

WHITING OIL & GAS CORPORATION WRD 23-33-R DRILL PLAN

Surface Location: 1925' FSL & 2187' FWL
 NESW Section 33, Township 2N, Range 97W
 Rio Blanco County, Colorado

Summary:

The WRD (White River Dome) 23-33-R will be a re-drill of a vertical test to the Weber formation. Primary pay section to test will be the Niobrara and the Weber formations.

1. ESTIMATED TOPS OF GEOLOGICAL MARKERS

Ground Level 6,169' Estimated KB 6,204' (35')

Formation	Est Top-TVD	Est Top-Sub Sea	Interval Thickness	Lithology	Potential
Green River Fm	35	6,169	1,394'	Ss, Sh	
Wasatch Fm/Base Aquifer	1,429	4,775	2,028'	Ss, Sh	Gas
Ohio Creek	3,457	2,747	183'	Ss-Congl	
Williams Fork	3,640	2,564	3,050'	Ss, Sh	Gas
Rollins	6,690	(486)	171'	Ss, Sh	Gas
Cozzette	6,861	(657)	240'	Ss, Sh	Gas
Corcoran	7,101	(897)	769'	Ss, Sh	Gas
Sego	7,870	(1,666)	171'	Ss, Sh	Gas
Lloyd SS	8,041	(1,837)	382'	Ss, Sh	Gas
Castlegate	8,423	(2,219)	423'	Ss, Sh	Gas
Mancos MFS	8,846	(2,642)	941'	Sh	
Base Mancos B	9,787	(3,583)	420'	Sh	
Niobrara	10,207	(4,003)	1,577'	Sh	Gas/Cond
Frontier	11,784	(5,580)	296'	Silts, Ss	Gas/Cond
Mowry	12,080	(5,876)	81'	Sh	Gas/Cond
Dakota	12,161	(5,957)	140'	Ss	Gas/Cond
Morrison	12,301	(6,097)	432'	Ss, Sh	
Curtis	12,733	(6,529)	87'	Ss, Sh	
Entrada	12,820	(6,616)	530'	Ss	
Chinle	13,350	(7,146)	274'	Ss, Sh	
Moenkopi	13,624	(7,420)	430'	Silts, Sh	Cond & Gas
Park City (Phosperia)	14,054	(7,850)	223'	Ls, Sh	Cond & Gas
Weber	14,277	(8,073)	653'	Ss	Cond & Gas
Maroon Fm	14,930	(8,726)	400'	Silts, Sh	
TD	15,330	(9,126)			

All fresh water and prospectively valuable minerals encountered during drilling, will be recorded by

depth and adequately protected.

2. PRESSURE CONTROL EQUIPMENT

A. Type:

BOPE:

Thirteen and five eights (13-5/8") inch 10,000 psi double ram hydraulic BOP with Blind and Pipe rams.

Thirteen and five eights (13-5/8") inch 10,000 psi single ram hydraulic BOP with Pipe rams.

Thirteen and five eights (13-5/8") inch 5,000 psi annular preventer.

**See attached drawing*

Rotating Head:

500 psi Rotating Head 13-3/8"

Wellhead:

13-3/8" casing, 5,000 psi Casing head, (A Section)

9-5/8" casing, 10,000 psi Casing spool, (B Section)

After the 13-3/8" casing is landed at 4,200', the 5,000 psi casing head will be welded on and the 10,000 psi casing spool (B Section) will be bolted up to the casing head. The 10,000 psi BOP stack will be bolted up to the upper 10,000 psi flange on the B Section. Once the 9-5/8" casing is landed at 10,200', the pack off will be place around the 9-5/8" casing in the B Section. This will give a full 10,000 psi working pressure through the B Section and the BOP. **See attached drawings.*

B. Testing Procedure:

The annular preventer will be pressure tested to 50% of stack rated working pressure for ten (10) minutes or until provisions of test are met, whichever is longer. The BOP, choke manifold, and related equipment will be pressure tested to approved BOP stack working pressure (if isolated from surface casing by a test plug) or to 70% of surface casing internal yield strength (if BOP is not isolated by a test plug). Pressure will be maintained for ten (10) minutes or until the requirements of the test are met, whichever is longer. At a minimum, the Annular and Blow-Out Preventer pressure tests will be performed:

1. When the BOPE is initially installed;
2. Whenever any seal subject to test pressure is broken;
3. Following related repairs; and
4. at thirty (30) day intervals.

Annular will be function tested weekly, and pipe & blind rams activated each trip, but not more than once per day. All BOP drills & tests will be recorded in IADC driller's log.

C. Choke Manifold Equipment:

All choke lines will be straight lines whenever possible at turns, tee blocks will be used or will be targeted with running tees, and will be anchored to prevent whip and vibration. **See attached drawing.*

D. Accumulator:

Accumulator will have sufficient capacity to open a hydraulically-controlled choke line valve; close all rams plus annular preventer, and retain a minimum of 200 psi above pre-charge on the closing manifold without the use of closing unit pumps. The fluid reservoir capacity will be double accumulator capacity and the fluid level will be maintained at manufacturer's recommendations. Accumulator pre-charge pressure test will be conducted prior to connecting the closing unit to the BOP stack.

E. Miscellaneous Information:

Choke manifold and BOP extension rods with hand wheels will be located outside rig sub-structure.

Hydraulic BOP closing unit will be located at least twenty-five (25) feet from the wellhead but readily accessible to the driller. Exact locations and configurations of the hydraulic BOP closing unit will depend

upon the particular rig contracted to drill this hole.

A flare line will be installed after the choke manifold with the discharge point of the flare line to a separate pit located at least 125 feet away from the well bore and any existing production facilities.

3. PROPOSED CASING DESIGN PROGRAM

A. Casing Program: All New

Section	Interval	Hole Size	Footage	Description
Conductor	0' – 100'	24"	100'	20" 94# H-40 STC
Surface	0' – 4,200'	17-1/2"	4,200'	13-3/8" 68.00# L-80 STC
1 st Intermediate	0' – 4,300'	12-1/4"	4,300'	9-5/8" 47# L-80 LTC
	4,300' - 10,200'	12-1/4"	5,900'	9-5/8" 47# HCL-80 LTC
2 nd Intermediate	10,000' – 12,800'	8-1/2"	2,800'	7" 29# HCP-110 LTC
Production Liner	12,600' – 15,330'	6-1/2"	2,730'	5" 18.0# P-110 FL-4S

- Conductor, cellar & mousehole are set by third party company before the drilling rig moves to location.
- Drilling Liner and Production Liner will have a 200' liner lap.
- 6-1/2" hole will be drilled with a hole opener or bi-center bit
- 5" liner has a Flush Joint Connection

13-3/8" surface casing will have twenty four (24) centralizers as follows: Centralizer #1 set 10' above the guide shoe of joint #1 by stop ring, and a Centralizer set across collars of joints #2, #4, #6 and on every fifth joint with one centralizer set in the conductor. Cement basket will be placed on the middle of last joint with stop ring.

9-5/8" intermediate casing will have fifty two (52) centralizers as follows: Centralizer #1 set on middle of joint #1 by stop ring, and a Centralizer set across collars of joints #2, #4, #6 and on every fifth joint with one centralizer set in the 13-3/8" casing.

7" drilling liner will have seventeen (17) centralizers as follows: Centralizer #1 set 10' above the guide shoe of joint #1 by stop ring, and a Centralizer set across collars of joints #2, #4, #6. Run a Centralizer every fifth joint with one Centralizer in the 9-5/8" intermediate casing.

5" liner will have seventeen (17) centralizers as follows: Centralizer #1 set on middle of joint #1 by stop ring, and a Centralizer set across collars of joints #2, #4, and #6 and on every fifth joint with one Centralizer in the 7" intermediate.

Casing string(s) will be pressure tested to 0.22 psi/foot of casing string length or 1500 psi, whichever is greater (not to exceed 70% of the internal yield strength of the casing), after cementing and prior to drilling out from under the casing shoe.

B. Casing Design Parameters:

Surface Casing, 13-3/8"				
Interval	Description	Burst (psi) ^a	Collapse (psi) ^b	Tension (klb) ^c
0' – 4,200'	13-3/8" 68.0# L-80 STC	5,020/1.87	2,260/1.15	952/3.86

- based on 9.3 ppg pore pressure at 10,200' with partially evacuated hole (0.22 psi/ft) and 9.0 ppg pore pressure back up
- based on full evacuation with 9.0 ppg fluid on backside
- based on casing string weight in 9.0 ppg mud

String Weight in 9.0 ppg mud \approx 246,400 lbs

1st Intermediate Casing, 9-5/8"

<u>Interval</u>	<u>Description</u>	<u>Burst (psi)^a</u>	<u>Collapse (psi)^b</u>	<u>Tension (klb)^c</u>
0' – 4,300'	9-5/8" 47# L-80 LTC	6,870/1.50	4,750/4.91	893/2.17
4,300' – 10,200'	9-5/8" 47# HCL-80 LTC	6,870/1.63	5,740/1.16	893/2.70

- a. based on 11.4 ppg pore pressure at 12,300' with partially evacuated hole (0.22 psi/ft) and 9.3 ppg pore pressure back up
- b. based on full evacuation with 9.3 ppg fluid on backside
- c. based on casing string weight in 9.3 ppg mud.
String Weight in 9.3 ppg mud \approx 411,400 lbs.

2nd Intermediate Casing, 7"

<u>Interval</u>	<u>Description</u>	<u>Burst (psi)^a</u>	<u>Collapse (psi)^b</u>	<u>Tension (klb)^c</u>
10,000' – 12,800'	7" 29# HCP-110 LTC	11,220/1.33	9,750/1.28	797/11.88

- a. based on 10,000 psi frac pressure
- b. based on full evacuation with 11.4 ppg fluid on backside
- c. based on casing string weight in 11.4 ppg mud.
String Weight in 11.4 ppg mud \approx 67,100 lbs.

Production Liner, 5"

<u>Interval</u>	<u>Description</u>	<u>Burst (psi)^a</u>	<u>Collapse (psi)^b</u>	<u>Tension (klb)^c</u>
12,600' – 15,330'	5" 18.0# P-110 FL-4S	13,950/1.45	13,470/1.88	310/7.33

- a. based on 10,000 psi frac pressure
- b. based on full evacuation with 9.0 ppg fluid on backside
- c. based on casing string weight in 9.0 ppg mud.
String Weight in 9.0 ppg mud \approx 42,400 lbs.

4. PROPOSED CEMENTING PROGRAM

All slurries tested for compatibility, compression strengths, and pumping times based on actual job conditions.

Surface, 13-3/8" Casing: TOC Surface, (Stage Tool at 2,400' - Stage_1 - 100% Excess, Stage_2 – 75% Excess)

CASING	SLURRY	FT. of FILL	CEMENT TYPE	SXS	XC (%)	WEIGHT (ppg)	YIELD (ft ³ /sx)
13-3/8"	Stage_1 - Lead	800'	First Stage Lead Cement Rockies LT; - 0.125 lbm/sk Poly-E-Flake (Lost Circulation Additive) - 0.25 lbm/sk Kwik Seal (Lost Circulation Additive)	380	100	11.5	2.94
13-3/8"	Stage_1 - Tail	1,000'	First Stage Tail Cement Premium Cement; - 94 lbm/sk Premium Cement (Cement) - 2% Calcium Chloride (Accelerator) - 0.125 lbm/sk Poly-E-Flake (Lost Circulation Additive)	1195	100	15.6	1.20
13-3/8"	Stage_2 - Lead	2,300'	Second Stage Lead Cement Rockies LT; - 0.125 lbm/sk Poly-E-Flake (Lost Circulation Additive) - 0.25 lbm/sk Kwik Seal (Lost Circulation Additive)	955	75	11.5	2.94
13-3/8"	Stage_2 - Tail	100'	Second Stage Tail Cement Premium Cement; - 94 lbm/sk Premium Cement (Cement) - 2% Calcium Chloride (Accelerator) - 0.125 lbm/sk Poly-E-Flake (Lost Circulation Additive)	105	75	15.6	1.20

- Cement volumes for the 13-3/8" Casing will be calculated to provide a top of cement to Surface.
- All waiting on cement (WOC) times will be adequate to achieve a minimum of 500 psi compressive strength at the casing shoe prior to drilling out.

1st Intermediate, 9-5/8" Casing: TOC 3,700', (Stage Tool at 8,000' - Stage_1 - 50% Excess, Stage_2 – 50% Excess)

CASING	SLURRY	FT. of FILL	CEMENT TYPE	SXS	XC (%)	WEIGHT (ppg)	YIELD (ft ³ /sx)
9-5/8"	Stage_1 - Lead	1,200'	First Stage Lead Cement ECONOCER (TM) SYSTEM; - 0.125 lbm/sk Poly-E-Flake (Lost Circulation Additive) - 0.8 % HR-5 (Retarder) - 0.2 % Super CBL (Expander)	265	50	12.20	2.15
9-5/8"	Stage_1 - Tail	1,000'	First Stage Tail Cement EXTENDACER (TM) SYSTEM; - 0.6 % HR-5 (Retarder) - 0.125 lbm/sk Poly-E-Flake (Lost Circulation Additive) - 3 lbm/sk Gilsonite (Lost Circulation Additive)	380	50	14.20	1.29
9-5/8"	Stage_2 - Lead	4,200'	Second Stage Lead Cement ECONOCER (TM) SYSTEM; - 0.125 lbm/sk Poly-E-Flake (Lost Circulation Additive) - 0.5 % HR-5 (Retarder) - 0.2 % Super CBL (Expander)	890	50	12.20	2.15
9-5/8"	Stage_2 - Tail	100'	Second Stage Tail Cement EXTENDACER (TM) SYSTEM; - 0.6 % HR-5 (Retarder) - 0.125 lbm/sk Poly-E-Flake (Lost Circulation Additive) - 3 lbm/sk Gilsonite (Lost Circulation Additive)	40	50	14.20	1.29

- Cement volumes for the 9-5/8" Casing will be calculated to provide a top of cement to 3,700'.
- All waiting on cement (WOC) times will be adequate to achieve a minimum of 500 psi compressive strength at the casing shoe prior to drilling out.

2nd Intermediate, 7" Casing: TOC 10,000', (30% Excess)

CASING	SLURRY	FT. of FILL	CEMENT TYPE	SXS	XC (%)	WEIGHT (ppg)	YIELD (ft ³ /sx)
7"	Stage_1 - Tail	2,800'	Primary Cement BONDCEM (TM) SYSTEM; - 0.5 % HR-601 (Retarder)	270	30	13.50	1.76

- Cement volumes for the 7" Casing will be calculated to provide a top of cement to 10,000'.
- All waiting on cement (WOC) times will be adequate to achieve a minimum of 500 psi compressive strength at the casing shoe prior to drilling out.

Production Liner, 5" Casing: TOC 12,600', (30% Excess)

CASING	SLURRY	FT. of FILL	CEMENT TYPE	SXS	XC (%)	WEIGHT (ppg)	YIELD (ft ³ /sx)
5"	Stage_1 - Tail	2,730'	Primary Cement BONDCEM (TM) SYSTEM; - 0.5 % HR-601 (Retarder)	185	30	13.50	1.76

- Cement volumes for the 5" Casing will be calculated to provide a top of cement to 12,600'.

5. MUD PROGRAM

Depth	Mud System	MW (ppg)	PV (cp)	YP (lb/100ft ²)	FL (ml/30min)
0' - 4,200'	Spud/LSND	8.5 – 9.0	6 - 10	15 - 25	NA
4,200' - 12,800'	LSND/Asphalt	8.7 – 12.0	6 - 15	10 - 15	6
12,800' - 15,330'	LSND/Asphalt	8.8 – 9.2	6 - 10	10 - 12	6

- Rig will have a mud pit monitoring system to show active volumes of mud
- See Attached Drilling Fluid Program

6. TESTING, LOGGING AND CORE PROGRAMS

Cores: None planned
DST: None planned

Surveys: Deviation surveys every 500' to TD

Mud Logger: From 4,200' to TD

Samples: 30' samples 4,200' to TD

Open Hole Logging Program: Triple Combo and BHC Sonic 12,800' to 4,200'
Triple Combo and BHC Sonic 15,330' to 12,800'

7. ANTICIPATED ABNORMAL PRESSURES OR TEMPERATURES

No abnormal temperatures are anticipated. No H₂S is anticipated.

Anticipated bottom hole pressure is 7,675 psi (0.62 psi/ft) at 12,300' TVD in the Dakota and the maximum anticipated surface pressure equals approximately 4,920 psi (anticipated bottom hole pressure minus the pressure of a partially evacuated hole calculated at 0.22 psi/foot of hole).

8. ANTICIPATED STARTING DATE AND DURATION:

Dirt work startup: Upon Approval
Spud: Upon Approval
Duration: 60 - 90 days