DRILLING PLAN - Horizontal / Niobrara

PROSPECT/FIELD	Niobrara (exploration) / D-J Basin				**COUNTY/STATE**	Arapahoe / Colorado
OPERATOR	ConocoPhillips					
WELL NAME / No.	State of Colorado 36-1H					
LOCATION	NESE 36 T3S-R64W	Surface Location:	1980' FSL	250' FEL		
	NWSW 3 T5S-R64W	Bottom Hole Location:	1980' FSL	480' FWL		
EST. T.D.	Leg #1 11,658' MD				**GROUND ELEVATION:**	5,556' (est) Finished Grade
	TOTAL LATERALS:	#1 4,010'				

PROGNOSIS: Based on 5,580' RKB Elevation (est)

FORMATION	DEPTH TVD		DATUM
Fox Hills Aquifer	N/A	*Fresh Water*	
Pierre Shale	1,620		3,960
Surface Casing	**1,820**		3,760
Sharon Springs Shale	7,118		(1,538)
Niobrara	7,154	*Gas / Oil*	(1,574)
Niobrara B	7,236	*Gas / Oil*	(1,656)
Niobrara C Chalk	7,291	*Gas / Oil*	(1,711)
Horizontal Target Zone	**7,321**	*Gas / Oil*	**(1,741)**
Niobrara D Chalk	7,356	*Gas / Oil*	(1,776)
Fort Hays Limestone	7,489	*Gas / Oil*	(1,909)
Carlisle Shale	7,524	*Gas / Oil*	(1,944)
Greenhorn	7,582	*Gas / Oil*	(2,002)
TD Pilot Hole	7,682		(2,102)

LOGS:

Type	Interval
Open Hole:	Triple Combo / HNGS / RTScanner / SonicScanner
(pilot hole)	From 7,983' to 6,000'
	GR & Sonic Scanner From 6,000' to Surface
LWD-MWD:	MWD-GR in Curve Build Section (6,748' to 7,648')
	LWD Density / Neutron / Resistivity / Sonic / Imaging
	Lateral Section (7,648' to 11,658')

DEVIATION:

Surf:	2.0° max., DLS 1°/ 100'; survey every 500' (Gyro at TD)
Int:	2.0° max., DLS 0.6/100'; survey every 90' (MWD-GR)
Prod (lateral):	90° Plan Lateral, DLS 0.5/100'; survey every 90'
	(MWD surveys every 30' in curve build sections)

DST'S: None Planned

CORES: None Planned

SAMPLES:

Mudlogging:	From 6,000' to TD	(Weatherford Logging)
(Two-Man Unit)	Dry samples every 10'	
	Wet samples every 30'	

BOP:

11" x 5M psi (Rams & Annular) / Choke Manifold (two 2" wings) 5M psi

Stack Up Configuration:
- Rotating Head
- Annular
- Pipe Rams
- Blind Rams
- Choke & Kill Valves / Lines
- Pipe Rams

WELLHEAD:

SH2R Type "Multi-Bowl" Wellhead (GE Oil & Gas)
Upper Flange 11" x 5M psi (Drilling Spool)
Lower Flange 11" x 5M psi (Casing Head)

Max. Anticipated BHP: 0.49 psi/ft 3,764 psi 09.4 ppg (EMW) **Estimated BH Static Temperatue (°F):** 225

MUD:	Interval			Type	Hole	WT	Vis	LGS %	WL		Remarks
Surface:	0'	-	1,820'	FW / Gel-Lime Sweeps	12-1/4"	8.4 - 9.0	28-45	< 6%	NC		Closed Loop
Intermediate:	1,820'	-	7,648'	Oil Base Mud (Integrade)	8-3/4"	9.0 - 9.9	35-45	< 6%	<6	(HpHt)	Closed Loop
Production (lateral):	7,648'	-	11,658'	FW / LSND / Gel-Polymer	6-1/8"	9.4 - 9.9	35-45	< 6%	<6		Closed Loop

CASING:	Size	Wt ppf	Hole	Depth	Cement Top	Excess	WOC	Remarks
Surface:	9-5/8"	36 # J55 STC	12-1/4"	1,820'	To Surface	140%	8 hrs	500' Tail Cement
Intermediate:	7"	26# P110 LTC	8-3/4"	7,648'	1720'	10%	8 hrs	500' Tail above Niobrara
Production (liner):	4-1/2"	13.5# P110 BTC	6-1/8"	11,658'	Un-Cemented			6,648' Top of Liner

CENTRALIZATION:

Surface Casing: 1/joint on bottom four joints; 1/4th joint to surface (bow-spring type)
Cementing baskets placed at 120' and 1,400'

Intermediate Casing: 1/joint on bottom two joints; 1/4th joint to 6,600'; 1/5th joint from 6,600' to surface (bow-spring type)

DIRECTIONAL PLAN

	MD	TVD (RKB elev.)				AZ
Surface (RKB):	0'	0'	1980' FSL	250' FEL	36-T3S-R64W	0.00
Vertical KOP (90° curve):	6,748'	6,748'	1980' FSL	250' FEL	36-T3S-R64W	0.00
Curve Landing / End Build:	7,648'	7,321'	1980' FSL	823' FEL	36-T3S-R64W	271.17
Intermediate Casing Point:	7,648'	7,321'	1980' FSL	823' FEL	36-T3S-R64W	271.17
Lateral TD - BHL	11,658'	7,321'	1980' FSL	480' FWL	36-T3S-R64W	271.17

Survey Company: Halliburton Sperry
Vertical Build Rate: 10.0 °/100'
Int Leg Turn Rate: 0.0 °/100'
Land curve at 90° inc. and 270.42° Az.
Hold 90° inclination on 270.42° Azimuth

Setback Boundary Distance to Section Lines = 460'

Comments:
MWD Surveys will be taken every 30' while building curve and every 90' while drilling lateral.

Prep By: Gary Hamilton **Date:** 7/26/12 **Doc:** REV 0

State of Colorado 36-1H
Surface Location: NESE 36 T3S-R64W, 1980' FSL, 250' FEL
Bottom Hole Location: NWSW 3 T5S-R64W, 1980' FSL, 480' FWL

Drilling Network:
User ID:
AFE #:

Permit:
CO #:
API #:
Fed #:

Directional:

	MD	TVD	FNL/FSL	FEL/FWL	S-T-R	AZI
Vertical KOP (90° curve):	6748	6748	1980' FSL	250' FEL	36-T3S-R64W	0.00
Curve Landing / End Build:	7,648'	7,321'	1980' FSL	823' FEL	36-T3S-R64W	271.17
Intermediate Casing Point:	7,648'	7,321'	1980' FSL	823' FEL	36-T3S-R64W	271.17
Lateral TD - BHL	11,658'	7,321'	1980' FSL	480' FWL	36-T3S-R64W	271.17

Formation (Pilot Hole)	TVD
Fox Hills Aquifer	1,462
Pierre Shale	1,620
Surface Casing	1,820
Top of Liner	6,648
KOP (10°/100')	6,748
Sharon Springs Shale	7,118
Niobrara	7,154
Niobrara B	7,236
Niobrara C Chalk	7,291
Horizontal Target Zone	7,321
Niobrara D Chalk	7,396
Fort Hays Limestone	7,469
Carlisle Shale	7,524
Greenhorn	7,582
TD Pilot Hole	7,682

CASING / HOLE SIZE

16" Conductor Pre-Set at 80' BGL

1820' — 12-1/4" Hole
9-5/8" 36# J-55 STC Surface Csg.
(Cemented to Surface)
Casing Tested to 1,500 psi
Shoe Test (FIT): 11.0 ppg EMW

7" 26# P-110 LTC Intermediate Casing
7648' — 8-3/4" Hole

Liner Top Packer Tested to 4,500 psi

4-1/2" 13.5# P-110 BTC Prod. Liner
11658' — 6-1/8" Hole

Casing Tested to 1,500 psi
Shoe Test to 11.0 ppg (EMW)

4-1/2" 13.5 # P-110 BTC Production Liner (Un-Cemented / Configured with 20 Stage Sleeves & 21 Swell Packers)

Curve Landing Point / 7" Casing Point
TVD = 7,321' (7,648' MD) at 90° Inclination

Drilling Fluids

Surf. Hole:
FW gel spud mud
8.4 - 9.0 ppg
w/ high vis sweeps

Int Hole:
Oil Mud / Invert
9.0 - 9.9 ppg
8-10 YP
<8 HtHp
65/35 OWR
250k Cl-

Prod Hole:
LSND Water Mud
9.4 - 9.9 ppg
35-45 vis

Cement

Reference Halliburton Cement Program
For Additional Details (preliminary only)

Surface:

390 Sx Lead	12.0 ppg / "SwiftCem"
200 Sx Tail	13.0 ppg / "SwiftCem"
(140% excess)	Yield Lead = 2.56 cu ft/ sack
	Yield Tail = 2.01 cu ft/sack
	Lead Fill = 1,320 ft
	Tail Fill = 500 ft

Intermediate:

410 Sx Lead	12.0 ppg / "ExtendaCem"
130 Sx Tail	15.8 ppg / "HalCem"
(10% excess)	Yield Lead = 2.01 cu ft/sack
	Yield Tail = 1.52 cu ft/sack
	Lead Fill = 4,934 ft
	Tail Fill = 994 ft

Formation Analysis

Mudlogging:
Two-Man Unit
On at 6,000' to TD
30' Wet Samples
10' Dry Samples

Coring / DST's:
None Planned

Curve Section:
MWD-GR
6,748' to 7,648'

Lateral Section:
LWD / MWD-GR
Density / Neutron
Resistivity / Sonic
Imaging

Notes for Well:

1.) **Refer to the drilling program for detailed casing, drilling fluids, bits and operational Procedures.**
2.) Drill 12-1/4" surface hole to 1,820' with fresh water mud, gyro survey and run 9-5/8" casing and cement to surface (Closed loop mud system)
3.) NUBOP & Test to 5,000 psi. Test surface casing to 1,500 psi for 30 minutes.
4.) Drill out with 8-3/4" bit and perform shoe test to 11.0 ppg MWE
5.) Utilize a steerable BHA with MWD-GR to keep intermediate hole as near vertical as practical
6.) Drill intermediate interval with Baroid's "Integrade" Oil Base Mud; Closed loop mud system
7.) Drill to planned pilot hole depth of ~7,682'
8.) Run open hole E-log evaluation
10.) Dress off cement above whipstock with mill tooth bit and drill down whipstock face to expose ~65' of new hole.
11.) Trip for PDC curve building bit / BHA.
12.) Drill curve section and land as per directional plan requirements for azimuth and TVD.
13.) Run 7" intermediate casing and cement as per plan
14.) Re-Test BOP to 5,000 psi. Test casing to 1,500 psi and displace hole to a LSND water based mud
15.) Make up drill out BHA and TIH; drill out and test shoe to 11.0 ppg EMW
16.) Drill approximately 150' of new hole past the 7" casing shoe to fit LWD tools in open hole
17.) Trip for LWD BHA
18.) Drill lateral interval as per directional plan and geology steering input.
19.) Evaluate lateral hole condition at TD for need to make reamer conditioning run.
20.) Run 4-1/2" completion liner (Un-cemented with 20 stage sleeves and 21 swell packers); Test liner top packer to 4,500 psi
21.) Lay down drill pipe; install TWC valve and nipple down BOPE.
22.) Install tubing spool and frac valve (pressure test flange & seal connections); remove TWC valve; install capping flange
23.) Prepare for rig release operations

Max. Anticipated BHP: 3,764 psi 9.4 ppg (EMW)

Estimated BH Static Temperatue (°F): 225

6-1/8" Hole

TD @ 11,658' MD
7,321' TVD
(BHL)

Pilot Hole to be plugged back to KOP following OH e-log evaluations
A mechanical OH sidetrack whipstock will be placed ~65' above KOP depth (cemented in place w/ 2-7/8" tail pipe anchor to ~ 7,953')