PETROLEUM DEVELOPMENT CORP DJ Basin

Well Name: **Spaur 10L-241**

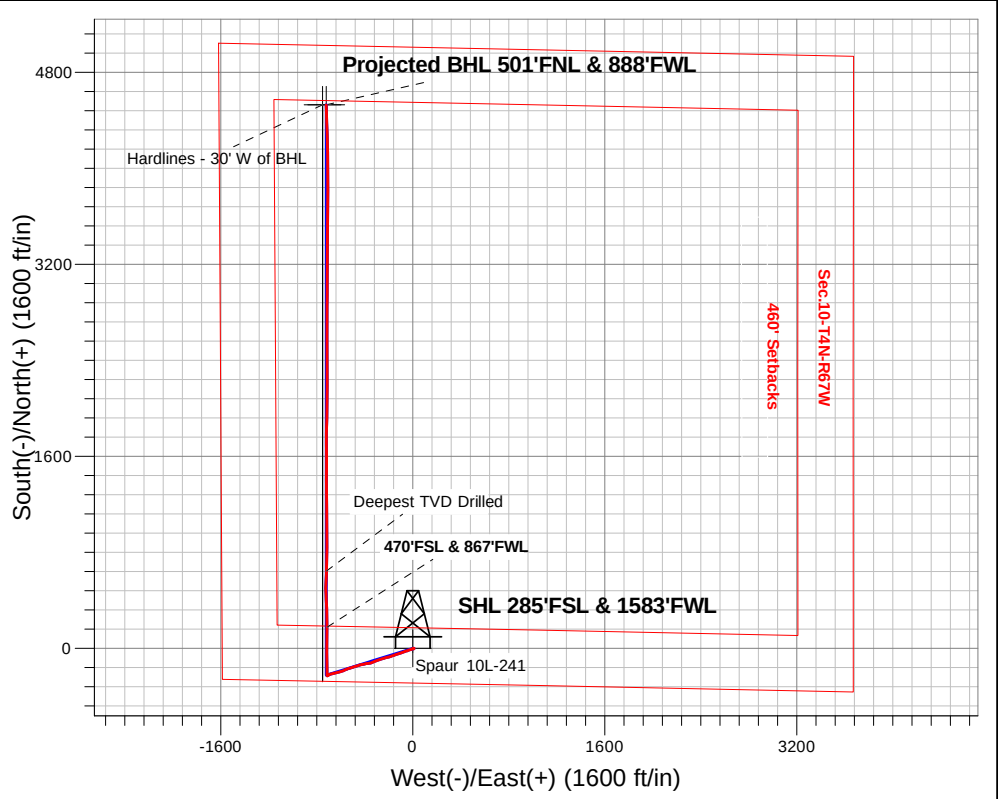
Surface Location: Spaur 4N67W10MLVT Pad Sec.10-T4N-R67W
North American Datum 1983 , US State Plane 1983, Colorado Northern Zone
Ground Elevation: 4840.0

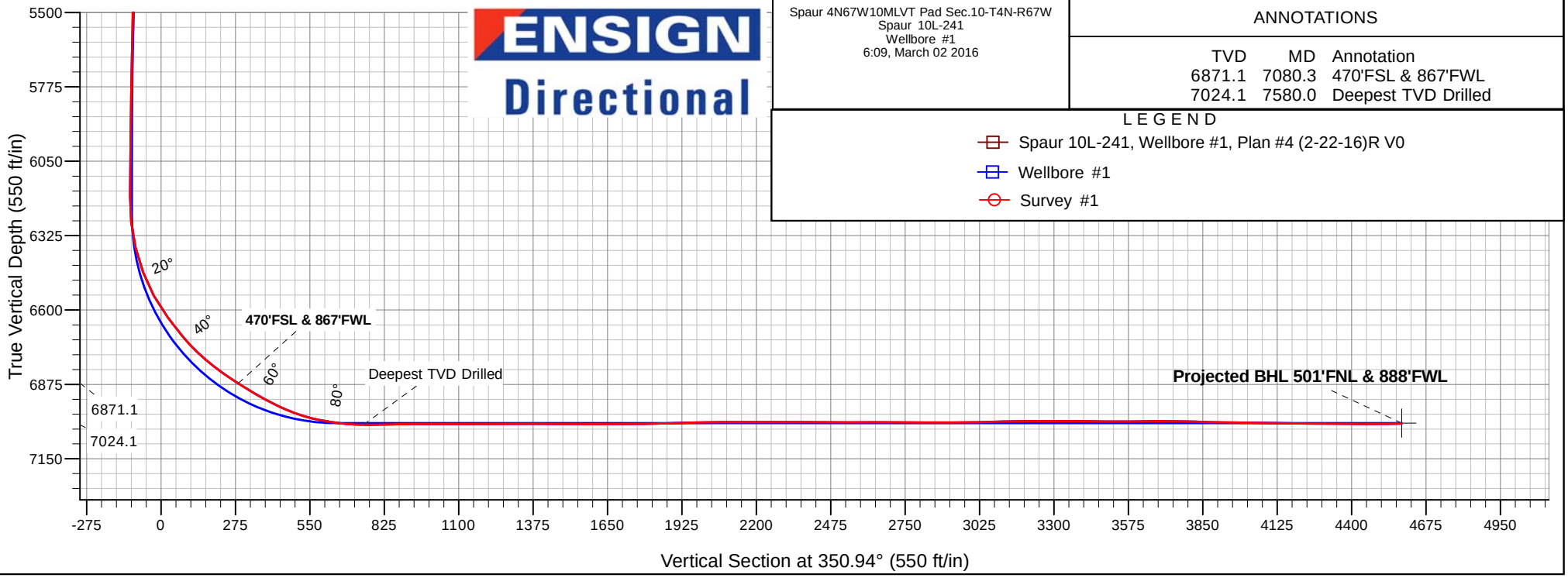
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1360168.93	3172640.73	40.320410	-104.880850	

RKB - 13' WELL @ 4853.0ft (RKB - 13')

FINAL SURVEY

Projected Bottom Hole Location
11466'MD 7020'TVD 4527'N & 723'W of SHL
91.0 degree Incl @ 357.6 degree AZM





Spaur 4N67W10MLVT Pad Sec.10-T4N-R67W
Spaur 10L-241
Wellbore #1
6:09, March 02 2016

ANNOTATIONS

TVD	MD	Annotation
6871.1	7080.3	470'FSL & 867'FWL
7024.1	7580.0	Deepest TVD Drilled

LEGEND

- Spaur 10L-241, Wellbore #1, Plan #4 (2-22-16)R V0
- Wellbore #1
- Survey #1

ENSIGN Directional

PETROLEUM DEVELOPMENT CORP DJ Basin

SEC.10-T4N-R67W
Spaur 4N67W10MLVT Pad Sec.10-T4N-R67W
Spaur 10L-241

Wellbore #1

Survey: Survey #1

Standard Survey Report

02 March, 2016

PDC ENERGY
Growing E&P Value

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Spaur 10L-241
Project:	SEC.10-T4N-R67W	**TVD Reference:**	WELL @ 4853.0ft (RKB - 13')
Site:	Spaur 4N67W10MLVT Pad Sec.10-T4N-R67W	**MD Reference:**	WELL @ 4853.0ft (RKB - 13')
Well:	Spaur 10L-241	**North Reference:**	True
Wellbore:	Wellbore #1	**Survey Calculation Method:**	Minimum Curvature
Design:	Wellbore #1	**Database:**	US_EDM

Project SEC.10-T4N-R67W, Weld County, Colorado

Map System:	US State Plane 1983	**System Datum:**	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

Site Spaur 4N67W10MLVT Pad Sec.10-T4N-R67W

Site Position:		**Northing:**	1,360,227.24 usft	**Latitude:**	40.320570
From:	Lat/Long	**Easting:**	3,172,640.32 usft	**Longitude:**	-104.880850
Position Uncertainty:	0.0 ft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	0.40 °

Well Spaur 10L-241

Well Position	**+N/-S**	0.0 ft	**Northing:**	1,360,168.93 usft	**Latitude:**	40.320410
	+E/-W	0.0 ft	**Easting:**	3,172,640.73 usft	**Longitude:**	-104.880850
Position Uncertainty		0.0 ft	**Wellhead Elevation:**	ft	**Ground Level:**	4,840.0 ft

Wellbore Wellbore #1

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2/22/2016	8.29	66.81	52,584

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	350.94

Survey Program **Date** 3/2/2016

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
167.0	11,466.0	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
1.0	0.01	86.30	1.0	0.0	0.0	0.0	0.66	0.66	0.00
SHL 285'FSL & 1583'FWL - Hardlines - 30' W of BHL									
167.0	1.10	86.30	167.0	0.1	1.6	-0.1	0.66	0.66	0.00
259.0	0.90	93.40	259.0	0.1	3.2	-0.4	0.26	-0.22	7.72
351.0	1.00	98.50	351.0	0.0	4.7	-0.8	0.14	0.11	5.54
443.0	0.90	104.80	443.0	-0.3	6.2	-1.3	0.16	-0.11	6.85
535.0	0.90	97.20	534.9	-0.6	7.6	-1.8	0.13	0.00	-8.26
627.0	0.70	103.20	626.9	-0.8	8.9	-2.2	0.24	-0.22	6.52
719.0	0.60	109.90	718.9	-1.1	9.9	-2.7	0.14	-0.11	7.28
815.0	1.00	214.50	814.9	-2.0	9.9	-3.5	1.34	0.42	108.96

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Spaur 10L-241
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Site:	Spaur 4N67W10MLVT Pad Sec.10-T4N-R67W	**MD Reference:**	WELL @ 4853.0ft (RKB - 13')
Well:	Spaur 10L-241	**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)
912.0	2.60	247.50	911.9	-3.5	7.4	-4.7	1.90	1.65	34.02
1,008.0	3.50	256.50	1,007.7	-5.1	2.5	-5.4	1.06	0.94	9.38
1,104.0	4.40	260.20	1,103.5	-6.4	-4.0	-5.7	0.97	0.94	3.85
1,199.0	5.30	260.00	1,198.2	-7.7	-11.9	-5.8	0.95	0.95	-0.21
1,295.0	5.50	246.80	1,293.7	-10.3	-20.5	-7.0	1.31	0.21	-13.75
1,335.0	5.50	248.80	1,333.6	-11.8	-24.0	-7.8	0.48	0.00	5.00
1,422.0	6.70	248.10	1,420.1	-15.2	-32.6	-9.9	1.38	1.38	-0.80
1,517.0	7.70	250.70	1,514.3	-19.3	-43.8	-12.2	1.11	1.05	2.74
1,613.0	9.40	254.00	1,609.2	-23.6	-57.4	-14.3	1.84	1.77	3.44
1,709.0	8.80	248.80	1,704.0	-28.5	-71.8	-16.8	1.06	-0.63	-5.42
1,805.0	9.80	249.30	1,798.8	-34.0	-86.2	-20.0	1.05	1.04	0.52
1,901.0	9.50	254.20	1,893.4	-39.0	-101.5	-22.6	0.91	-0.31	5.10
1,997.0	9.20	250.90	1,988.1	-43.7	-116.4	-24.8	0.64	-0.31	-3.44
2,093.0	9.40	253.20	2,082.9	-48.5	-131.1	-27.2	0.44	0.21	2.40
2,188.0	9.90	248.90	2,176.5	-53.7	-146.2	-30.0	0.92	0.53	-4.53
2,284.0	9.60	253.20	2,271.2	-59.0	-161.6	-32.8	0.82	-0.31	4.48
2,380.0	8.90	248.60	2,365.9	-64.0	-176.1	-35.4	1.06	-0.73	-4.79
2,475.0	10.80	254.90	2,459.5	-69.0	-191.6	-37.9	2.30	2.00	6.63
2,570.0	11.10	256.10	2,552.8	-73.5	-209.0	-39.7	0.40	0.32	1.26
2,666.0	11.00	254.00	2,647.0	-78.2	-226.8	-41.5	0.43	-0.10	-2.19
2,761.0	9.80	250.70	2,740.4	-83.4	-243.2	-44.1	1.41	-1.26	-3.47
2,857.0	10.50	252.50	2,834.9	-88.7	-259.2	-46.8	0.80	0.73	1.88
2,953.0	10.80	254.20	2,929.3	-93.8	-276.2	-49.2	0.45	0.31	1.77
3,048.0	9.40	250.50	3,022.8	-98.8	-292.1	-51.6	1.62	-1.47	-3.89
3,144.0	9.30	250.20	3,117.5	-104.1	-306.8	-54.5	0.12	-0.10	-0.31
3,240.0	10.10	245.40	3,212.2	-110.2	-321.7	-58.2	1.18	0.83	-5.00
3,335.0	9.70	249.80	3,305.7	-116.4	-336.8	-61.9	0.90	-0.42	4.63
3,431.0	9.40	250.90	3,400.4	-121.8	-351.8	-64.9	0.37	-0.31	1.15
3,527.0	8.80	264.90	3,495.2	-125.0	-366.5	-65.7	2.38	-0.63	14.58
3,623.0	6.90	265.50	3,590.3	-126.1	-379.6	-64.8	1.98	-1.98	0.63
3,719.0	8.50	259.10	3,685.4	-127.9	-392.3	-64.5	1.89	1.67	-6.67
3,815.0	9.90	257.20	3,780.2	-131.1	-407.3	-65.3	1.49	1.46	-1.98
3,911.0	10.10	258.10	3,874.7	-134.6	-423.6	-66.3	0.26	0.21	0.94
4,006.0	8.20	257.90	3,968.5	-137.8	-438.4	-67.0	2.00	-2.00	-0.21
4,102.0	7.70	245.10	4,063.6	-141.9	-450.9	-69.2	1.91	-0.52	-13.33
4,198.0	8.90	254.60	4,158.6	-146.6	-463.9	-71.7	1.89	1.25	9.90
4,294.0	9.40	253.30	4,253.4	-150.8	-478.6	-73.6	0.56	0.52	-1.35
4,390.0	9.90	251.70	4,348.0	-155.7	-493.9	-76.0	0.59	0.52	-1.67
4,486.0	10.10	255.60	4,442.6	-160.4	-509.9	-78.1	0.74	0.21	4.06
4,582.0	8.10	252.30	4,537.4	-164.5	-524.5	-79.9	2.15	-2.08	-3.44
4,678.0	9.10	251.40	4,632.3	-169.0	-538.2	-82.1	1.05	1.04	-0.94
4,773.0	11.70	249.50	4,725.7	-174.8	-554.3	-85.3	2.76	2.74	-2.00
4,869.0	11.20	243.10	4,819.8	-182.4	-571.7	-90.1	1.42	-0.52	-6.67

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Well:	Spaur 10L-241	**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)
4,964.0	9.80	250.90	4,913.2	-189.2	-587.6	-94.3	2.10	-1.47	8.21
5,060.0	10.30	252.10	5,007.7	-194.5	-603.5	-97.1	0.56	0.52	1.25
5,156.0	9.90	260.50	5,102.3	-198.5	-619.8	-98.4	1.59	-0.42	8.75
5,252.0	10.10	255.60	5,196.8	-202.0	-636.1	-99.3	0.91	0.21	-5.10
5,347.0	10.20	254.00	5,290.3	-206.4	-652.2	-101.1	0.31	0.11	-1.68
5,443.0	7.40	255.40	5,385.2	-210.3	-666.4	-102.7	2.92	-2.92	1.46
5,539.0	7.50	255.40	5,480.4	-213.4	-678.4	-103.9	0.10	0.10	0.00
5,635.0	6.90	248.60	5,575.6	-217.1	-689.9	-105.7	1.08	-0.63	-7.08
5,731.0	4.80	248.60	5,671.1	-220.7	-699.0	-107.8	2.19	-2.19	0.00
5,827.0	3.50	241.70	5,766.9	-223.5	-705.3	-109.7	1.45	-1.35	-7.19
5,923.0	2.00	247.20	5,862.7	-225.6	-709.4	-111.0	1.58	-1.56	5.73
6,019.0	1.60	216.20	5,958.7	-227.3	-711.8	-112.4	1.08	-0.42	-32.29
6,114.0	1.00	228.90	6,053.7	-228.9	-713.2	-113.7	0.70	-0.63	13.37
6,239.0	0.50	228.70	6,178.7	-230.0	-714.4	-114.6	0.40	-0.40	-0.16
6,335.0	5.30	352.80	6,274.5	-225.9	-715.3	-110.4	5.83	5.00	129.27
6,431.0	14.10	0.60	6,369.1	-209.7	-715.7	-94.4	9.25	9.17	8.13
6,527.0	20.40	359.00	6,460.7	-181.3	-715.9	-66.3	6.58	6.56	-1.67
6,622.0	28.80	356.00	6,547.0	-141.8	-717.8	-27.0	8.94	8.84	-3.16
6,718.0	37.50	0.90	6,627.3	-89.4	-718.9	24.9	9.48	9.06	5.10
6,814.0	40.00	0.60	6,702.2	-29.3	-718.1	84.1	2.61	2.60	-0.31
6,910.0	48.50	2.30	6,770.9	37.6	-716.4	149.9	8.94	8.85	1.77
7,006.0	55.50	359.90	6,830.0	113.1	-715.0	224.3	7.55	7.29	-2.50
7,080.3	57.22	359.19	6,871.1	175.0	-715.5	285.5	2.45	2.32	-0.95
470'FSL & 867'FWL									
7,101.0	57.70	359.00	6,882.3	192.4	-715.8	302.7	2.45	2.32	-0.93
7,197.0	61.70	357.90	6,930.7	275.3	-718.0	384.9	4.28	4.17	-1.15
7,292.0	67.10	357.90	6,971.7	360.9	-721.2	469.9	5.68	5.68	0.00
7,340.0	72.30	358.30	6,988.4	405.8	-722.7	514.6	10.86	10.83	0.83
7,388.0	77.10	358.40	7,001.0	452.1	-724.0	560.5	10.00	10.00	0.21
7,436.0	80.20	359.00	7,010.5	499.1	-725.0	607.1	6.57	6.46	1.25
7,484.0	82.60	1.10	7,017.6	546.6	-725.0	653.9	6.61	5.00	4.38
7,532.0	86.10	1.80	7,022.4	594.3	-723.8	700.9	7.43	7.29	1.46
7,580.0	89.80	1.60	7,024.1	642.3	-722.4	748.0	7.72	7.71	-0.42
Deepest TVD Drilled									
7,675.0	91.50	2.30	7,023.0	737.2	-719.1	841.3	1.94	1.79	0.74
7,771.0	90.20	1.60	7,021.6	833.1	-715.9	935.5	1.54	-1.35	-0.73
7,867.0	89.90	0.00	7,021.5	929.1	-714.5	1,030.1	1.70	-0.31	-1.67
7,962.0	89.80	357.70	7,021.8	1,024.1	-716.4	1,124.1	2.42	-0.11	-2.42
8,058.0	90.20	358.30	7,021.8	1,120.0	-719.8	1,219.4	0.75	0.42	0.63
8,154.0	90.50	0.00	7,021.2	1,216.0	-721.2	1,314.4	1.80	0.31	1.77
8,250.0	89.70	0.90	7,021.0	1,312.0	-720.5	1,409.1	1.25	-0.83	0.94
8,346.0	89.50	359.70	7,021.7	1,408.0	-720.0	1,503.8	1.27	-0.21	-1.25
8,442.0	90.10	0.40	7,022.0	1,504.0	-719.9	1,598.6	0.96	0.63	0.73
8,538.0	90.20	359.90	7,021.8	1,600.0	-719.6	1,693.4	0.53	0.10	-0.52

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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)
8,634.0	90.60	359.30	7,021.1	1,696.0	-720.3	1,788.3	0.75	0.42	-0.63
8,730.0	91.80	0.70	7,019.1	1,792.0	-720.3	1,883.1	1.92	1.25	1.46
8,826.0	91.50	1.30	7,016.3	1,887.9	-718.6	1,977.5	0.70	-0.31	0.63
8,922.0	90.70	1.40	7,014.5	1,983.9	-716.4	2,071.9	0.84	-0.83	0.10
9,018.0	89.60	0.40	7,014.2	2,079.9	-714.9	2,166.5	1.55	-1.15	-1.04
9,114.0	90.30	0.20	7,014.3	2,175.9	-714.3	2,261.2	0.76	0.73	-0.21
9,210.0	89.60	359.90	7,014.4	2,271.9	-714.3	2,356.0	0.79	-0.73	-0.31
9,306.0	89.50	359.00	7,015.1	2,367.9	-715.2	2,450.9	0.94	-0.10	-0.94
9,402.0	90.30	0.00	7,015.3	2,463.9	-716.0	2,545.9	1.33	0.83	1.04
9,498.0	90.00	0.40	7,015.0	2,559.9	-715.7	2,640.6	0.52	-0.31	0.42
9,593.0	89.30	0.20	7,015.6	2,654.8	-715.2	2,734.3	0.77	-0.74	-0.21
9,689.0	90.20	359.70	7,016.0	2,750.8	-715.3	2,829.2	1.07	0.94	-0.52
9,785.0	89.90	0.40	7,016.0	2,846.8	-715.2	2,923.9	0.79	-0.31	0.73
9,881.0	91.60	0.00	7,014.7	2,942.8	-714.9	3,018.7	1.82	1.77	-0.42
9,976.0	91.50	359.90	7,012.1	3,037.8	-714.9	3,112.5	0.15	-0.11	-0.11
10,072.0	89.60	0.20	7,011.2	3,133.8	-714.9	3,207.3	2.00	-1.98	0.31
10,168.0	90.40	0.40	7,011.2	3,229.8	-714.4	3,302.0	0.86	0.83	0.21
10,264.0	89.60	0.60	7,011.2	3,325.8	-713.5	3,396.6	0.86	-0.83	0.21
10,360.0	88.90	1.30	7,012.5	3,421.8	-711.9	3,491.2	1.03	-0.73	0.73
10,456.0	91.40	0.90	7,012.2	3,517.7	-710.1	3,585.7	2.64	2.60	-0.42
10,552.0	90.00	0.60	7,011.0	3,613.7	-708.8	3,680.2	1.49	-1.46	-0.31
10,648.0	89.10	0.20	7,011.8	3,709.7	-708.2	3,774.9	1.03	-0.94	-0.42
10,744.0	88.00	359.70	7,014.2	3,805.7	-708.2	3,869.7	1.26	-1.15	-0.52
10,840.0	89.90	359.10	7,016.0	3,901.7	-709.2	3,964.7	2.08	1.98	-0.63
10,936.0	89.00	359.50	7,016.9	3,997.6	-710.4	4,059.6	1.03	-0.94	0.42
11,031.0	89.00	359.30	7,018.6	4,092.6	-711.4	4,153.6	0.21	0.00	-0.21
11,127.0	89.70	359.00	7,019.7	4,188.6	-712.8	4,248.6	0.79	0.73	-0.31
11,223.0	89.00	359.00	7,020.7	4,284.6	-714.5	4,343.6	0.73	-0.73	0.00
11,319.0	89.90	358.10	7,021.7	4,380.5	-716.9	4,438.8	1.33	0.94	-0.94
11,421.0	91.00	357.60	7,020.9	4,482.5	-720.8	4,540.0	1.18	1.08	-0.49
11,466.0	91.00	357.60	7,020.1	4,527.4	-722.6	4,584.7	0.00	0.00	0.00
BHL 500'FNL & 889'FWL									

Company:	PETROLEUM DEVELOPMENT CORP DJ Basin	**Local Co-ordinate Reference:**	Well Spaur 10L-241
Project:	SEC.10-T4N-R67W	**TVD Reference:**	WELL @ 4853.0ft (RKB - 13')
Site:	Spaur 4N67W10MLVT Pad Sec.10-T4N-R67W	**MD Reference:**	WELL @ 4853.0ft (RKB - 13')
Well:	Spaur 10L-241	**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 285'FSL & 1583'FW - survey hits target center - Point	0.00	0.00	1.0	0.0	0.0	1,360,168.96	3,172,640.73	40.320410	-104.880850
Hardlines - 30' W of BHL - survey misses target center by 4590.4ft at 1.0ft MD (1.0 TVD, 0.0 N, 0.0 E) - Polygon	0.00	0.00	1.0	4,528.4	-752.1	1,364,691.78	3,171,857.07	40.332840	-104.883548
Point 1			1.0	0.0	0.0	1,364,691.78	3,171,857.06		
Point 2			1.0	-4,800.0	0.0	1,359,892.11	3,171,890.58		
BHL 500'FNL & 889'FWL - survey misses target center by 2.4ft at 11466.0ft MD (7020.1 TVD, 4527.4 N, -722.6 E) - Point	0.00	0.00	7,018.0	4,528.4	-722.1	1,364,691.96	3,171,887.07	40.332840	-104.883440

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
7,080.3	6,871.1	175.0	-715.5	470'FSL & 867'FWL
7,580.0	7,024.1	642.3	-722.4	Deepest TVD Drilled

Checked By: _____ Approved By: _____ Date: _____