GEOLOGIC & DRILLING PROGNOSIS

Prepared: 30-Dec-25 CMW

WELL NAME: **FEDERAL RGU 444-6-297**
Directional from the pad RGU 23-6-297

API: 05-103-12642
STATE: CO
COUNTY: RIO BLANCO
SURFACE HOLE LOCATION: Sec. 6 T 2S R 97W
TYPE OF UNIT: FED
FEDERAL EA: Yes
HARDLINE: No

ELEVATION (ft):
PAD (ft): 6222
GROUND (ft): 6222
KELLY BUSHING (ft): 6252

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	650	**652**	Potentially Useable Water
A Groove	800	**804**	Potentially Useable Water
B Groove	1000	**1008**	Potentially Useable Water
Dissolution Surface	1300	**1323**	Possible Lost Circ Zone
Garden Gulch	2200	**2301**	Potentially Useable Water
Orange Marker	2245	**2475**	Potentially Useable Water
Upper Wasatch	2440	**2562**	Potentially Useable Water
Top of "G" Sand	5050	**5401**	Possible Lost Circ Zone
Fort Union	5310	**5683**	Gas and Limited Use and Quality Water
Lower Wasatch	6100	**6543**	Potentially Useable Water
Ohio Creek	6922	**7437**	Possible Lost Circ Zone
Upper Measaverde	7642	**8194**	Gas and Limited Use and Quality Water
Approx. Top Gas	8442	**9000**	Gas and Limited Use and Quality Water
Cameo Coals	10012	**10570**	Gas, Coal, and Limited Use and Quality Water
Rollins SS	10742	**11300**	Gas and Limited Use and Quality Water
Cozzette	10892	**11450**	Gas and Limited Use and Quality Water
Corcoran	11217	**11775**	Gas and Limited Use and Quality Water
Upper Sego	11477	**12035**	Gas and Limited Use and Quality Water
Lower Sego	11722	**12280**	Gas and Limited Use and Quality Water
TD	12222	**12780**	

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					
Surface:	9.625	2540	2671	12.25	188	1.68	112	884	2.53	349	
Liner or Production:	4.5	12222	12780	8.75	1685	1.88	896	1030	2.09	493	
							Surface (sacks):	461	**Prod. (sacks):**	1389	

ANTICIPATED PRESSURES (psi)

MASP	Prod Csg Test Pressure	Anticipated BHP	Prod. Csg. Grade
3,667	8,500	5,683	HCP-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	2671	WBM	8.3-9.5	45-50	7-15	Bentonite/PHPA
2671	12780	LSND	8.6-10.0	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** stephen.sunnenberg@flywheelenergy.com

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

CASING & CEMENTING PLAN

Operator: TEP Rocky Mountain
Well Name & Number: FEDERAL RGU 444-6-297
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	0-2671	2,671	2,540	2,020	3,520	453,000
Production	8.75	4.500	11.6	HCP-110	GB (BTC)	0-12780	12,780	12,222	8,650	10,690	367,000

	Surface Casing Shoe		Production Casing Shoe	
	Max MW =	9.5 ppg	Max MW =	10.0 ppg
	HP =	1,255 psi	HP =	6,355 psi

True Vertical Depth =	12,222	ft
Bottom Hole Pressure =	5,683	psi
Pore Pressure Gradient =	0.465	psi/ft
Max. Sur. Pressure =	3,667	psi
BOP Required =	5M	System

Bottom Hole Temperature = 260 degrees Farenheit

Casing Safety Factors			
Surface Casing	Pb = 1.18	Min = 1.100	Pass
	Pc = 1.61	Min = 1.125	Pass
	Sj = 4.71	Min = 1.500	Pass
Production Casing	Pb = 3.57	Min = 1.100	Pass
	Pc = 1.36	Min = 1.125	Pass
	Sj = 2.48	Min = 1.500	Pass

Cement Design Calculations

Critical Depths - Permitting Purposes Only	
Casing/Formation	**Measured Depth**
Surface Casing	2,671 ft
Top of "G" Sand	5,401 ft
Top of Mesaverde	8,194 ft
Top of Gas	9,000 ft
Total Depth	12,780 ft

Surface Cement	**Stg II Lead**	**Stg I Lead**	**Tail**
Top of Cement (ft)	0	0	2,171
Bottom of Cement (ft)	0	2,171	2,671
Cement Type	Type IL	Type IL	Class G
Additives (lb/sk)	.25 IntegraSeal	.25 IntegraSeal	.25 IntegraSeal
Volume, bbls	0	121	28
Annular vol w/ excess, ft^3	0	884	188
Volume (sks)	0	349	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 =		461
	Total Cubic Ft. =		1,072

Production Cement	**Lead**	**Tail**
Top of Cement (ft)	5201	7994
Bottom of Cement (ft)	7994	12780
Cement Type	Type IL	Class G
Additives (lb/sk)	.25 IntegraSeal	35% Silica
Volume, bbls	183	300
Annular vol w/excess, ft^3	1,030	1685
Volume (sks)	493	896
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 (%)	0.20	0.10
Total Sacks =		1,389
Total Cubic Ft. =		2,714

NOTES:

Surface

Single track guide shoe and float collar. Bowspring Centralize 1st, 2nd, & 3rd jt. & every 4th joint.
WOC prior to drill out for a minimum of 500 psi compressive.

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 9000 to 8500

All Casing strings will be tested to .22psi/ft, or 1500 psi, whichever is greater, but will not exceed 70% of the minimum internal yield. If pressure declines more than 10% in 30 minutes, notification will be made and corrective actions will be taken.

Casing Design Calculations

Surface Casing - 36#

Burst

Bottom Hole Pressure = TVD * Pore Pressure Gradient
= 12222 * 0.465
RG 312-24-298 5683.2 psi
RGU 23-6-297
Pburst = Bottom Hole Presure - (0.22 * TVD)
= 5683.23 - (0.22 * 12222)
= 2994.4 psi

Pb = Casing Burst Rating / Pburst
= 3520 / 2994.39
= 1.18

Pb ≥ 1.1
1.18 ≥ 1.1

Collapse

If: Max MW * Setting TVD * 0.052 ≥ Pore Pressure Gradient * Setting TVD
9.5 * 2540 * 0.052 ≥ 0.465 * 2540
1254.8 ≥ 1181.1

Pcollapse = Max MW * Setting TVD *0.052
= 1254.8 psi

Else:
Pcollapse = Pore Pressure Gradient * Setting TVD
= 1181.1 psi
Pcollapse= 1254.8 psi

Pc = Casing Collapse Rating / Pcollapse
= 2020 / 1254.76
= 1.61

Pc ≥ 1.125
1.61 ≥ 1.125

Tensile

Tension = (Weight1 * Length1)
= (36 * 2671)
= 96156 lbs

Sj = Casing Tension Rating / Tension
= 453000 / 96156
= 4.71

Sj ≥ 1.5
4.71 ≥ 1.5

Production Casing

Burst

Bottom Hole Pressure = TVD * Pore Pressure Gradient
= 12222 * 0.465
= 5683.2 psi

Pburst = Bottom Hole Presure - (0.22 * TVD)
= 5683.23 - (0.22 * 12222)
= 2994.4 psi
Pburst = MATP = 8,500 psi
Pburstmax = 8,500 psi

Pb = Casing Burst Rating / Pburst max
= 10690 / 8500
= 1.26

Pb ≥ 1.1
1.26 ≥ 1.1

Collapse

If: Max MW * Setting TVD * 0.052 ≥ Pore Pressure Gradient * Setting TVD
10 * 12222 * 0.052 ≥ 0.465 * 12222
6355.4 ≥ 5683.23

Pcollapse = Max MW * Setting TVD *0.052
= 6355.4 psi

Else:
Pcollapse = Pore Pressure Gradient * Setting TVD
= 5683.2 psi

Pcollapse= 6355.4 psi
Pc = Casing Collapse Rating / Pcollapse
= 8650 / 6355.44
= 1.36

Pc ≥ 1.125
1.36 ≥ 1.125

Tensile

Tension = Weight * Length
= 11.6 * 12780
= 148248 lbs

Sj = Casing Tension Rating / Tension
= 367000 / 148248
= 2.48

Sj ≥ 1.5
2.48 ≥ 1.5