



DRILLING PROGRAM  
BHR Fed O23-14-397-4RH  
SE/4, SE/4 S23 T3N R97W  
Rio Blanco Co., Colorado

Surface Lat. 40.208617° Long: -108.240532°  
BH Lat. 40.234524° Long: -108.24434°  
Graded 6,077'  
<B: 25'

#### 1.0 ESTIMATED FORMATION TOPS

FORMATION	TVD(KB)	MD(KB)
Wasatch	25'	
Mesaverde	1,847'	
Loss Zone 1 (in H1 Sidetrack)	3,137'	
Rollins	5,346'	5,370'
Loss Zone 2 (in H1 Sidetrack)	5,737'	
Sego-Lower	6,626'	6,669'
Castlegate	7,047'	7,096'
Mancos - Marker 6 - Condensed Section	8,404'	8,473'
Niobrara - Buck Peak	* 9,733'	9,822'
Niobrara - Tow Creek	* 10,193'	10,288'
Niobrara - Wolf Mountain	* 10,570'	10,698'
Niobrara - Hot Wolf Mtn - Rangely Bench	* 10,903'	
Top Target	* 10,936'	
Target	10,961'	
Base Target	10,986'	

#### 2.0 ESTIMATED DEPTHS AT WHICH WATER, OIL, GAS, OR OTHER MINERAL BEARING FORMATIONS ARE EXPECTED TO BE ENCOUNTERED

- A. Formations marked with an asterisk (\*) in "1.0" above indicate anticipated oil or gas bearing formations.
- B. Several water zones were identified within the Mesaverde and Upper Mancos stratigraphic units between 3,300' (base of surface casing) and 6,416' MD using open hole logs from the 23-3-97 #1 vertical pilot hole (API # 05-103-11954-00) located on same pad from which the BHR Fed O23-14-397-4RH will be drilled. These porous rock units have been noted, and casing design for proposed O23-14-397-4RH well has taken these into account so that surface and intermediate casing will cover all identified zones.

#### 3.0 CASING AND CEMENTING WILL BE DONE TO PROTECT POTENTIALLY PRODUCTIVE HYDROCARBONS, FRESH WATER ZONES, ABNORMAL PRESSURE ZONES, AND PROSPECTIVELY VALUABLE MINERAL DEPOSITS.

- A. Casing Head: 9 5/8" x 11" 5M, With Flange at Ground Level  
Tubing Head: 11" 5M x 7-1/6" 10M
- B. Operators minimum specifications for pressure control equipment are shown on the attached BOP schematic. After running surface and intermediate casing, and prior to drilling out, all BOPE (blind rams, pipe rams, manifold, etc.) and related equipment will be pressure tested to 100% of the BOP's rated working pressure. The Annular Preventer will be tested to 70% of its rated working pressure. Thereafter, the BOPE will be checked daily for mechanical operations. Such check will be noted in the IADC drilling reports. BOPE will be tested to a low pressure of 250 psi prior to testing to the high pressures indicated above.

#### 4.0a PROPOSED CASING PROGRAM

Section	Top (MD)	Bottom (MD)	Hole	Csg OD	Wt (lb/ft)	Grade	Thread	Length
Conductor:	Surface	80'	26"	20"	104	XHY	PE	80'
Surface:	Surface	3,300'	12 1/4"	9 5/8"	36.00	J55	LTC	3,300'
Intermediate:	Surface	10,130'	8 3/4"	7"	26.00	HCL80	LTC	10,130'
Production:	9,930'	20,707'	6-1/8"	4 1/2"	13.5	P110	BTC	10,777'

**NOTE: All casing installed shall be NEW CONDITION**

#### 4.0b CASING PROPERTIES DESIGN FACTORS

Section	Interval (MD)	Casing	ID	COLLAPSE (psi)	BURST (psi)	TENSION (k-lbs)*
Conductor:	Surface - 80'	20", 104#, XHY, PE	19.0000"	n/a	n/a	n/a
Surface:	Surface - 3,300'	9 5/8", 36#, J55, LTC	8.9210"	2,020	3,520	453
Intermediate:	Surface - 10,130'	7", 26#, HCL80, LTC	6.2760"	6,370	7,250	511
Production:	9,930' - 20,707'	4 1/2", 13.5#, P110, BTC	3.9200"	10,680	12,420	385

\* Joint Strength



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CASING RATING / DESIGN SAFETY FACTORS									
Section	Interval (MD)	Casi	COLLAPSE (psi)		BURST (psi)		TENSION (k-lbs)		
Conductor:	Surface - 80'	20", 104#, XHY, PE	n/a	/	n/a	n/a	/	n/a	/
Surface:	Surface - 3,300'	9 5/8", 36#, J55, LTC	1.0	/	1.31	1.2	/	1.90	1.6 / 3.82
Intermediate:	Surface - 10,130'	7", 26#, HCL80, LTC	1.0	/	1.3	1.2	/	1.6	1.6 / 1.6
Production:	9,930' - 20,707'	4 1/2", 13.5#, P110, BTC	1.0	/	1.45	1.2	/	2.17	1.6 / 2.1

## 5.0 CEMENTING PROGRAM

### 5.1 Surface Casing Cementing Program

Surface Casing Set At:		3,300' MD(KB)						
	Density (lb/gal)	Fill Up (ft)	Volume (ft³)	Excess (%)	Total Vol + % Excess		Yield (ft³/sx)	Sacks
					(bbl)	(ft³)		
Lead:	12.0	2,800'	877 ft³	50%	234 bbl	1,315 ft³	2.53 ft³/sx	520
Tail:	12.5	500'	157 ft³	0%	28 bbl	157 ft³	2.22 ft³/sx	71
Shoe:	12.5	43'	19 ft³	0%	3 bbl	19 ft³	2.22 ft³/sx	8
Slurry Recipes								
Lead:	Type III + Additives							
Tail:	Type III + Additives							
Shoe Track:	Same Slurry As Tail.							

### 5.2 Intermediate Casing Cementing Program

Intermediate Casing Set At:		10,130' MD(KB)						
	Density (lb/gal)	Fill Up (ft)	Volume (ft³)	Excess (%)	Total Vol + % Excess		Yield (ft³/sx)	Sacks
					(bbl)	(ft³)		
Lead:	12.5	4,873'	733 ft³	10%	144	806 ft³	2.07ft³/sx	389
Tail:	13.5	2,157'	324 ft³	10%	64 bbl	357 ft³	1.9 ft³/sx	188
Shoe:	13.5	43'	9 ft³	0%	2 bbl	9 ft³	1.9 ft³/sx	5
Slurry Recipes								
Lead:	Type III + Additives							
Tail:	50/50 Class G / POZ + Additives							
Shoe Track:	Same Slurry As Tail.							

### 5.3 Production Liner Cementing Program

Production Liner Set:		9,930' – 20,707' MD(KB)						
	Density (lb/gal)	Fill Up (ft)	Volume (ft³)	Excess (%)	Total Vol + % Excess		Yield (ft³/sx)	Sacks
					(bbl)	(ft³)		
Lead:	13.5	200'	20 ft³	0%	4 bbl	22 ft³	1.85 ft³/sx	12
Tail:	13.5	10,577'	996 ft³	10%	195 bbl	1,095 ft³	1.85 ft³/sx	593
Shoe:	13.5	43'	4 ft³	0%	1 bbl	4 ft³	1.85 ft³/sx	2
Slurry Recipes								
Lead:	50/50 Class G / POZ + Additives							
Tail:	50/50 Class G / POZ + Additives							
Shoe Track:	Same Slurry As Tail							

## 6.0 DRILLING MUD PROGRAM

Hole Section	From	To	Mud Type	MW (lb/gal)	Vis (sec/q)	PV (cP)	YP (lb/100 ft²)	LGS (%)	pH	API WL	HPHT (ml)	O/W (o/w)	E	WPS (mg/l)
Surface	80'	3,300'	LSND	8.5-9.0	30-45	8-20	6-12	<6%	8.5-9.5	12-20	-	-	-	-
Intermediate	3,300'	10,130'	LSND	8.5-9.5	30-45	8-20	6-12	<6%	8.5-9.5	6-8	-	-	-	-
Production	10,130'	20,707'	OBM	11.0-12.0	40-60	12-20	6-14	<5%	-	-	10.0-20.0	80/20-75/25	500-900	250 <sup>k</sup> -350 <sup>k</sup>



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#### 7.0 BOTTOM HOLE PRESSURE AND TEMPERATURE

BHP (psi)	BHT Circ	BHT Static
7,047	240°F	260°F

#### 8.0 AUXILIARY EQUIPMENT

See attached schematic for BOP components  
Centrifuge to be used in Intermediate and Production Holes

#### 9.0 BLM AND COLORADO OIL & GAS COMMISSION NOTICES

- a) 24 Hours prior to spud
- b) 12 hours prior to running and cementing casing
- c) 12 hours prior to testing BOPs
- d) 24 hours prior to P&A of well

#### 10.0 DEVIATION & MWD SURVEYS AND OPEN HOLE LOGGING PROGRAM

##### 10.1 Deviation Surveys & MWD

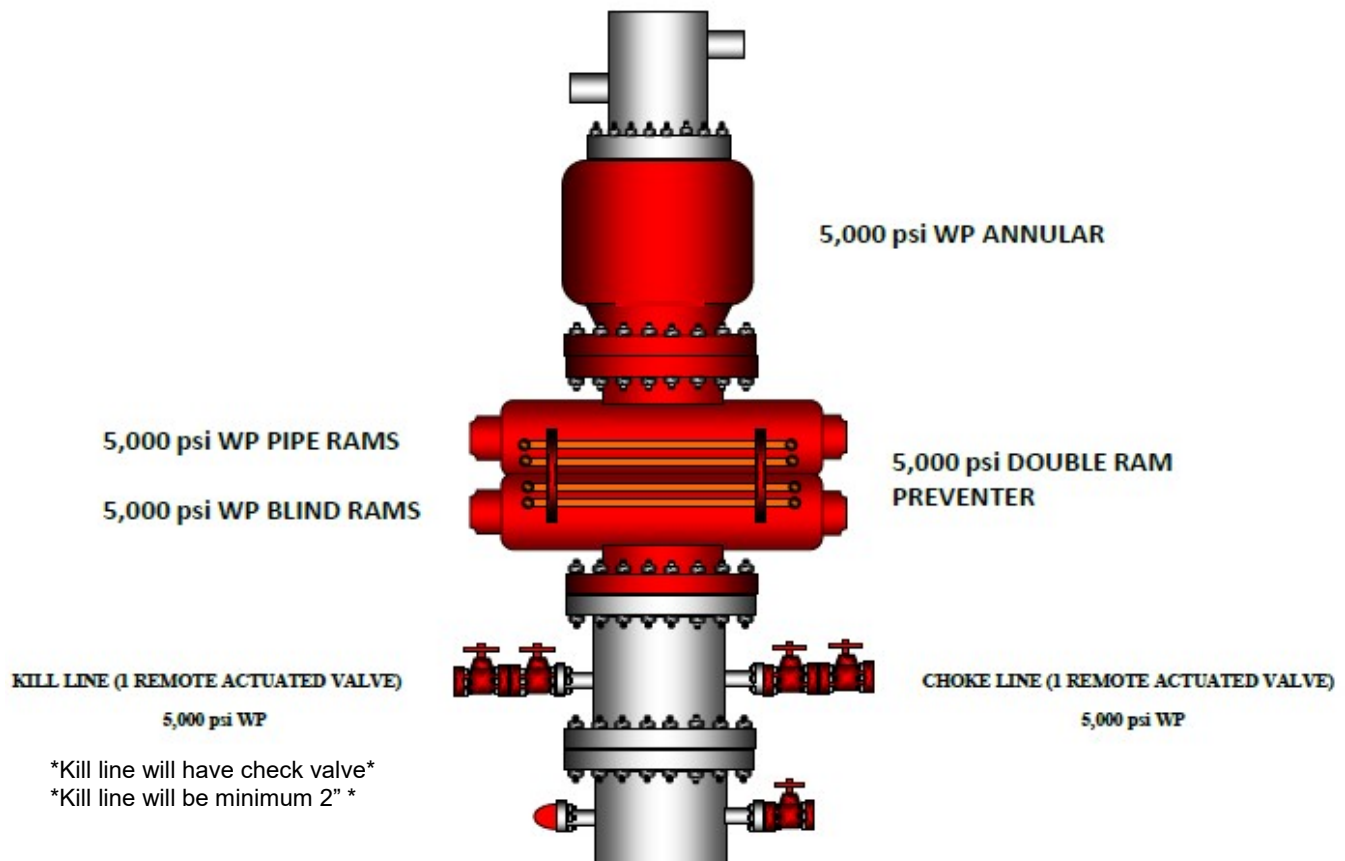
Surface Hole: 3° maximum deviation, 1°/100' Dog Leg Severity. Survey every 500'  
Surface - TD: Please see attached directional plan

##### 10.2 Open Hole Logging Program

The first well drilled on the O23 Pad has been logged with an open-hole resistivity log with gamma-ray from TD into the surface casing. All subsequent wells on the pad will have a cement bond log with gamma-ray run on the production casing (or intermediate casing if production liner is run). All wells on the pad will have the horizontal portion of the wellbore logged with, at minimum, measured-while-drilling log with gamma-ray.

### BOP AND PRESSURE CONTAINMENT DATA

1. BOP EQUIPMENT SHALL CONSIST OF A DOUBLE GATE, HYDRAULICALLY OPERATED ANNULAR PREVENTER WITH PIPE & BLIND RAMS OR TOW SINGLE RAM TYPE PREVENTERS. ONE EQUIPPED WITH PIPE RAMS, THE OTHER EQUIPPED WITH BLIND RAMS.
2. BOP'S ARE TO BE WELL BRACED WITH HAND CONTROLS EXTENDED CLEAR OF THE SUBSTRUCTURE.
3. ACCUMULATOR TO PROVIDE CLOSING PRESSURE IN EXCESS OF THAT REQUIRED WITH SUFFICIENT VOLUME TO OPERATE ALL COMPONENTS.
4. AUXILIARY EQUIPMENT: LOWER KELLY COCK, FULL OPENING STARBBING VALVE, 2½" CHOKE MANIFOLD.
5. ALL BOP EQUIPMENT, AUXILIARY EQUIPMENT, STAND PIPE, VALVES, AND ROTARY HOSE TO BE TESTED TO THE RATED WORKING PRESSURE OF THE BOP'S AT THE TIME OF INSTALLATION AND EVERY 30 DAYS THEREAFTER. BOT'S TO BE MECHANICALLY CHECKED DAILY.
6. MODIFICATION OF HOOK-UP OR TESTING PROCEDURE MUST BE APPROVED IN WRITING ON TOWER REPORTS BY WELLSITE SUPERVISOR.





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## ATTACHMENT "B"

### PRESSURE CONTAINMENT MANIFOLD EQUIPMENT

