

**GEOLOGIC & DRILLING PROGNOSIS**

Prepared: 18-Feb-21 DC

**WELL NAME:** RG 542-18-297  
Directional from the pad RG 41-18-297

**API:** 05-103-12473-00  
**STATE:** CO  
**COUNTY:** RIO BLANCO  
**BOTTOM HOLE LOCATION:** Sec. 18 T 2S R 97W  
**TYPE OF UNIT:** FED  
**FEDERAL EA:** Yes  
**HARDLINE:** No

Unspaced

**ELEVATION (ft):**  
**PAD (ft):** 6621  
**GROUND (ft):** 6620  
**KELLY BUSHING (ft):** 6651

**RIG INFORMATION:**  
**RIG NAME:** HP 329  
**KB HEIGHT (ft):** 30

**ESTIMATE TOPS:**

| Formation           | TVD          | MD           | Formation Resource Notes                     |
|---------------------|--------------|--------------|--|
| Green River         | 921          | 931          | Potentially Useable Water                    |
| A Groove            | 1081         | 1098         | Potentially Useable Water                    |
| B Groove            | 1266         | 1291         | Potentially Useable Water                    |
| Dissolution Surface | 1581         | 1621         | Possible Lost Circ Zone                      |
| Orange Marker       | 2456         | 2535         | Potentially Useable Water                    |
| Wasatch             | 2661         | 2750         | Potentially Useable Water                    |
| Top of "G" Sand     | 5021         | 5216         | Possible Lost Circ Zone                      |
| Fort Union          | 5351         | 5561         | Gas and Limited Use and Quality Water        |
| Ohio Creek          | 6661         | 6931         | Possible Lost Circ Zone                      |
| Mesaverde           | 6661         | 6931         | Gas and Limited Use and Quality Water        |
| Approx. Top Gas     | 7751         | 8036         | Gas and Limited Use and Quality Water        |
| Cameo Coals         | 10101        | 10386        | Gas, Coal, and Limited Use and Quality Water |
| Rollins SS          | 10681        | 10966        | Gas and Limited Use and Quality Water        |
| Cozzette            | 10831        | 11116        | Gas and Limited Use and Quality Water        |
| Corcoran            | 11051        | 11336        | Gas and Limited Use and Quality Water        |
| Upper Segro         | 11411        | 11696        | Gas and Limited Use and Quality Water        |
| Lower Segro         | 11711        | 11996        | Gas and Limited Use and Quality Water        |
| <b>TD</b>           | <b>11831</b> | <b>12116</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: GR from TD to surface, DIL-SP and Neutron Density from TD to 100' inside surface casing

**CASED HOLE LOGS:** Specifics: Pulsed Neutron Log (e.g. RMTE, RPM, or RST)  
Processing: Emulation Triple Combo Using OH logs and training well  
Cement Evaluation: 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            | 84              | 84             | 30             | 228                         | 199                 |                              |                        |                           |                 |           |
| Surface              | 13.375        | 1381            | 1421           | 17.5           | N/A                         | N/A                 | N/A                          | 1086                   | 2.34                      | 464             |           |
| Intermediate         | 9.625         | 3161            | 3250           | 12.25          | 172                         | 2.10                | 82                           | 172                    | 2.40                      | 72              |           |
| Liner or Production: | 4.5           | 11831           | 12116          | 8.75/7.875     | 1446                        | 1.85                | 784                          | 373                    | 2.00                      | 187             |           |
|                      |               |                 |                |                | <b>Surface (sacks): 464</b> |                     | <b>Intermediate (sacks):</b> | <b>154</b>             | <b>Prod. (sacks): 970</b> |                 |           |

**ANTICIPATED PRESSURES (psi)**

| MASP  | Prod Csg Test Pressure | Anticipated BHP | Prod. Csg. Grade |
|-------|------------------------|-----------------|------------------|
| 2,899 | 8,500                  | 5,501           | 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         | 3250    | WBM      | 8.33-9.0 | 45-50 | 7-15 | Bentonite/PHPA |
| 3250      | 12116   | LSND     | 8.7-10.0 | 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:** Office Cell  
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(note: if there are questions concerning TD or logging, please call Geologist)

### CASING & CEMENTING PLAN

Operator: Terra Energy Partners  
 Well Name & Number: RG 542-18-297  
 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                    | 17.5                  | 13.375                  | 54.5                     | J-55  | BTC    | 0-1421        | 1,421              | 1,381                    | 1130           | 2735        | 853,000       |
| Intermediate               | 12.250                | 9.625                   | 36.0                     | J-55  | LTC    | 0-3250        | 3,250              | 3,161                    | 2,020          | 3,520       | 453,000       |
| Production                 | 8.750                 | 4.500                   | 11.6                     | P-110 | DWC/C  | 0-12116       | 12,116             | 11,831                   | 8,860          | 12,150      | 417,000       |

| Surface Casing Shoe              | Intermediate Casing Shoe           | Production Casing Shoe              |
|----------------------------------|------------------------------------|-------------------------------------|
| Max MW = 9.2 ppg<br>HP = 661 psi | Max MW = 9.2 ppg<br>HP = 1,512 psi | Max MW = 10.0 ppg<br>HP = 6,152 psi |

True Vertical Depth = 11,831  
 Bottom Hole Pressure = 5,501  
 Pore Pressure Gradient = 0.465  
 Max. Sur. Pressure = 2,899  
 BOP Required = 3M  
 5M system will be used as per A

Bottom Hole Temperature = 230 degrees Fahrenheit

| Casing Safety Factors |            |             |      |
|-----------------------|------------|-------------|------|
| Surface Casing        | Pb = 3.53  | Min = 1.100 | Pass |
|                       | Pc = 1.71  | Min = 1.125 | Pass |
|                       | Sj = 11.01 | Min = 1.500 | Pass |
| Intermediate Casing   | Pb = 1.21  | Min = 1.100 | Pass |
|                       | Pc = 1.34  | Min = 1.125 | Pass |
|                       | Sj = 3.87  | Min = 1.500 | Pass |
| Production Casing     | Pb = 4.19  | Min = 1.100 | Pass |
|                       | Pc = 1.44  | Min = 1.125 | Pass |
|                       | Sj = 2.97  | Min = 1.500 | Pass |

#### Cement Design Calculations

Estimating Cement for Ryan Gulch Wells (Permitting purpose only)

| Critical Depths - Permitting Purposes Only |                |
|--|----------------|
| Casing/Formation                           | Measured Depth |
| Surface Casing                             | 1,421 ft       |
| Intermediate Casing                        | 3,250 ft       |
| Top of Mesaverde                           | 6,931 ft       |
| Top of Gas                                 | 8,036 ft       |
| Total Depth                                | 12,116 ft      |

| Production Cement Tops (Permitting Purposes Only) |                      |
|---|----------------------|
| Cement Slurry                                     | TOC - Measured Depth |
| Scavenger   | 3,050 ft             |
| Lead  | 6,731 ft             |
| Tail  | 7,836 ft             |

| Surface Cement                         | Lead           |
|--|----------------|
| <b>Cement Tops</b>                     | <b>Surface</b> |
| Volume, bbls                           | 176            |
| Annular vol w/ excess, ft <sup>3</sup> | 1086           |
| Volume, sacks                          | 464            |
| Slurry Weight, ppg                     | 12.3           |
| Slurry Yield, ft <sup>3</sup> /sk      | 2.340          |
| Mixwater, gal/sk                       | 13.40          |
| Annular Capacity (BBJ)                 | 0.1237         |
| Annular Capacity (CF)                  | 0.6947         |
| Excess                                 | 0.1            |
| <b>Total Sacks</b>                     | <b>464</b>     |
| <b>Total Cubic Ft.</b>                 | <b>1,086</b>   |

| Intermediate Cement                    | Lead         | Tail         |
|--|--------------|--------------|
| <b>Cement Tops</b>                     | <b>2,250</b> | <b>2,750</b> |
| Volume, bbls                           | 28           | 28           |
| Annular vol w/ excess, ft <sup>3</sup> | 172          | 172          |
| Volume, sacks                          | 72           | 82           |
| Slurry Weight, ppg                     | 12.3         | 12.8         |
| Slurry Yield, ft <sup>3</sup> /sk      | 2.400        | 2.100        |
| Mixwater, gal/sk                       | 13.30        | 11.30        |
| Annular Capacity (BBJ)                 | 0.0558       | 0.0558       |
| Annular Capacity (CF)                  | 0.3132       | 0.3132       |
| Excess                                 | 0.1          | 0.1          |
| <b>Total Sacks =</b>                   | <b>154</b>   |              |
| <b>Total Cubic Ft. =</b>               | <b>345</b>   |              |

| Production Cement                     | Scavenger    | Lead        |
|---------------------------------------|--------------|-------------|
| <b>Cement Tops</b>                    | <b>3,050</b> | <b>6731</b> |
| Volume, bbls                          | 201          | 60          |
| Annular vol w/excess, ft <sup>3</sup> | 1,244        | 373         |
| Volume, sacks                         | 405          | 187         |
| Slurry Weight, ppg                    | 11.0         | 12.7        |
| Slurry Yield, ft <sup>3</sup> /sk     | 3.074        | 1.999       |
| Mixwater, gal/sk                      | 18.830       | 11.000      |
| Annular Capacity (BBJ)                | 0.0547       | 0.0547      |
| Annular Capacity (CF)                 | 0.3072       | 0.3072      |
| Excess                                | 0.1          | 0.1         |
| <b>Total Sacks =</b>                  |              |             |
| <b>Total Cubic Ft. =</b>              |              |             |

#### NOTES:

Surface Casing 17-1/2" hole to TD - Cement to surface.  
 54.5# 13-3/8" J-55, BTC surface casing will be ran.  
 10% excess is included in calculations.  
 Normal Surface excess is 40% over gauge hole  
 Normal Intermediate excess is 50% over gauge hole  
 Normal Production excess is 45% over gauge hole.

Casing Design Calculations

| Surface Casing - 54.5#   | Intermediate Casing - 36#   | Production Casing  |
|--|---|--|
| <p><b>Burst</b></p> <p>Bottom Hole Pressure = TVD * Pore Pressure Gradient<br/>                     = 3161 * 0.465<br/>                     = 1469.865 psi</p> <p>Pburst = Bottom Hole Pressure - (0.22 * TVD)<br/>                     = 1469.865 - (0.22 * 3161)<br/>                     = 774.445 psi</p> <p>Pb = Casing Burst Rating / Pburst<br/>                     = 2735 / 774.445<br/>                     = 3.53</p> <p>Pb ≥ 1.1<br/>                     3.53 ≥ 1.1</p> <p><b>Collapse</b></p> <p>If: Max MW * Setting TVD * 0.052 ≥ Pore Pressure Gradient * Setting TVD<br/>                     9.2 * 1381 * 0.052 ≥ 0.465 * 1381<br/>                     660.6704 ≥ 642.165</p> <p>Pcollapse = Max MW * Setting TVD * 0.052<br/>                     = 660.6704 psi</p> <p>Else:<br/>                     Pcollapse = Pore Pressure Gradient * Setting TVD<br/>                     = 642.165 psi<br/>                     Pcollapse = 660.6704 psi</p> <p>Pc = Casing Collapse Rating / Pcollapse<br/>                     = 1130 / 660.6704<br/>                     = 1.71</p> <p>Pc ≥ 1.125<br/>                     1.71 ≥ 1.125</p> <p><b>Tensile</b></p> <p>Tension = (Weight1 * Length1)<br/>                     = (54.5 * 1421)<br/>                     = 77444.5 lbs</p> <p>Sj = Casing Tension Rating / Tension<br/>                     = 853000 / 77444.5<br/>                     = 11.01</p> <p>Sj ≥ 1.5<br/>                     11.01 ≥ 1.5</p> | <p><b>Burst</b></p> <p>Bottom Hole Pressure = TVD * Pore Pressure Gradient<br/>                     = 11831 * 0.465<br/>                     = 5501.4 psi</p> <p>Pburst = Bottom Hole Pressure - (0.22 * TVD)<br/>                     = 5501.415 - (0.22 * 11831)<br/>                     = 2898.6 psi</p> <p>Pb = Casing Burst Rating / Pburst<br/>                     = 3520 / 2898.595<br/>                     = 1.21</p> <p>Pb ≥ 1.1<br/>                     1.21 ≥ 1.1</p> <p><b>Collapse</b></p> <p>If: Max MW * Setting TVD * 0.052 ≥ Pore Pressure Gradient * Setting TVD<br/>                     9.2 * 3161 * 0.052 ≥ 0.465 * 3161<br/>                     1512.2 ≥ 1469.865</p> <p>Pcollapse = Max MW * Setting TVD * 0.052<br/>                     = 1512.2 psi</p> <p>Else:<br/>                     Pcollapse = Pore Pressure Gradient * Setting TVD<br/>                     = 1469.9 psi<br/>                     Pcollapse = 1512.2 psi</p> <p>Pc = Casing Collapse Rating / Pcollapse<br/>                     = 2020 / 1512.2224<br/>                     = 1.34</p> <p>Pc ≥ 1.125<br/>                     1.34 ≥ 1.125</p> <p><b>Tensile</b></p> <p>Tension = (Weight1 * Length1)<br/>                     = (36 * 3250)<br/>                     = 117000 lbs</p> <p>Sj = Casing Tension Rating / Tension<br/>                     = 453000 / 117000<br/>                     = 3.87</p> <p>Sj ≥ 1.5<br/>                     3.87 ≥ 1.5</p> | <p><b>Burst</b></p> <p>Bottom Hole Pressure = TVD * Pore Pressure Gradient<br/>                     = 11831 * 0.465<br/>                     = 5501.4 psi</p> <p>Pburst = Bottom Hole Pressure - (0.22 * TVD)<br/>                     = 5501.415 - (0.22 * 11831)<br/>                     = 2898.6 psi</p> <p>Pb = Casing Burst Rating / Pburst<br/>                     = 12150 / 2898.595<br/>                     = 4.19</p> <p>Pb ≥ 1.1<br/>                     4.19 ≥ 1.1</p> <p><b>Collapse</b></p> <p>If: Max MW * Setting TVD * 0.052 ≥ Pore Pressure Gradient * Setting TVD<br/>                     10 * 11831 * 0.052 ≥ 0.465 * 11831<br/>                     6152.1 ≥ 5501.415</p> <p>Pcollapse = Max MW * Setting TVD * 0.052<br/>                     = 6152.1 psi</p> <p>Else:<br/>                     Pcollapse = Pore Pressure Gradient * Setting TVD<br/>                     = 5501.4 psi</p> <p>Pcollapse = 6152.1 psi</p> <p>Pc = Casing Collapse Rating / Pcollapse<br/>                     = 8860 / 6152.12<br/>                     = 1.44</p> <p>Pc ≥ 1.125<br/>                     1.44 ≥ 1.125</p> <p><b>Tensile</b></p> <p>Tension = Weight * Length<br/>                     = 11.6 * 12116<br/>                     = 140546 lbs</p> <p>Sj = Casing Tension Rating / Tension<br/>                     = 417000 / 140545.6<br/>                     = 2.97</p> <p>Sj ≥ 1.5<br/>                     2.97 ≥ 1.5</p> |