



EPW_RMP

CONCEPT WELL PLANNING - COLORADO (NAD83)

Deal Gulch 1-16

Deal Gulch 1-16

Deal Gulch 1-16 Pilot Hole

Plan: Deal Gulch 1-16Pilot Hole

Survey Report - Geographic

01 March, 2012





Shell EP

Survey Report - Geographic



Company:	EPW_RMP	Local Co-ordinate Reference:	Well Deal Gulch 1-16
Project:	CONCEPT WELL PLANNING - COLORADO (NAD83)	TVD Reference:	KB @ 7219.30ft (Original Well Elev)
Site:	Deal Gulch 1-16	MD Reference:	KB @ 7219.30ft (Original Well Elev)
Well:	Deal Gulch 1-16	North Reference:	Grid
Wellbore:	Deal Gulch 1-16 Pilot Hole	Survey Calculation Method:	Minimum Curvature
Design:	Deal Gulch 1-16Pilot Hole	Database:	EDM_UA_Production

Project	CONCEPT WELL PLANNING - COLORADO (NAD83)		
Map System:	EPW NAD83	System Datum:	Mean Sea Level
Geo Datum:	NAD83 [1188_4269]		
Map Zone:	NAD83 / UTM 13N [1188_26913]		

Site		Deal Gulch 1-16			
Site Position:		Northing:	14,677,851.15 usft	Latitude:	40° 23' 16.750 N
From:	Lat/Long	Easting:	944,704.66 usft	Longitude:	107° 29' 53.891 W
Position Uncertainty:	1.00 ft	Slot Radius:	10.000 in	Grid Convergence:	-1.62 °

Well	Deal Gulch 1-16					
Well Position	+N/-S	0.00 ft	Northing:	14,677,851.15 usft	Latitude:	40° 23' 16.750 N
	+E/-W	0.00 ft	Easting:	944,704.66 usft	Longitude:	107° 29' 53.891 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	7,207.30 ft	Ground Level:	7,207.30 ft

Wellbore	Deal Gulch 1-16 Pilot Hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2009	2/8/2012	10.12	66.57	52,764

Design	Deal Gulch 1-16Pilot Hole				
Audit Notes:					
Version:	Phase:	PROTOTYPE	Tie On Depth:	5,081.00	
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00		216.26

Survey Tool Program	Date	3/1/2012			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
0.00	5,081.00	Deal Gulch 1-16 Initial Permit (Deal Gulch	EPW UNKNOWN	Survey tool used to measure well is unknown	
5,081.00	6,322.20	Deal Gulch 1-16Pilot Hole (Deal Gulch 1-1			

Planned Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
0.00	0.00	0.00	0.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W	
100.00	0.00	360.00	100.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W	
200.00	0.00	360.00	200.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W	
300.00	0.00	360.00	300.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W	
400.00	0.00	360.00	400.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W	
500.00	0.00	360.00	500.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W	
600.00	0.00	360.00	600.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W	
700.00	0.00	360.00	700.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W	
800.00	0.00	360.00	800.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W	
900.00	0.00	360.00	900.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W	



Shell EP

Survey Report - Geographic



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Project:	CONCEPT WELL PLANNING - COLORADO (NAD83)	TVD Reference:	KB @ 7219.30ft (Original Well Elev)
Site:	Deal Gulch 1-16	MD Reference:	KB @ 7219.30ft (Original Well Elev)
Well:	Deal Gulch 1-16	North Reference:	Grid
Wellbore:	Deal Gulch 1-16 Pilot Hole	Survey Calculation Method:	Minimum Curvature
Design:	Deal Gulch 1-16Pilot Hole	Database:	EDM_UA_Production

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
1,000.00	0.00	360.00	1,000.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
1,100.00	0.00	360.00	1,100.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
1,200.00	0.00	360.00	1,200.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
1,300.00	0.00	360.00	1,300.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
1,400.00	0.00	360.00	1,400.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
1,500.00	0.00	360.00	1,500.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
1,600.00	0.00	360.00	1,600.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
1,700.00	0.00	360.00	1,700.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
1,800.00	0.00	360.00	1,800.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
1,900.00	0.00	360.00	1,900.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
2,000.00	0.00	360.00	2,000.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
2,100.00	0.00	360.00	2,100.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
2,200.00	0.00	360.00	2,200.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
2,300.00	0.00	360.00	2,300.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
2,400.00	0.00	360.00	2,400.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
2,500.00	0.00	360.00	2,500.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
2,600.00	0.00	360.00	2,600.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
2,700.00	0.00	360.00	2,700.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
2,800.00	0.00	360.00	2,800.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
2,900.00	0.00	360.00	2,900.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
3,000.00	0.00	360.00	3,000.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
3,100.00	0.00	360.00	3,100.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
3,200.00	0.00	360.00	3,200.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
3,300.00	0.00	360.00	3,300.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
3,400.00	0.00	360.00	3,400.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
3,500.00	0.00	360.00	3,500.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
3,600.00	0.00	360.00	3,600.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
3,700.00	0.00	360.00	3,700.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
3,800.00	0.00	360.00	3,800.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
3,900.00	0.00	360.00	3,900.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
4,000.00	0.00	360.00	4,000.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
4,100.00	0.00	360.00	4,100.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
4,200.00	0.00	360.00	4,200.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
4,300.00	0.00	360.00	4,300.00	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
4,310.77	0.00	360.00	4,310.77	0.00	0.00	14,677,851.15	944,704.66	40° 23' 16.750 N	107° 29' 53.891 W
4,350.00	2.55	216.26	4,349.99	-0.70	-0.52	14,677,850.44	944,704.15	40° 23' 16.743 N	107° 29' 53.897 W
4,400.00	5.80	216.26	4,399.85	-3.64	-2.67	14,677,847.51	944,701.99	40° 23' 16.713 N	107° 29' 53.924 W
4,450.00	9.05	216.26	4,449.42	-8.85	-6.49	14,677,842.30	944,698.17	40° 23' 16.661 N	107° 29' 53.971 W
4,500.00	12.30	216.26	4,498.55	-16.31	-11.97	14,677,834.83	944,692.69	40° 23' 16.586 N	107° 29' 54.039 W
4,550.00	15.55	216.26	4,547.07	-26.02	-19.08	14,677,825.13	944,685.58	40° 23' 16.488 N	107° 29' 54.128 W
4,600.00	18.80	216.26	4,594.84	-37.92	-27.81	14,677,813.23	944,676.85	40° 23' 16.368 N	107° 29' 54.236 W
4,650.00	22.05	216.26	4,641.69	-51.99	-38.13	14,677,799.16	944,666.53	40° 23' 16.226 N	107° 29' 54.364 W
4,700.00	25.30	216.26	4,687.47	-68.17	-50.01	14,677,782.98	944,654.65	40° 23' 16.063 N	107° 29' 54.512 W
4,750.00	28.55	216.26	4,732.05	-86.43	-63.40	14,677,764.72	944,641.26	40° 23' 15.879 N	107° 29' 54.678 W
4,800.00	31.80	216.26	4,775.27	-106.69	-78.26	14,677,744.46	944,626.40	40° 23' 15.674 N	107° 29' 54.863 W
4,850.00	35.05	216.26	4,816.99	-128.89	-94.55	14,677,722.25	944,610.11	40° 23' 15.451 N	107° 29' 55.065 W
4,900.00	38.30	216.26	4,857.09	-152.97	-112.21	14,677,698.18	944,592.45	40° 23' 15.208 N	107° 29' 55.284 W
4,950.00	41.55	216.26	4,895.43	-178.84	-131.19	14,677,672.31	944,573.48	40° 23' 14.947 N	107° 29' 55.520 W
5,000.00	44.80	216.26	4,931.89	-206.42	-151.42	14,677,644.73	944,553.24	40° 23' 14.669 N	107° 29' 55.771 W
5,050.00	48.05	216.26	4,966.35	-235.63	-172.84	14,677,615.52	944,531.82	40° 23' 14.375 N	107° 29' 56.037 W
5,081.00	50.06	216.26	4,986.66	-254.51	-186.69	14,677,596.64	944,517.97	40° 23' 14.184 N	107° 29' 56.209 W
5,100.00	49.11	216.26	4,998.98	-266.17	-195.25	14,677,584.98	944,509.42	40° 23' 14.067 N	107° 29' 56.315 W
5,200.00	44.11	216.26	5,067.65	-324.75	-238.22	14,677,526.39	944,466.44	40° 23' 13.476 N	107° 29' 56.849 W
5,300.00	39.11	216.26	5,142.38	-378.29	-277.49	14,677,472.86	944,427.18	40° 23' 12.936 N	107° 29' 57.337 W



Shell EP
Survey Report - Geographic



Company:	EPW_RMP	Local Co-ordinate Reference:	Well Deal Gulch 1-16
Project:	CONCEPT WELL PLANNING - COLORADO (NAD83)	TVD Reference:	KB @ 7219.30ft (Original Well Elev)
Site:	Deal Gulch 1-16	MD Reference:	KB @ 7219.30ft (Original Well Elev)
Well:	Deal Gulch 1-16	North Reference:	Grid
Wellbore:	Deal Gulch 1-16 Pilot Hole	Survey Calculation Method:	Minimum Curvature
Design:	Deal Gulch 1-16Pilot Hole	Database:	EDM-UA_Production

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
5,400.00	34.11	216.26	5,222.62	-426.36	-312.75	14,677,424.78	944,391.91	40° 23' 12.452 N	107° 29' 57.775 W
5,500.00	29.11	216.26	5,307.76	-468.62	-343.75	14,677,382.53	944,360.92	40° 23' 12.026 N	107° 29' 58.159 W
5,600.00	24.11	216.26	5,397.13	-504.73	-370.24	14,677,346.42	944,334.43	40° 23' 11.662 N	107° 29' 58.488 W
5,700.00	19.11	216.26	5,490.07	-534.42	-392.02	14,677,316.73	944,312.65	40° 23' 11.362 N	107° 29' 58.759 W
5,800.00	14.11	216.26	5,585.87	-557.47	-408.92	14,677,293.68	944,295.74	40° 23' 11.130 N	107° 29' 58.969 W
5,900.00	9.11	216.26	5,683.79	-573.70	-420.83	14,677,277.45	944,283.83	40° 23' 10.966 N	107° 29' 59.117 W
5,922.30	8.00	216.26	5,705.84	-576.38	-422.79	14,677,274.77	944,281.87	40° 23' 10.940 N	107° 29' 59.141 W
6,000.00	8.00	216.26	5,782.78	-585.10	-429.19	14,677,266.05	944,275.48	40° 23' 10.852 N	107° 29' 59.220 W
6,100.00	8.00	216.26	5,881.81	-596.32	-437.42	14,677,254.83	944,267.24	40° 23' 10.738 N	107° 29' 59.323 W
6,200.00	8.00	216.26	5,980.84	-607.54	-445.65	14,677,243.61	944,259.01	40° 23' 10.625 N	107° 29' 59.425 W
6,300.00	8.00	216.26	6,079.86	-618.76	-453.88	14,677,232.39	944,250.78	40° 23' 10.512 N	107° 29' 59.527 W
6,322.20	8.00	216.26	6,101.85	-621.25	-455.71	14,677,229.90	944,248.95	40° 23' 10.487 N	107° 29' 59.550 W

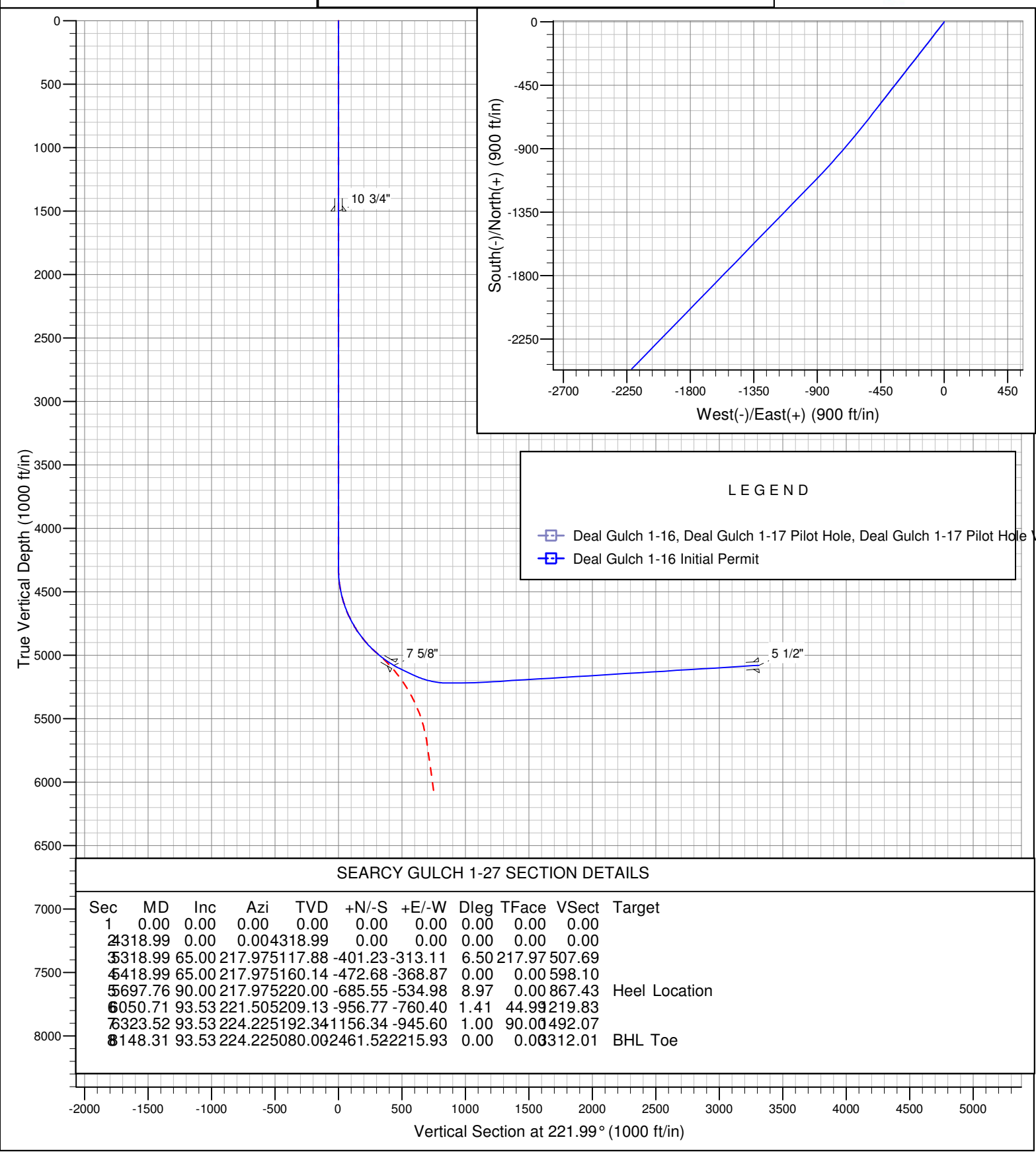
Checked By: _____	Approved By: _____	Date: _____
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Project: SWAN COLORADO (NAD83)
Site: Deal Gulch 1-16
Well: Deal Gulch 1-16
Wellbore: Deal Gulch 1-16 Permit
Design: Deal Gulch 1-16 Initial Permit

SITE DETAILS: Deal Gulch 1-16

Site Centre Latitude: 40° 23' 16.750 N
Longitude: 107° 29' 53.891 W

Positional Uncertainty: 1.00
Convergence: -1.62
Local North: Grid



LEGEND

- Deal Gulch 1-16, Deal Gulch 1-17 Pilot Hole, Deal Gulch 1-17 Pilot Hole V0
- Deal Gulch 1-16 Initial Permit

SEARCY GULCH 1-27 SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	V Sect	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	318.99	0.00	0.00	4318.99	0.00	0.00	0.00	0.00	0.00	
3	318.99	65.00	217.97	5117.88	-401.23	-313.11	6.50	217.97	507.69	
4	418.99	65.00	217.97	5160.14	-472.68	-368.87	0.00	0.00	598.10	
5	697.76	90.00	217.97	5220.00	-685.55	-534.98	8.97	0.00	867.43	Heel Location
6	050.71	93.53	221.50	5209.13	-956.77	-760.40	1.41	44.99	219.83	
7	323.52	93.53	224.22	5192.34	-1156.34	-945.60	1.00	90.00	492.07	
8	148.31	93.53	224.22	5080.00	-2461.52	-2215.93	0.00	0.00	312.01	BHL Toe

Deal Gulch 1-16

T5N, R90W, SEC16
Wellbore Diagram

Updated: 2/9/2012
Location: Section 16 Township 5N Range 90W Moffat County, Colorado
Unit: Williams Fork Unit
API Number: Pending Elevation: 7210 GL
Target Zone: Niobrara Shale 7222 KB

Surface Section:

Hole: 13-1/2"
Depth: 1500' MD/TVD
Casing: 10-3/4" 40.5# J-55, ST&C
Cement Top: Surface

Intermediate Section

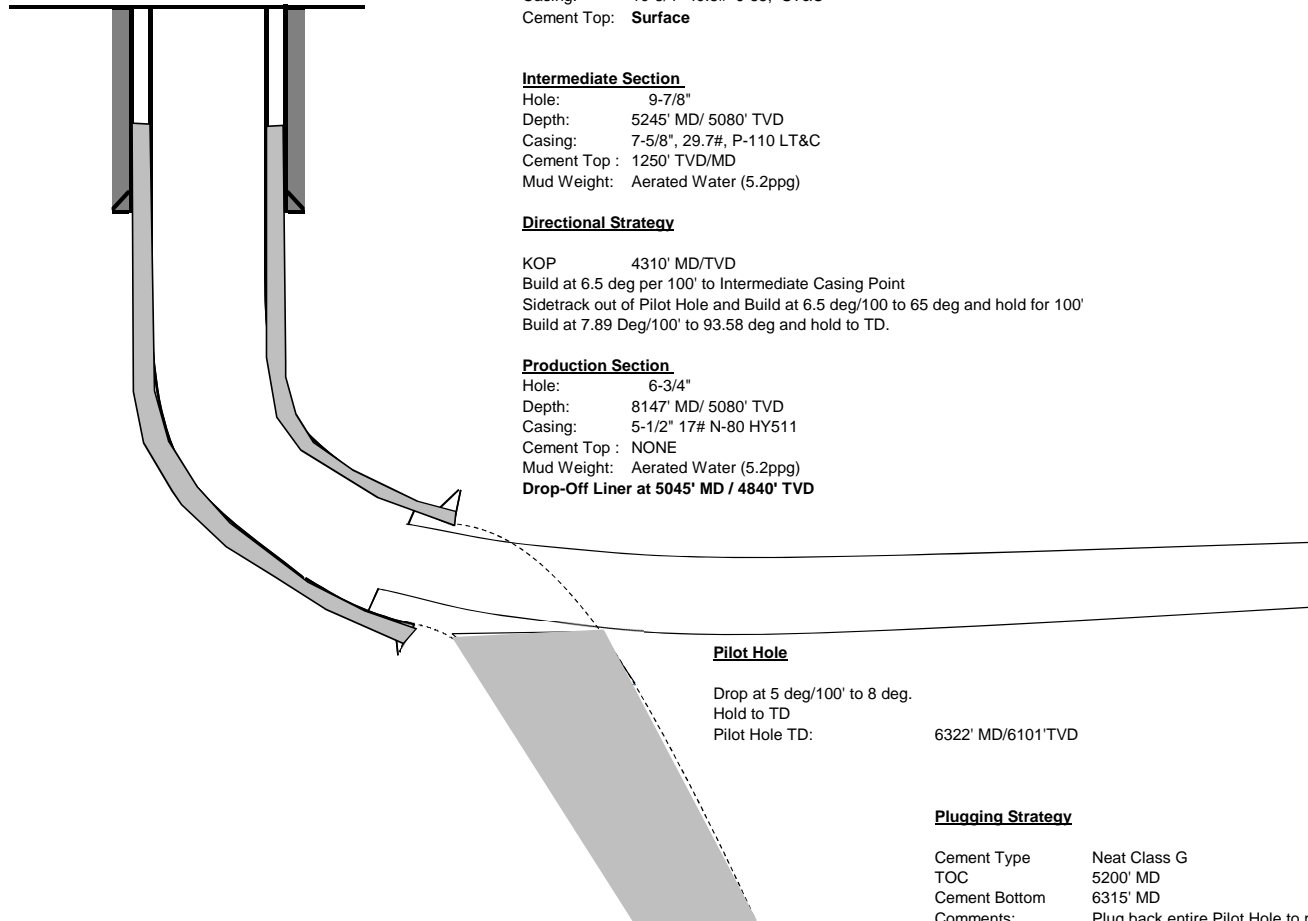
Hole: 9-7/8"
Depth: 5245' MD/ 5080' TVD
Casing: 7-5/8", 29.7#, P-110 LT&C
Cement Top : 1250' TVD/MD
Mud Weight: Aerated Water (5.2ppg)

Directional Strategy

KOP 4310' MD/TVD
Build at 6.5 deg per 100' to Intermediate Casing Point
Sidetrack out of Pilot Hole and Build at 6.5 deg/100 to 65 deg and hold for 100'
Build at 7.89 Deg/100' to 93.58 deg and hold to TD.

Production Section

Hole: 6-3/4"
Depth: 8147' MD/ 5080' TVD
Casing: 5-1/2" 17# N-80 HY511
Cement Top : NONE
Mud Weight: Aerated Water (5.2ppg)
Drop-Off Liner at 5045' MD / 4840' TVD



Pilot Hole

Drop at 5 deg/100' to 8 deg.
Hold to TD
Pilot Hole TD: 6322' MD/6101'TVD

Plugging Strategy

Cement Type	Neat Class G
TOC	5200' MD
Cement Bottom	6315' MD
Comments:	Plug back entire Pilot Hole to previous casing string. Dress off plug until MWD readings allow for an open hole sidetrack. This is estimated at 5200' MD

Drilling and Completion Plan – Pilot and Horizontal Hole

This well is a “toe-up” horizontal well with a pilot hole. See attached directional plan for well.

The surface hole will be 13-1/2” with a 10-3/4” casing cemented from the bottom to the surface. The intermediate hole will be a 9-7/8” with a 7-5/8” casing. The production section will be a 6-3/4” hole with a 5-1/2” casing. Depths of casing strings will vary by hole and are detailed on Form 2. All casing will be new, range 3 casing.

After setting 7-5/8” intermediate casing on this well, a slant pilot hole will be drilled penetrating the Niobrara, into the underlying Carlisle formation. After obtaining appropriate geological data from the pilot hole, the main lateral borehole will be sidetracked away from the pilot hole and drilled to TD.

The purpose of the pilot hole is to obtain subsurface data that cannot easily be obtained in the horizontal production section. The pilot hole provides the following:

- Wellbore for obtaining core samples
- The slant trajectory of pilot hole is preferred for open hole logs over the toe-up horizontal section
- Formation data obtained from the pilot hole greatly improves accuracy of depth control during drilling of the subsequent horizontal section.

Subsequent to obtaining all necessary subsurface data from pilot hole, the pilot hole will be plugged back with cement and an open-hole sidetrack will be performed to drill the lateral portion of the wellbore.

Completion of the main horizontal (lateral) borehole will consist of an open-hole section covered by a perforated or slotted liner run to the well TD by the drilling rig. The producing interval will be the Niobrara Formation and will start below the intermediate casing string set point near the top of the Niobrara Formation. If drilling with casing is required, a contingency will be to perforate the liner once landed in the well.

Artificial lift will consist of a sucker rod and pump jack system. The tubing will be run near the low spot of the well, the “heel”, and anchored above the producing interval. The sucker rods will be run with the pump set near the end of the tubing. All tubing and sucker rod equipment will be run with a BOP package and a kill weight completion fluid system. The well will be initially swabbed for fluid clean up and flow testing. Frac'ing or additional reservoir stimulation methods are not anticipated to be necessary.