COG Production LLC
DRILLING AND OPERATIONS PROGRAM
Baby Buddah 13 Federal #1H
SHL: 190' FWL & 2350' FSL
BHL: 330' FEL & 2190' FSL
Section 13 T26S R28E
Eddy County, New Mexico

In conjunction with Form 3160-3, Application for Permit to Drill subject well, COG Production LLC submits the following eleven items of pertinent information in accordance with BLM requirements.

1. Geological surface formation: Permian
2. The estimated tops of geologic markers & estimated depths at which anticipated water, oil or gas formations are expected to be encountered are as follows:

Rustler	69'	
Fresh Water	118'	
Top of Salt	809'	
Base of Salt	2,416'	
Delaware	2,610'	Oil
Bone Spring	6,316'	Oil
3rd Bone Spring	9,019'	Oil
TD TVD	8,180'	
TD MD	12,712'	
PH TD	9,000'	

No other formations are expected to give up oil, gas or fresh water in measurable quantities. The surface fresh water sands will be protected by setting 13-3/8" casing at 450' and circulating cement back to surface. All intervals will be isolated by setting 5 ½" casing to total depth and tying back cement to a minimum of 500' into 9-5/8" csg.

3. Proposed Casing Program: All casing is new and API approved

Hole Size	Depths	Section	OD Casing	New/ Used	Wt	Collar	Grade	Collapse Design Factor	Burst Design Factor	Tension Design Factor
17 ½"	0' - 450' (see COA)	Surface	13 3/8"	New	48#	STC	H-40	1.125	1.125	1.6
12 ¼"	0' – 2,650'	Intrmd	9 5/8"	New	36#	LTC	J-55	1.125	1.125	1.6
7 7/8"	0' – 12,712'	Production Curve & Lateral	5 ½"	New	17#	LTC	P-110	1.125	1.125	1.6

- While running all casing strings, the pipe will be kept a minimum of 1/3 full at all times to avoid approaching the collapse pressure of casing.

4. Proposed Cement Program

a. 13-3/8" Surface — Slurry: 350 sx Class C + 2% $CaCl_2$ (14.8 ppg / 1.34 cuft/sx) **Calculated w/50% excess on OH volumes

b. 9 5/8" Intermediate: — Lead: 450 sx Class C + 4% Gel + 2% $CaCl_2$ (13.5 ppg /1.75 cuft/sx)
Tail: 250 sx Class C + 2% $CaCl_2$ (14.8 ppg / 1.34 cuft/sx)
**Calculated w/35% excess on OH volumes

d. 5 ½" Production — Lead: 650 sx 50:50:10 H + Salt+Gilsonite+CFR-3+ HR601 (11.8 ppg / 2.5 cuft/sx)
Tail: 950 sx 50:50:2 H +Salt+GasStop +HR601 +CFR-3 (14.4 ppg /1.25 cuft/sx)
**Calculated w/35% excess on OH volumes

- The above cement volumes could be revised pending the caliper measurement from the open hole logs.
- The 9-5/8" intermediate string is designed to circulate to surface.
- The production string will at least tie back 500' into 9-5/8" shoe
- Pilot hole will be plugged back with the below plugs:
  1. Plug #1 –
     - 700' from 8,300' – 9,000'.
     - 250 sx Class H
     - 17.2 ppg 0.98 cuft/sk
  2. Plug #2
     - 700' from 7,600' – 8,300'.
     - 250 sx Class H
     - 17.2 ppg 0.98 cuft/sk

See COA

5. Minimum Specifications for Pressure Control:

Nipple up on 13 3/8 with annular preventer tested to 50% of rating working pressure by independent tester and the rest of the 2M system tested to 2000 psi.
Nipple up on 9 5/8 with 3M system tested 3000 psi to by independent tester.
Pipe rams will be operationally checked each 24 hour period. Blind rams will be operationally checked on each trip out of the hole. These checks will be noted on the daily tour sheets. A 2" kill line and a minimum 3" choke line will be included in the drilling spool located below the ram-type BOP. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold with 3000 psi WP rating.

6. Estimated BHP:

Lateral TD = 3548 psi
Pilot Hole TD= 3903 psi

7. **Mud Program:** The applicable depths and properties of this system are as follows:

Depth	Type System	Mud Weight	Viscosity (sec)	Waterloss (cc)
0' – 450'	Fresh Water	8.4	29	N.C.
450' – 2650'	Brine	10	29	N.C.
2650' – 12,712' (Lateral)	Cut Brine	8.8 – 9.2 See COA	29	N.C.

The necessary mud products for weight addition and fluid loss control will be on location at all times.

8. **Auxiliary Well Control and Monitoring Equipment:**

   a. A Kelly cock will be in the drill string at all times.
   b. A full opening drill pipe stabbing valve having the appropriate connections will be on the rig floor at all times.
   c. Hydrogen Sulfide detection equipment will be in operation after drilling out the 13 3/8" casing shoe until the 5 ½" casing is cemented. Breathing equipment will be on location upon drilling the 13 3/8" shoe until total depth is reached.

9. **Testing, Logging and Coring Program:**

   a. Drill stem tests will be based on geological sample shows.
   b. If open hole electrical logging is preformed, the program will be:
      i. Total Depth to Intermediate Casing: Dual Laterolog-Micro Laterolog and Gamma Ray. Compensated Neutron – Z Density log with Gamma Ray and Caliper.
      ii. Total Depth to Surface: Compensated Neutron with Gamma Ray
      iii. No coring program is planned
      iv. Additional testing will be initiated subsequent to setting the 5 ½" production casing. Specific intervals will be targeted based on log evaluation, geological sample shows and drill stem tests.

10. **Potential Hazards:**

   a. No abnormal pressures or temperatures are expected. There is no known presence of H2S in this area. If H2S is encountered the operator will comply with the provisions of Onshore Oil and Gas Order No. 6. All personnel will be familiar with all aspects of safe operation of equipment being used to drill this well. No H2S is anticipated to be encountered.

11. **Anticipated starting date and Duration of Operations:**

a. Road and location construction will begin after the BLM has approved the APD. Anticipated spud date will be as possible after BLM approval and as soon as a rig will be available. Move in operations and drilling is expected to take 30 days.