set (md)</u>	<u>Hole Size (in)</u>	<u>Approx. Cmt Tail (ft3)</u>	<u>Tail Yield (ft3/sx)</u>	<u>Approx. Sx Tail</u>	<u>Approx. Cmt Lead (ft3)</u>	<u>Lead Yield (ft3/sx)</u>	<u>Approx. Sx Lead</u>	<u>WOC (hrs)</u>
Conductor:	20	80	80	30	230	1.15					
DV Tool:	9.625	900	900	12.25	-	-	-	366	2.53	145	
Surface:	9.625	3000	3177	12.25	188	1.68	112	724	2.53	286	
Liner or Production:	4.5	11916	12405	8.75	1345	1.88	715	307	2.09	147	
							<b>Surface (sacks):</b>	543	<b>Prod. (sacks):</b>	862	

**ANTICIPATED PRESSURES (psi)**

<u>MASP</u>	<u>Prod Csg Test Pressure</u>	<u>Anticipated BHP</u>	<u>Prod. Csg. Grade</u>
2,919	8,500	5,541	P-110

**MUD PROGRAM:** (Do not deviate from mud engineer's recommendation without prior consent from Parachute office)

<u>FROM (md)</u>	<u>TO (md)</u>	<u>TYPE MUD</u>	<u>#GAL</u>	<u>VIS</u>	<u>WL</u>	<u>CHEMICALS</u>
0	3177	WBM	8.3-9.5	45-50	7-15	Bentonite/PHPA
3177	12405	LSND	8.6-11.0	40-80	6-10	PHPA/Barite

(Write mud added to system on tour sheets and report all mud mixed and daily cost in morning report)

**LOST CIRCULATION:** Report depth and bbls of mud lost on morning report and tour sheet. Any severe lost circulation problems should be reported immediately to well supervisor.

**SURVEYS:** Run every 100' on surface hole and trips unless otherwise instructed.

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(note: if there are questions concerning TD or logging, please call Geologist)

**CASING & CEMENTING PLAN**

Operator: TEP Rocky Mountain  
 Well Name & Number: FED RGU 521-12-298  
 Location: Ryan Gulch

Casing Design Calculations											
Type of Casing	Size of Hole (inches)	Size of Casing (inches)	Weight per Foot (lbs/ft)	Grade	Thread	Interval (ft - ft)	Length (feet)	Setting Depth (TVD feet)	Collapse (psi)	Burst (psi)	Tension (lbs)
Surface	12.25	9.625	36.0	J-55	BTC	0-3177	3,177	3,000	2,020	3,520	453,000
Production	8.75	4.500	11.6	P-110	EB (BTC)	0-12405	12,405	11,916	8,300	10,690	367,000

Surface Casing Shoe	Production Casing Shoe
Max MW = 9.5 ppg HP = 1,482 psi	Max MW = 10.0 ppg HP = 6,196 psi

True Vertical Depth = 11,916 ft  
 Bottom Hole Pressure = 5,541 psi  
 Pore Pressure Gradient = 0.465 psi/ft  
 Max. Sur. Pressure = 2,919 psi  
 BOP Required = 5M System

Bottom Hole Temperature = 260 degrees Fahrenheit

Casing Safety Factors			
Surface Casing	Pb = 1.21	Min = 1.100	Pass
	Pc = 1.36	Min = 1.125	Pass
	Sj = 3.96	Min = 1.500	Pass
Production Casing	Pb = 3.66	Min = 1.100	Pass
	Pc = 1.34	Min = 1.125	Pass
	Sj = 2.55	Min = 1.500	Pass

Cement Design Calculations

Critical Depths - Permitting Purposes Only	
Casing/Formation	Measured Depth
DV Tool	900 ft
Surface Casing	3,177 ft
Top of Mesaverde	7,825 ft
Top of Gas	8,625 ft
Total Depth	12,405 ft

Surface Cement	Stg II Lead	Stg I Lead	Tail
Top of Cement (ft)	0	900	2,677
Bottom of Cement (ft)	900	2,677	3,177
Cement Type	Type I/II	Type I/II	Class G
Additives (lb/sk)	.25 IntegraSeal	.25 IntegraSeal	.25 IntegraSeal
Volume, bbls	50	99	28
Annular vol w/ excess, ft <sup>3</sup>	366	724	188
Volume (sks)	145	286	112
Slurry Density (ppg)	12.3	12.3	13.9
Slurry Yield (ft <sup>3</sup> /sk)	2,530	2,530	1,680
Mixwater (gal/sk)	14.80	14.80	8.27
Annular Capacity (BBI)	0.0558	0.0558	0.0558
Annular Capacity (CF)	0.3132	0.3132	0.3132
Excess (%)	0.30	0.30	0.20
Total Sacks =			543
Total Cubic Ft. =			1,278

Production Cement	Lead	Tail
Top of Cement (ft)	7625	7625
Bottom of Cement (ft)	7625	12405
Cement Type	Type I/II	Class G
Additives (lb/sk)	.25 IntegraSeal	35% Silica
Volume, bbls	44	218
Annular vol w/excess, ft <sup>3</sup>	307	1345
Volume (sks)	147	715
Slurry Density (ppg)	12.7	13.5
Slurry Yield (ft <sup>3</sup> /sk)	2,090	1,880
Mixwater (gal/sk)	11,200	9,100
Annular Capacity (BBI)	0.0547	0.0547
Annular Capacity (CF)	0.3072	0.3072
Excess (%)	0.25	0.10
Total Sacks =		862
Total Cubic Ft. =		1,652

**NOTES:**

Surface and Intermediate

Single track guide shoe and float collar. Bowspring Centralize 1st, 2nd, & 3rd jt. Above/below DV tool @ 900', & every 4th joint.

Production

Reamer/Guide Shoe, 1jt blank, and Single Valve FC. Spiralizer Centralize 1st, 2nd, 3rd, 6th and 8th. 10' short jt above Ohio Creek  
 5 Spiralizers every other joint above drop/TOG From 8625 to 8125

### Casing Design Calculations

Surface Casing - 36#	Burst
	<p>Bottom Hole Pressure = TVD * Pore Pressure Gradient                      = 11916 * 0.465                      = 5540.9 psi</p> <p>Pburst = Bottom Hole Pressure - (0.22 * TVD)                      = 5540.94 - (0.22 * 11916)                      = 2919.4 psi</p> <p>Pb = Casing Burst Rating / Pburst                      = 3520 / 2919.42                      = 1.21</p> <p>Pb ≥ 1.1                      1.21 ≥ 1.1</p>
	<p><b>Collapse</b></p> <p>If: Max MW * Setting TVD * 0.052 ≥ Pore Pressure Gradient * Setting TVD                      9.5 * 3000 * 0.052 ≥ 0.465 * 3000                      1482 ≥ 1395</p> <p>Pcollapse = Max MW * Setting TVD * 0.052                      = 1482 psi</p> <p>Else:                      Pcollapse = Pore Pressure Gradient * Setting TVD                      = 1395 psi                      Pcollapse = 1482 psi</p> <p>Pc = Casing Collapse Rating / Pcollapse                      = 2020 / 1482                      = 1.36</p> <p>Pc ≥ 1.125                      1.36 ≥ 1.125</p>
	<p><b>Tensile</b></p> <p>Tension = (Weight * Length)                      = (36 * 3177)                      = 114372 lbs</p> <p>Sj = Casing Tension Rating / Tension                      = 453000 / 114372                      = 3.96</p> <p>Sj ≥ 1.5                      3.96 ≥ 1.5</p>
Production Casing	Burst
	<p>Bottom Hole Pressure = TVD * Pore Pressure Gradient                      = 11916 * 0.465                      = 5540.9 psi</p> <p>Pburst = Bottom Hole Pressure - (0.22 * TVD)                      = 5540.94 - (0.22 * 11916)                      = 2919.4 psi</p> <p>Pb = Casing Burst Rating / Pburst                      = 10690 / 2919.42                      = 3.66</p> <p>Pb ≥ 1.1                      3.66 ≥ 1.1</p>
	<p><b>Collapse</b></p> <p>If: Max MW * Setting TVD * 0.052 ≥ Pore Pressure Gradient * Setting TVD                      10 * 11916 * 0.052 ≥ 0.465 * 11916                      6196.3 ≥ 5540.94</p> <p>Pcollapse = Max MW * Setting TVD * 0.052                      = 6196.3 psi</p> <p>Else:                      Pcollapse = Pore Pressure Gradient * Setting TVD                      = 5540.9 psi</p> <p>Pcollapse = 6196.3 psi</p> <p>Pc = Casing Collapse Rating / Pcollapse                      = 8300 / 6196.32                      = 1.34</p> <p>Pc ≥ 1.125                      1.34 ≥ 1.125</p>
	<p><b>Tensile</b></p> <p>Tension = Weight * Length                      = 11.6 * 12405                      = 143898 lbs</p> <p>Sj = Casing Tension Rating / Tension                      = 367000 / 143898                      = 2.55</p> <p>Sj ≥ 1.5                      2.55 ≥ 1.5</p>