

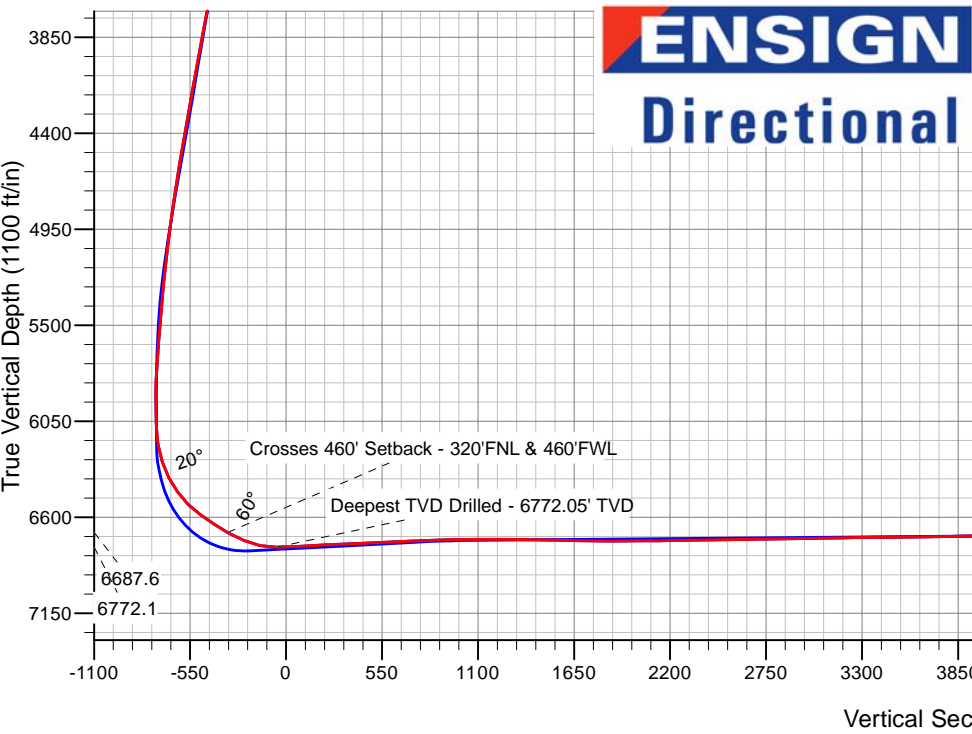
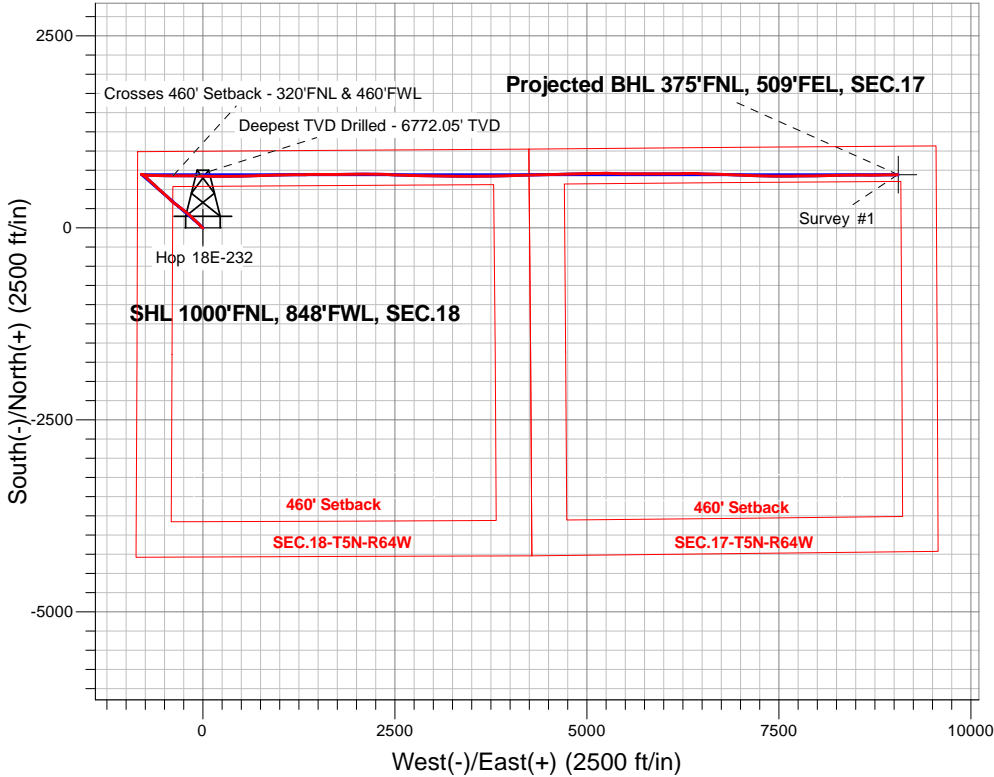
PETROLEUM DEVELOPMENT CORP DJ Basin

Well Name: Hop 18E-232

Surface Location: Hop 5N64W18A Pad Sec.18-T5N-R64W
North American Datum 1983 , US State Plane 1983, Colorado Northern Zone
Ground Elevation: 4628.0
+N/-S+E/-W Northing Easting Latitude Longitude Slot
0.0 0.0 1391153.813250983.06 40.403618 -104.598774
Ensign Rig #152 - RKB -23' WELL @ 4651.0ft (Ensign Rig #152 - RKB -23')

FINAL SURVEY

Projected Bottom Hole Location
16424'MD 6654'TVD 692'N & 9043'E of SHL
94.10 degree Incl @ 88.90 degree AZM



Hop 5N64W18A Pad Sec.18-T5N-R64W
Hop 18E-232
Wellbore #1
9:07, September 26 2016

ANNOTATIONS

TVD	MD	Annotation
6687.6	6972.2	Crosses 460' Setback - 320'FNL & 460'FWL
6772.1	7269.0	Deepest TVD Drilled - 6772.05' TVD

LEGEND

- Hop 18E-232, Wellbore #1, Plan #2 (9-09-16)R V0
- Wellbore #1
- Survey #1

Projected BHL 375'FNL, 509'FEL, SEC.17



PETROLEUM DEVELOPMENT CORP DJ Basin

SEC.18-T5N-R64W

Hop 5N64W18A Pad Sec.18-T5N-R64W

Hop 18E-232

Wellbore #1

Survey: Survey #1

Standard Survey Report

26 September, 2016

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Hop 18E-232
Project:	SEC.18-T5N-R64W	TVD Reference:	WELL @ 4651.0ft (Ensign Rig #152 - RKB -23')
Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	MD Reference:	WELL @ 4651.0ft (Ensign Rig #152 - RKB -23')
Well:	Hop 18E-232	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	US_EDM

Project	SEC.18-T5N-R64W, Weld County, Colorado		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		Using Well Reference Point
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

Site	Hop 5N64W18A Pad Sec.18-T5N-R64W				
Site Position:		Northing:	1,391,153.68 usft	Latitude:	40.403618
From:	Lat/Long	Easting:	3,250,968.30 usft	Longitude:	-104.598827
Position Uncertainty:	0.0 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.58 °

Well	Hop 18E-232					
Well Position	+N/-S	0.0 ft	Northing:	1,391,153.81 usft	Latitude:	40.403618
	+E/-W	0.0 ft	Easting:	3,250,983.06 usft	Longitude:	-104.598774
Position Uncertainty		0.0 ft	Wellhead Elevation:	0.0 ft	Ground Level:	4,628.0 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	9/9/2016	8.07	66.90	52,600

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.0	0.0	0.0	85.63	

Survey Program	Date	9/26/2016			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
156.0	16,424.0	Survey #1 (Wellbore #1)	MWD	MWD - Standard	

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	
156.0	0.40	234.10	156.0	-0.3	-0.4	-0.5	0.26	0.26	0.00	
252.0	0.60	185.80	252.0	-1.0	-0.8	-0.8	0.47	0.21	-50.31	
347.0	1.10	200.00	347.0	-2.4	-1.1	-1.3	0.57	0.53	14.95	
443.0	1.10	251.20	443.0	-3.5	-2.3	-2.6	0.99	0.00	53.33	
539.0	1.80	302.30	538.9	-3.0	-4.5	-4.7	1.46	0.73	53.23	
634.0	2.80	311.70	633.9	-0.7	-7.5	-7.5	1.12	1.05	9.89	
730.0	2.90	315.70	729.7	2.6	-10.9	-10.7	0.23	0.10	4.17	
826.0	3.70	319.40	825.6	6.7	-14.6	-14.1	0.86	0.83	3.85	
922.0	5.20	311.70	921.3	12.0	-19.9	-18.9	1.68	1.56	-8.02	

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Hop 18E-232
Project:	SEC.18-T5N-R64W	TVD Reference:	WELL @ 4651.0ft (Ensign Rig #152 - RKB -23')
Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	MD Reference:	WELL @ 4651.0ft (Ensign Rig #152 - RKB -23')
Well:	Hop 18E-232	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	US_EDM

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,018.0	6.00	320.40	1,016.8	18.7	-26.3	-24.8	1.21	0.83	9.06
1,114.0	7.00	319.40	1,112.2	27.0	-33.3	-31.2	1.05	1.04	-1.04
1,210.0	7.90	316.40	1,207.4	36.2	-41.7	-38.8	1.02	0.94	-3.13
1,305.0	9.10	316.60	1,301.4	46.4	-51.3	-47.7	1.26	1.26	0.21
1,401.0	9.90	315.20	1,396.0	57.8	-62.4	-57.8	0.87	0.83	-1.46
1,430.0	9.60	314.50	1,424.6	61.3	-65.9	-61.0	1.11	-1.03	-2.41
1,591.0	12.40	312.70	1,582.7	82.4	-88.1	-81.6	1.75	1.74	-1.12
1,687.0	14.20	314.10	1,676.1	97.6	-104.2	-96.4	1.90	1.88	1.46
1,782.0	14.10	313.10	1,768.2	113.6	-121.0	-112.0	0.28	-0.11	-1.05
1,879.0	13.50	313.10	1,862.4	129.4	-137.9	-127.6	0.62	-0.62	0.00
1,975.0	12.80	312.20	1,955.9	144.2	-153.9	-142.5	0.76	-0.73	-0.94
2,071.0	15.00	314.50	2,049.1	160.1	-170.7	-158.0	2.36	2.29	2.40
2,167.0	14.40	312.00	2,141.9	176.8	-188.4	-174.4	0.91	-0.63	-2.60
2,263.0	13.50	309.90	2,235.1	191.9	-205.9	-190.7	1.08	-0.94	-2.19
2,359.0	12.90	308.30	2,328.5	205.8	-222.9	-206.6	0.73	-0.63	-1.67
2,454.0	14.40	308.00	2,420.9	219.6	-240.5	-223.1	1.58	1.58	-0.32
2,550.0	13.60	305.20	2,514.0	233.5	-259.2	-240.6	1.09	-0.83	-2.92
2,646.0	15.10	308.70	2,607.0	247.8	-278.1	-258.4	1.80	1.56	3.65
2,741.0	15.60	309.00	2,698.6	263.6	-297.7	-276.8	0.53	0.53	0.32
2,837.0	15.40	308.00	2,791.1	279.5	-317.8	-295.6	0.35	-0.21	-1.04
2,934.0	15.10	306.70	2,884.7	295.0	-338.1	-314.6	0.47	-0.31	-1.34
3,030.0	14.90	306.00	2,977.4	309.7	-358.1	-333.4	0.28	-0.21	-0.73
3,126.0	13.90	304.30	3,070.4	323.5	-377.6	-351.8	1.13	-1.04	-1.77
3,221.0	12.40	309.40	3,162.9	336.4	-394.9	-368.1	1.99	-1.58	5.37
3,317.0	13.40	315.70	3,256.5	350.9	-410.6	-382.7	1.80	1.04	6.56
3,413.0	12.30	312.50	3,350.1	365.8	-426.0	-396.8	1.36	-1.15	-3.33
3,509.0	13.70	313.80	3,443.7	380.6	-441.7	-411.4	1.49	1.46	1.35
3,605.0	12.90	312.40	3,537.1	395.6	-457.8	-426.3	0.90	-0.83	-1.46
3,700.0	14.10	313.40	3,629.5	410.8	-474.1	-441.4	1.29	1.26	1.05
3,796.0	15.00	313.40	3,722.4	427.3	-491.6	-457.6	0.94	0.94	0.00
3,892.0	15.40	312.90	3,815.0	444.5	-509.9	-474.6	0.44	0.42	-0.52
3,988.0	14.90	312.50	3,907.7	461.6	-528.4	-491.7	0.53	-0.52	-0.42
4,083.0	14.00	311.80	3,999.7	477.5	-546.0	-508.0	0.97	-0.95	-0.74
4,179.0	15.30	312.20	4,092.5	493.7	-564.0	-524.7	1.36	1.35	0.42
4,275.0	14.50	311.10	4,185.3	510.1	-582.4	-541.9	0.88	-0.83	-1.15
4,371.0	14.00	311.30	4,278.4	525.7	-600.2	-558.4	0.52	-0.52	0.21
4,465.0	15.00	314.10	4,369.4	541.7	-617.5	-574.4	1.30	1.06	2.98
4,561.0	14.80	313.90	4,462.1	558.8	-635.3	-590.8	0.22	-0.21	-0.21
4,657.0	13.60	312.40	4,555.2	574.9	-652.4	-606.7	1.31	-1.25	-1.56
4,752.0	12.90	311.80	4,647.7	589.5	-668.6	-621.7	0.75	-0.74	-0.63
4,848.0	12.40	311.80	4,741.3	603.5	-684.2	-636.3	0.52	-0.52	0.00
4,944.0	11.80	314.60	4,835.2	617.3	-698.9	-649.8	0.87	-0.63	2.92
5,040.0	11.40	314.30	4,929.3	630.8	-712.7	-662.5	0.42	-0.42	-0.31
5,136.0	10.60	313.90	5,023.5	643.6	-725.9	-674.7	0.84	-0.83	-0.42

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Project:	SEC.18-T5N-R64W	TVD Reference:	WELL @ 4651.0ft (Ensign Rig #152 - RKB -23')
Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	MD Reference:	WELL @ 4651.0ft (Ensign Rig #152 - RKB -23')
Well:	Hop 18E-232	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	US_EDM

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,231.0	9.30	311.30	5,117.1	654.7	-737.9	-685.9	1.45	-1.37	-2.74
5,327.0	8.20	307.40	5,211.9	664.0	-749.2	-696.4	1.30	-1.15	-4.06
5,422.0	7.10	305.20	5,306.1	671.5	-759.4	-706.0	1.20	-1.16	-2.32
5,518.0	6.20	303.60	5,401.4	677.8	-768.5	-714.6	0.96	-0.94	-1.67
5,614.0	5.90	306.40	5,496.9	683.5	-776.8	-722.5	0.44	-0.31	2.92
5,710.0	5.00	299.00	5,592.5	688.5	-784.4	-729.7	1.19	-0.94	-7.71
5,805.0	4.70	286.70	5,687.1	691.6	-791.8	-736.8	1.14	-0.32	-12.95
5,900.0	4.10	293.00	5,781.9	694.1	-798.7	-743.4	0.81	-0.63	6.63
5,996.0	0.70	60.60	5,877.8	695.7	-801.3	-745.9	4.75	-3.54	132.92
6,091.0	0.30	117.60	5,972.8	695.9	-800.6	-745.2	0.62	-0.42	60.00
6,187.0	0.40	76.10	6,068.8	695.8	-800.0	-744.7	0.28	0.10	-43.23
6,282.0	9.40	95.80	6,163.3	695.1	-792.0	-736.7	9.50	9.47	20.74
6,311.0	11.30	95.40	6,191.9	694.6	-786.8	-731.5	6.56	6.55	-1.38
6,406.0	17.70	102.50	6,283.8	690.6	-763.4	-708.5	6.98	6.74	7.47
6,502.0	28.00	94.70	6,372.2	685.6	-726.6	-672.2	11.16	10.73	-8.13
6,598.0	35.20	93.90	6,453.9	681.9	-676.5	-622.5	7.51	7.50	-0.83
6,693.0	45.60	90.50	6,526.1	679.7	-615.0	-561.4	11.19	10.95	-3.58
6,790.0	55.10	90.90	6,588.0	678.8	-540.4	-487.1	9.80	9.79	0.41
6,886.0	56.00	88.90	6,642.3	678.9	-461.3	-408.2	1.96	0.94	-2.08
6,972.2	60.54	89.45	6,687.6	680.0	-388.0	-335.0	5.29	5.26	0.63
Crosses 460' Setback - 320'FNL & 460'FWL									
6,981.0	61.00	89.50	6,691.9	680.0	-380.3	-327.4	5.29	5.26	0.60
7,077.0	68.10	90.20	6,733.1	680.2	-293.7	-241.0	7.43	7.40	0.73
7,173.0	76.90	92.30	6,762.0	678.2	-202.2	-149.9	9.40	9.17	2.19
7,269.0	91.00	91.80	6,772.1	674.8	-107.1	-55.3	14.70	14.69	-0.52
Deepest TVD Drilled - 6772.05' TVD									
7,365.0	93.40	91.00	6,768.4	672.5	-11.2	40.1	2.64	2.50	-0.83
7,461.0	93.50	91.40	6,762.6	670.5	84.6	135.5	0.43	0.10	0.42
7,556.0	92.30	90.00	6,757.8	669.3	179.5	230.0	1.94	-1.26	-1.47
7,652.0	92.20	89.80	6,754.0	669.5	275.4	325.6	0.23	-0.10	-0.21
7,747.0	92.50	89.10	6,750.1	670.4	370.3	420.4	0.80	0.32	-0.74
7,843.0	93.00	88.60	6,745.5	672.3	466.2	516.1	0.74	0.52	-0.52
7,939.0	92.40	88.90	6,741.0	674.4	562.1	611.8	0.70	-0.63	0.31
8,035.0	92.90	88.60	6,736.6	676.5	657.9	707.6	0.61	0.52	-0.31
8,130.0	91.30	88.10	6,733.1	679.2	752.8	802.4	1.76	-1.68	-0.53
8,226.0	92.00	87.40	6,730.3	683.0	848.7	898.3	1.03	0.73	-0.73
8,322.0	91.10	88.60	6,727.7	686.3	944.6	994.2	1.56	-0.94	1.25
8,417.0	90.20	88.60	6,726.6	688.7	1,039.6	1,089.1	0.95	-0.95	0.00
8,513.0	90.20	88.10	6,726.3	691.4	1,135.6	1,185.0	0.52	0.00	-0.52
8,608.0	89.20	89.80	6,726.8	693.2	1,230.5	1,279.8	2.08	-1.05	1.79
8,704.0	89.10	89.50	6,728.2	693.8	1,326.5	1,375.5	0.33	-0.10	-0.31
8,800.0	88.70	88.90	6,730.1	695.1	1,422.5	1,471.3	0.75	-0.42	-0.63
8,896.0	88.70	90.20	6,732.2	695.8	1,518.5	1,567.1	1.35	0.00	1.35

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Well:	Hop 18E-232	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	US_EDM

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,992.0	89.30	90.50	6,733.9	695.3	1,614.4	1,662.7	0.70	0.63	0.31
9,088.0	89.80	90.00	6,734.7	694.8	1,710.4	1,758.4	0.74	0.52	-0.52
9,184.0	89.70	90.00	6,735.1	694.8	1,806.4	1,854.1	0.10	-0.10	0.00
9,280.0	90.30	88.60	6,735.1	696.0	1,902.4	1,949.9	1.59	0.63	-1.46
9,376.0	90.20	88.20	6,734.7	698.7	1,998.4	2,045.8	0.43	-0.10	-0.42
9,472.0	90.70	90.50	6,733.9	699.8	2,094.4	2,141.6	2.45	0.52	2.40
9,568.0	91.20	89.80	6,732.3	699.5	2,190.4	2,237.3	0.90	0.52	-0.73
9,664.0	90.20	91.60	6,731.2	698.4	2,286.3	2,332.9	2.14	-1.04	1.88
9,759.0	90.70	92.50	6,730.4	695.0	2,381.3	2,427.3	1.08	0.53	0.95
9,855.0	91.50	92.80	6,728.6	690.5	2,477.2	2,522.6	0.89	0.83	0.31
9,950.0	91.90	92.10	6,725.7	686.5	2,572.0	2,616.9	0.85	0.42	-0.74
10,046.0	90.10	91.60	6,724.1	683.4	2,668.0	2,712.3	1.95	-1.88	-0.52
10,142.0	90.20	91.20	6,723.8	681.0	2,763.9	2,807.8	0.43	0.10	-0.42
10,237.0	90.70	90.90	6,723.1	679.3	2,858.9	2,902.4	0.61	0.53	-0.32
10,333.0	90.70	91.20	6,721.9	677.5	2,954.9	2,997.9	0.31	0.00	0.31
10,429.0	91.50	91.00	6,720.1	675.7	3,050.8	3,093.5	0.86	0.83	-0.21
10,524.0	91.50	91.40	6,717.6	673.7	3,145.8	3,188.0	0.42	0.00	0.42
10,619.0	90.60	90.20	6,715.8	672.4	3,240.8	3,282.6	1.58	-0.95	-1.26
10,715.0	90.30	90.50	6,715.1	671.8	3,336.8	3,378.3	0.44	-0.31	0.31
10,810.0	91.10	90.70	6,713.9	670.8	3,431.7	3,472.9	0.87	0.84	0.21
10,906.0	90.30	89.60	6,712.7	670.5	3,527.7	3,568.6	1.42	-0.83	-1.15
11,002.0	90.30	88.90	6,712.2	671.8	3,623.7	3,664.4	0.73	0.00	-0.73
11,098.0	90.70	88.90	6,711.4	673.6	3,719.7	3,760.2	0.42	0.42	0.00
11,193.0	91.40	88.80	6,709.7	675.5	3,814.7	3,855.1	0.74	0.74	-0.11
11,289.0	92.00	88.80	6,706.8	677.5	3,910.6	3,950.9	0.63	0.63	0.00
11,385.0	90.70	88.40	6,704.5	679.9	4,006.5	4,046.7	1.42	-1.35	-0.42
11,481.0	89.90	88.40	6,704.0	682.6	4,102.5	4,142.6	0.83	-0.83	0.00
11,577.0	90.00	88.40	6,704.1	685.2	4,198.5	4,238.5	0.10	0.10	0.00
11,673.0	90.60	88.60	6,703.6	687.8	4,294.4	4,334.4	0.66	0.63	0.21
11,769.0	91.10	88.20	6,702.2	690.4	4,390.4	4,430.2	0.67	0.52	-0.42
11,864.0	89.00	88.80	6,702.1	692.9	4,485.3	4,525.1	2.30	-2.21	0.63
11,960.0	89.30	88.40	6,703.5	695.3	4,581.3	4,621.0	0.52	0.31	-0.42
12,056.0	89.50	87.90	6,704.5	698.4	4,677.3	4,716.9	0.56	0.21	-0.52
12,152.0	90.00	87.90	6,705.0	701.9	4,773.2	4,812.8	0.52	0.52	0.00
12,247.0	90.20	89.80	6,704.8	703.8	4,868.2	4,907.6	2.01	0.21	2.00
12,343.0	90.60	89.10	6,704.1	704.7	4,964.2	5,003.4	0.84	0.42	-0.73
12,439.0	91.30	88.60	6,702.5	706.6	5,060.1	5,099.3	0.90	0.73	-0.52
12,535.0	89.80	89.50	6,701.6	708.2	5,156.1	5,195.1	1.82	-1.56	0.94
12,630.0	90.50	89.30	6,701.4	709.2	5,251.1	5,289.9	0.77	0.74	-0.21
12,726.0	90.60	91.60	6,700.4	708.5	5,347.1	5,385.5	2.40	0.10	2.40
12,822.0	91.50	91.20	6,698.7	706.1	5,443.0	5,481.0	1.03	0.94	-0.42
12,918.0	89.90	91.40	6,697.5	704.0	5,539.0	5,576.5	1.68	-1.67	0.21
13,013.0	90.40	90.50	6,697.3	702.4	5,634.0	5,671.1	1.08	0.53	-0.95
13,109.0	90.80	89.80	6,696.3	702.1	5,730.0	5,766.8	0.84	0.42	-0.73

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Hop 18E-232
Project:	SEC.18-T5N-R64W	TVD Reference:	WELL @ 4651.0ft (Ensign Rig #152 - RKB -23')
Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	MD Reference:	WELL @ 4651.0ft (Ensign Rig #152 - RKB -23')
Well:	Hop 18E-232	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	US_EDM

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
13,205.0	91.50	89.10	6,694.3	703.1	5,826.0	5,862.6	1.03	0.73	-0.73
13,301.0	90.50	90.00	6,692.7	703.8	5,921.9	5,958.4	1.40	-1.04	0.94
13,396.0	90.70	88.90	6,691.7	704.7	6,016.9	6,053.1	1.18	0.21	-1.16
13,492.0	88.80	90.30	6,692.1	705.4	6,112.9	6,148.9	2.46	-1.98	1.46
13,588.0	89.20	89.60	6,693.8	705.5	6,208.9	6,244.6	0.84	0.42	-0.73
13,684.0	89.40	88.90	6,694.9	706.7	6,304.9	6,340.4	0.76	0.21	-0.73
13,780.0	88.80	91.40	6,696.4	706.5	6,400.9	6,436.1	2.68	-0.63	2.60
13,875.0	89.00	92.10	6,698.3	703.6	6,495.8	6,530.5	0.77	0.21	0.74
13,971.0	90.50	91.90	6,698.7	700.2	6,591.7	6,625.9	1.58	1.56	-0.21
14,067.0	90.30	91.00	6,698.0	697.8	6,687.7	6,721.4	0.96	-0.21	-0.94
14,163.0	91.80	92.80	6,696.3	694.6	6,783.6	6,816.8	2.44	1.56	1.88
14,258.0	91.90	92.30	6,693.2	690.4	6,878.5	6,911.1	0.54	0.11	-0.53
14,354.0	92.10	92.30	6,689.8	686.5	6,974.3	7,006.4	0.21	0.21	0.00
14,450.0	91.80	91.90	6,686.6	683.0	7,070.2	7,101.7	0.52	-0.31	-0.42
14,546.0	91.80	92.10	6,683.6	679.7	7,166.1	7,197.1	0.21	0.00	0.21
14,642.0	92.50	91.20	6,680.0	676.9	7,262.0	7,292.5	1.19	0.73	-0.94
14,737.0	90.70	90.90	6,677.3	675.2	7,357.0	7,387.0	1.92	-1.89	-0.32
14,833.0	91.10	90.90	6,675.8	673.7	7,452.9	7,482.6	0.42	0.42	0.00
14,929.0	91.50	90.50	6,673.6	672.5	7,548.9	7,578.2	0.59	0.42	-0.42
15,024.0	90.80	89.50	6,671.7	672.5	7,643.9	7,672.9	1.28	-0.74	-1.05
15,120.0	91.20	88.90	6,670.0	673.8	7,739.9	7,768.7	0.75	0.42	-0.63
15,216.0	88.90	89.60	6,669.9	675.1	7,835.8	7,864.5	2.50	-2.40	0.73
15,311.0	89.30	88.90	6,671.4	676.3	7,930.8	7,959.3	0.85	0.42	-0.74
15,407.0	89.50	88.90	6,672.4	678.2	8,026.8	8,055.1	0.21	0.21	0.00
15,503.0	89.90	88.20	6,672.9	680.6	8,122.8	8,151.0	0.84	0.42	-0.73
15,599.0	89.70	88.10	6,673.3	683.7	8,218.7	8,246.9	0.23	-0.21	-0.10
15,695.0	89.30	89.30	6,674.1	685.9	8,314.7	8,342.8	1.32	-0.42	1.25
15,791.0	90.00	90.20	6,674.7	686.3	8,410.7	8,438.5	1.19	0.73	0.94
15,887.0	90.10	90.20	6,674.6	686.0	8,506.7	8,534.2	0.10	0.10	0.00
15,983.0	90.80	90.00	6,673.9	685.8	8,602.7	8,629.9	0.76	0.73	-0.21
16,078.0	91.60	89.60	6,671.9	686.1	8,697.7	8,724.6	0.94	0.84	-0.42
16,174.0	92.30	89.10	6,668.6	687.2	8,793.6	8,820.4	0.90	0.73	-0.52
16,270.0	93.00	88.80	6,664.2	689.0	8,889.5	8,916.1	0.79	0.73	-0.31
16,365.0	94.10	88.90	6,658.3	690.9	8,984.3	9,010.8	1.16	1.16	0.11
16,424.0	94.10	88.90	6,654.1	692.0	9,043.1	9,069.5	0.00	0.00	0.00

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	Local Co-ordinate Reference:	Well Hop 18E-232
Project:	SEC.18-T5N-R64W	TVD Reference:	WELL @ 4651.0ft (Ensign Rig #152 - RKB -23')
Site:	Hop 5N64W18A Pad Sec.18-T5N-R64W	MD Reference:	WELL @ 4651.0ft (Ensign Rig #152 - RKB -23')
Well:	Hop 18E-232	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	US_EDM

Design Targets									
Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
SHL 1000'FNL, 848'FWL - survey hits target center - Point	0.00	0.00	1.0	0.0	0.0	1,391,153.83	3,250,983.06	40.403618	-104.598774
BHL 375'FNL, 500'FEL, - survey misses target center by 12.0ft at 16424.0ft MD (6654.1 TVD, 692.0 N, 9043.1 E) - Point	0.00	0.00	6,662.0	692.1	9,052.1	1,391,937.79	3,260,027.25	40.405513	-104.566271

Survey Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
6,972.2	6,687.6	680.0	-388.0	Crosses 460' Setback - 320'FNL & 460'FWL	
7,269.0	6,772.1	674.8	-107.1	Deepest TVD Drilled - 6772.05' TVD	

Checked By: _____	Approved By: _____	Date: _____
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