

# NINE POINT DRILLING PLAN

## Union Pacific 157Y29

### *Rangely Weber Sand Unit*

#### Directional Well

Surface: 465' FNL & 2001' FWL, Section 29, T2N, R102W  
Bottomhole: 972' FNL & 1018' FWL, Section 29, T2N, R102W

Rio Blanco County, CO

a. NAMES & ESTIMATED TOPS OF GEOLOGIC GROUPS:

Name	Estimated Tops
Mancos group	Surface

b. NAMES, ESTIMATED TOPS & THICKNESS OF FORMATIONS:  
(based upon est. surface elev. of 5,323')

Name	Estimated Tops	Thickness
Mancos	Surface	2,820'
Frontier	2,820' TVD/ 2,829' MD	353'
Dakota	3,173' TVD/ 3,195' MD	85'
Morrison	3,258' TVD/ 3,283' MD	683'
Curtis	3,941' TVD/ 3,991' MD	112'
Entrada	4,053' TVD/ 4,107' MD	140'
Carmel	4,193' TVD/ 4,252' MD	61'
Navajo	4,254' TVD/ 4,316' MD	591'
Chinle	4,845' TVD/ 4,929' MD	109'
Shinarump	4,954' TVD/ 5,042' MD	98'
Moenkopi	5,052' TVD/ 5,143' MD	646'
Weber	5,698' TVD/ 5,813' MD	714'
Base Of Weber	6,412' TVD/ 6,552' MD	
TD	6,495' TVD/ 6,640' MD	

c. PRESSURE CONTROL EQUIPMENT:

**For drilling surface hole to 2000':**

No BOP equipment required. A diverter will be utilized if a Surface Hole Drilling Rig equipped to drill with air/air mist is used to preset surface casing.

**For drilling through 9 5/8" surface casing to TD:**

Maximum anticipated surface pressure is <3000 psi.

Pressure control equipment shall be in accordance with BLM minimum standards.

A casing head with an 11", 3000 psi flange will be welded onto the 9 5/8" surface casing.

BOP stack will consist of either 2 single gate or a double gate and annular preventer. The gate preventers will be equipped with pipe rams on bottom and blind rams on top. The choke and kill lines will be connected to outlets below the bottom rams, utilizing either the ram body outlet or a drilling spool with side outlets. Co-flex hose will be utilized from the BOP to the choke manifold. The BOP stack will be 11" or 13.625" bore, 3000 psi working pressure or greater. The choke and kill lines will be 3" bore, 3000 psi working pressure or greater. Please refer to attached schematic.

Test procedure and frequency shall be in accordance with BLM minimum standards for 3000 psi equipment, per BLM Oil & Gas Order #2.

**d. PROPOSED CASING PROGRAM, DRILLED HOLE SIZE:**

**Casing Information:** All casing will be new pipe and tested to 1500 psi.

<b>Casing</b>	<b>Weight</b>	<b>Grade</b>	<b>Conn.</b>	<b>Stage</b>	<b>Centralizers</b>
9 5/8"	36.0#/ft	K-55	LTC	No	*
7"	23.0#/ft	J-55	LTC	No	As Needed

\*Centralizers will be placed on the bottom three joints and every fourth joint thereafter.

**Casing Design Information (9 5/8" casing @ 2000'):**

Collapse value for new pipe: 2020 psi    Actual Load: 862 psi    S.F.: 2.3

Burst value for new pipe: 3520 psi    Actual Load: 1169 psi\*    S.F.: 3.0

Tension value for new pipe: 489,000#    Actual Load: 61,000#    S.F.: 8.0

\*Surface casing burst load based on a formation fracture gradient of 1.0 psi/ft.

**(7" casing @ top of Weber at 5698' TVD):**

Collapse value for new pipe: 3270 psi    Actual Load: 2553 psi    S.F.: 1.3

Burst value for new pipe: 4360 psi    Actual Load: 1805 psi    S.F.: 2.4

Tension value for new pipe: 313,000#    Actual Load: 112,000#    S.F.: 2.8

**Surface Hole (0'-2000')**

Drilling of the surface hole will be with a Surface Hole drilling rig equipped to drill with air/air mist if the rig is available. Hole size will be in the 12 ¼" - 11" range at the discretion of the drilling contractor.

Variance to Onshore Oil and Gas Order No. 2 III -E. Special Drilling Operations which addresses additional drilling equipment required for drilling with air/gas is requested for the Surface Hole drilling rig which may be used to preset surface casing. To our knowledge, it is possible (but not probable) that minor amounts of shallow gas (<2000') could be encountered while drilling in this area. The Mancos formation was oil productive in the 1920's but has been mostly depleted and there are no productive Mancos wells with ¼ mile of the proposed well. Consequently, the majority of the equipment specified in the Special Drilling Operations is not necessary to drill surface holes (<2000') in this area. Auxiliary Equipment to be used is outlined in Section 8. Air/gas will not be used to drill below surface casing.

If the Surface Hole drilling rig is not available to preset the surface casing a conventional rotary drilling rig will be used to drill the surface hole. A 12 ¼" hole will be drilled utilizing fresh water mud.

#### **Production Hole (2000' - 5698' TVD)**

Drilling below surface casing will be with conventional rotary equipment utilizing fresh water mud. Hole size will be 8 3/4".

#### **Open Hole (5698' - 6495' TVD - TD)**

The Weber Payzone will be drilled and completed open hole utilizing NaCl brine. Hole size will be 6-1/8".

#### **e. AMOUNT AND TYPES OF CEMENT TO BE USED SETTING CASING STRING:**

<b>Casing</b>	<b>Cement</b>
9 5/8"	Two-slurry system with oilfield type cement circulated in place. Lead: 35:65 Poz: Class "G" cement mixed at 12.7 ppg with a yield of 1.97cf/sx. Theoretical volume of lead cement is 480 sacks including 80% excess in the open hole. Tail: Class "G" cement mixed at 15.8 ppg with an yield of 1.17cf/sx. Theoretical volume of tail cement is 290 sacks. Volumes based on calculated plus 100% excess. Tail plug used. Allowed to set under pressure. Theoretical open hole annular volume is 626 cu ft.
7"	Two-slurry system with oilfield "light weight" cement with additives ahead of oilfield premium cement with additives circulated in place. Lead: Class G cement mixed at 11.0 ppg with a yield of 3.52cf/sx. Theoretical volume of lead cement is 230 sacks including 80% excess in the open hole. Tail: CemCRETE Blend 54/46 mixed at 12.5 ppg with a yield of 1.61cf/sx. Theoretical volume of tail cement is 360 sacks including 80% excess in the open hole. If cement does not reach the surface in cementing the production string, a bond log will be run to

determine the top of cement (TOC) to ensure isolation between the Frontier formation and the surface casing shoe.

**f. TYPES AND CHARACTERISTICS OF PROPOSED CIRCULATING MEDIUM:**

**Surface Hole (0'-2000')**

Surface hole will be drilled with air/air mist if a Surface Hole drilling rig is utilized to preset surface casing prior to moving in and rigging up a conventional rotary drilling rig.

Mud circulating equipment and materials as specified in Onshore Order #2, III - E will not be kept on location due to the fact that the Surface Hole drilling rig equipped to drill with air/air mist is not equipped to circulate mud.

If a Surface Hole drilling rig is not utilized to preset the surface casing a conventional rotary rig will be used to drill the surface hole. Water based drilling fluids consisting primarily of fresh water, bentonite, lignite, caustic, lime, soda ash, and polymers will be used. No chromate's will be used. It is not intended to use oil in the mud, however, in the event it is used, oil concentration will be less than 4% by volume. Maximum anticipated mud weight is  $\pm 9.0$  ppg.

A minimum quantity of weighting material will be kept on location

**Production Hole (2000'-5698' TVD')**

Drilling below surface casing will be with water based drilling fluids consisting primarily of fresh water, bentonite, lignite, caustic, lime, soda ash, and polymers. No chromate's will be used. It is not intended to use oil in the mud, however, in the event it is used, oil concentration will be less than 4% by volume. Maximum anticipated mud weight is  $\pm 10.0$  ppg.

A minimum quantity of weighting material will be kept on location.

H2S and CO2 detector will be used at all times during drilling operation.

**Open Hole (5698' – 6495' TVD'-TD)**

The Weber Payzone will be drilled and completed open hole utilizing NaCl brine.

**g. TESTING, LOGGING AND CORING PROCEDURES:**

**Logging:**

Electric Logging: Cased Hole logs / gamma ray and porosity  
Open Hole logs (possible)

**Coring:** None planned.

**Testing:** None planned.

**h. EXPECTED BOTTOM HOLE PRESSURES, ABNORMAL PRESSURES, TEMPERATURES OR POTENTIAL HAZARDS:**

Normal pressure gradient to top of Weber. Offset pressure history indicates that the pressure gradient in the Weber should be between a minimum of 0.32 psi/ft to a maximum of 0.50 psi/ft.

Maximum expected BHP @ TD: ~ 3000 psi

Maximum expected BHT @ TD: ~ 160° F

**Hydrogen Sulfide:**

Hydrogen sulfide (H<sub>2</sub>S) gas exists in the Weber Formation within the Rangely Field. Concentrations vary across the Field (+/-100-700 ppm) due to a long history of production in conjunction with water and CO<sub>2</sub> injection.

Chevron's "H<sub>2</sub>S Contingency Plan" will be adhered to minimize any potential hazard.

**Possible Aquifers:** None

**Oil:** Probable in Weber @ 5698' – 6495' TVD

**Gas:** Probable minor gas in Weber @ 5698' TVD decreasing to TD.

**Protection of oil, gas, water, or other mineral bearing formations:**

Protection shall be accomplished by cementing surface casing back to the surface. Production casing will be cemented with a sufficient cement volume to attempt to bring cement back to surface. If cement does not reach the surface in cementing the production string, a bond log will be run to determine the top of cement (TOC) to ensure isolation between the Frontier formation and the surface casing shoe.

**i. OTHER INFORMATION:**

**Auxiliary Equipment**

Conventional Rotary Drilling Rig

Geolograph

PVT-Flowmeter

Desilter

Desander

Full Opening Safety Valve

Upper Kelly Valve

Lower Kelly Valve

Surface Hole Rig Equipped to Drill with Air/Air Mist

Diverter; 100' Discharge Line

Closed-Loop Drilling System

Additional Fluid Storage

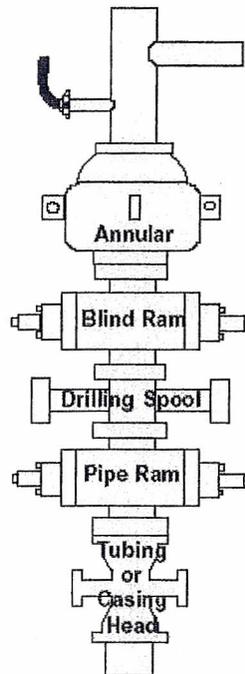
Cuttings Catch Tank

Dewatering System

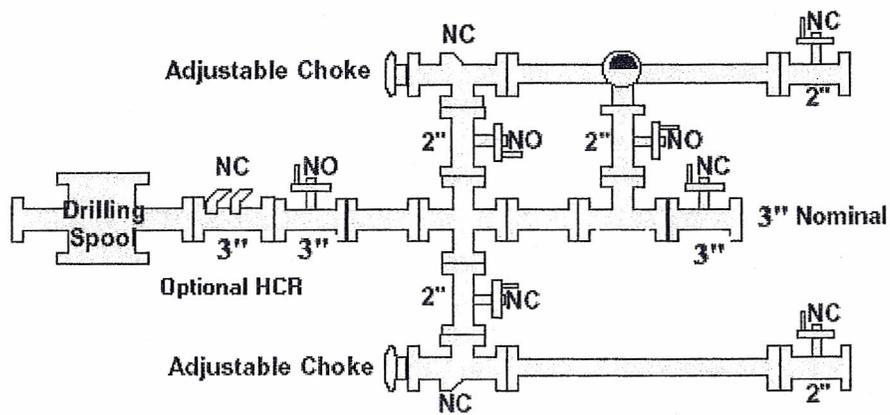
Centrifuge System

# BOP Schematic

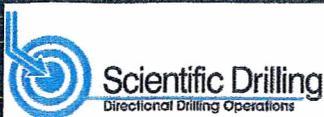
Class III BOP Stack



Class III Choke Manifold



NO	Normally Open
NC	Normally Closed



Project: Rangely County Colorado  
 Site: SEC 29-T2N-R102W Rio Blanco  
 Well: UP157Y29  
 Wellbore: Wellbore #1  
 Plan: BUILD HOLD PLAN (UP157Y29/Wellbore #1)



SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2000.0	0.00	360.00	2000.0	0.0	0.0	0.00	360.00	0.0	
2080.0	0.00	360.00	2080.0	0.0	0.0	0.00	360.00	0.0	
2848.1	15.36	244.75	2838.9	-43.7	-92.6	2.00	244.75	102.4	
6639.6	15.36	244.75	6495.0	-472.2	-1001.0	0.00	0.00	1106.8	PBHL-BH-157Y29



Azinuths to Grid North  
 True North: 2.18°  
 Magnetic North: 13.18°  
 Magnetic Field  
 Strength: 52684.5nT  
 Dip Angle: 66.14°  
 Date: 2009/11/17  
 Model: IGRF200510

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
WEBER	5000.0	-378.8	-803.0	1304092.41	2057098.96	40° 7' 8.055 N	108° 52' 20.456 W	
PBHL-BH	6495	-472.2	-1001.0	1303999.01	2056900.96	40° 7' 7.058 N	108° 52' 22.957 W	

Rangely County Colorado

Geodetic System: US State Plane 1983  
 Datum: North American Datum 1983  
 Ellipsoid: GRS 1980  
 Zone: Colorado Northern Zone  
 System Datum: Mean Sea Level

WELL DETAILS: UP157Y29

Ground Level: 5323.0  
 Northing: 1304471.21  
 Easting: 2057901.96  
 Latitude: 40° 7' 12.097 N  
 Longitude: 108° 52' 10.312 W

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
2820.0	2828.5	Frontier
3173.0	3194.5	Dakota
3258.0	3282.7	Morrison
3941.0	3981.0	Curtis
4053.0	4107.2	Entrada
4193.0	4252.3	Carmel
4254.0	4315.6	Navajo
4845.0	4928.5	Chinle
4954.0	5041.5	Shinarump
5052.0	5143.2	Moenkopi
5698.0	5913.1	Weber

