

GEOLOGIC & DRILLING PROGNOSIS

Prepared: 23-Oct-25 CMW

WELL NAME: FED RGU 321-12-298
Directional from the pad RGU 44-1-298

API: 05-103-12659
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:

Formation	TVD	MD	Formation Resource Notes
Uinta	30	30	Potentially Useable Water
Green River	700	706	Potentially Useable Water
A Groove	850	863	Potentially Useable Water
B Groove	1050	1074	Potentially Useable Water
Dissolution Surface	1350	1389	Possible Lost Circ Zone
Garden Gulch	2250	2336	Potentially Useable Water
Orange Marker	2420	2515	Potentially Useable Water
Upper Wasatch	2500	2599	Potentially Useable Water
Top of "G" Sand	5110	5345	Possible Lost Circ Zone
Fort Union	5370	5618	Gas and Limited Use and Quality Water
Lower Wasatch	6160	6449	Potentially Useable Water
Ohio Creek	6516	6819	Possible Lost Circ Zone
Upper Measaverde	7236	7545	Gas and Limited Use and Quality Water
Approx. Top Gas	8036	8345	Gas and Limited Use and Quality Water
Cameo Coals	9606	9915	Gas, Coal, and Limited Use and Quality Water
Rollins SS	10336	10645	Gas and Limited Use and Quality Water
Cozzette	10486	10795	Gas and Limited Use and Quality Water
Corcoran	10811	11120	Gas and Limited Use and Quality Water
Upper Sego	11071	11380	Gas and Limited Use and Quality Water
Lower Sego	11316	11625	Gas and Limited Use and Quality Water
TD	11816	12125	

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

	Csg Size (in)	Depth Set (tvd)	Depth Set (md)	Hole Size (in)	Approx. Cmt Tail (ft3)	Tail Yield (ft3/sx)	Approx. Sx Tail	Approx. Cmt Lead (ft3)	Lead Yield (ft3/sx)	Approx. Sx Lead	WOC (hrs)
Conductor:	20	80	80	30	230	1.15					
DV Tool:	9.625	900	900	12.25	-	-	-	366	2.53	145	
Surface:	9.625	3000	3125	12.25	188	1.68	112	702	2.53	278	
Liner or Production:	4.5	11816	12125	8.75	1345	1.88	715	307	2.09	147	
							Surface (sacks):	534		Prod. (sacks):	862

ANTICIPATED PRESSURES (psi)

MASP	Prod Csg Test Pressure	Anticipated BHP	Prod. Csg. Grade
2,895	8,500	5,494	P-110

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

FROM (md)	TO (md)	TYPE MUD	#GAL	VIS	WL	CHEMICALS
0	3125	WBM	8.3-9.5	45-50	7-15	Bentonite/PHPA
3125	12125	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.

TEP GEOLOGIST: Stephen Sunnenberg
Office: 281-936-0361
Cell: 303-918-4327
Email: sunnenberg@terraep.com

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

CASING & CEMENTING PLAN

Operator: TEP Rocky Mountain
 Well Name & Number: FED RGU 321-12-298
 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	0-3125	3,125	3,000	2,020	3,520	453,000
Production	8.75	4.500	11.6	P-110	EB (BTC)	0-12125	12,125	11,816	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 = 6,144 psi

True Vertical Depth = 11,816 ft
 Bottom Hole Pressure = 5,494 psi
 Pore Pressure Gradient = 0.465 psi/ft
 Max. Sur. Pressure = 2,895 psi
 BOP Required = 5M System

Bottom Hole Temperature = 260 degrees Fahrenheit

Casing Safety Factors			
Surface Casing	Pb = 1.22	Min = 1.100	Pass
	Pc = 1.36	Min = 1.125	Pass
	Sj = 4.03	Min = 1.500	Pass
Production Casing	Pb = 3.69	Min = 1.100	Pass
	Pc = 1.35	Min = 1.125	Pass
	Sj = 2.61	Min = 1.500	Pass

Cement Design Calculations

Critical Depths - Permitting Purposes Only	
Casing/Formation	Measured Depth
DV Tool	900 ft
Surface Casing	3,125 ft
Top of Mesaverde	7,545 ft
Top of Gas	8,345 ft
Total Depth	12,125 ft

Surface Cement	Stg II Lead	Stg I Lead	Tail
Top of Cement (ft)	0	900	2,625
Bottom of Cement (ft)	900	2,625	3,125
Cement Type	Type I/II	Type I/II	Class G
Additives (lb/sk)	.25 IntegraSeal	.25 IntegraSeal	.25 IntegraSeal
Volume, bbls	50	96	28
Annular vol w/ excess, ft ³	366	702	188
Volume (sks)	145	278	112
Slurry Density (ppg)	12.3	12.3	13.9
Slurry Yield (ft ³ /sk)	2,530	2,530	1,680
Mixwater (gal/sk)	14.80	14.80	8.27
Annular Capacity (Bbl)	0.0558	0.0558	0.0558
Annular Capacity (CF)	0.3132	0.3132	0.3132
Excess (%)	0.30	0.30	0.20
Total Sacks =			534
Total Cubic Ft. =			1,257

Production Cement	Lead	Tail
Top of Cement (ft)	7345	7345
Bottom of Cement (ft)	7345	12125
Cement Type	Type I/II	Class G
Additives (lb/sk)	.25 IntegraSeal	35% Silica
Volume, bbls	44	218
Annular vol w/excess, ft ³	307	1345
Volume (sks)	147	715
Slurry Density (ppg)	12.7	13.5
Slurry Yield (ft ³ /sk)	2,090	1,880
Mixwater (gal/sk)	11,200	9,100
Annular Capacity (Bbl)	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 8345 to 7845

Casing Design Calculations

Surface Casing - 36#	Burst
	<p>Bottom Hole Pressure = TVD * Pore Pressure Gradient = 11816 * 0.465 = 5494.4 psi</p> <p>Pburst = Bottom Hole Pressure - (0.22 * TVD) = 5494.44 - (0.22 * 11816) = 2894.9 psi</p> <p>Pb = Casing Burst Rating / Pburst = 3520 / 2894.92 = 1.22</p> <p>Pb ≥ 1.1 1.22 ≥ 1.1</p>
	<p>Collapse</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>Tensile</p> <p>Tension = (Weight * Length) = (36 * 3125) = 112500 lbs</p> <p>Sj = Casing Tension Rating / Tension = 453000 / 112500 = 4.03</p> <p>Sj ≥ 1.5 4.03 ≥ 1.5</p>
Production Casing	Burst
	<p>Bottom Hole Pressure = TVD * Pore Pressure Gradient = 11816 * 0.465 = 5494.4 psi</p> <p>Pburst = Bottom Hole Pressure - (0.22 * TVD) = 5494.44 - (0.22 * 11816) = 2894.9 psi</p> <p>Pb = Casing Burst Rating / Pburst = 10690 / 2894.92 = 3.69</p> <p>Pb ≥ 1.1 3.69 ≥ 1.1</p>
	<p>Collapse</p> <p>If: Max MW * Setting TVD * 0.052 ≥ Pore Pressure Gradient * Setting TVD 10 * 11816 * 0.052 ≥ 0.465 * 11816 6144.3 ≥ 5494.44</p> <p>Pcollapse = Max MW * Setting TVD * 0.052 = 6144.3 psi</p> <p>Else: Pcollapse = Pore Pressure Gradient * Setting TVD = 5494.4 psi</p> <p>Pcollapse = 6144.3 psi</p> <p>Pc = Casing Collapse Rating / Pcollapse = 8300 / 6144.32 = 1.35</p> <p>Pc ≥ 1.125 1.35 ≥ 1.125</p>
	<p>Tensile</p> <p>Tension = Weight * Length = 11.6 * 12125 = 140650 lbs</p> <p>Sj = Casing Tension Rating / Tension = 367000 / 140650 = 2.61</p> <p>Sj ≥ 1.5 2.61 ≥ 1.5</p>