



Energen Resources

Carson National Forest-S28, T32N, R4W

Carracas Mesa

Carracas 28 B #2 30-034-30168

Final Design

RCVD AUG 29 '07

OIL CONS. DIV.

DIST. 3

Survey: Survey #1

End of Well Survey

21 August, 2007

Surface: 1730/N 780/W Sect. 27 32N 4W
Lateral origin 2188 /N 686 /E } Sect 28 32N 4W
Lateral B.H. 2551 /N 1873 /E }

Origin MD 4872
TVd 4079

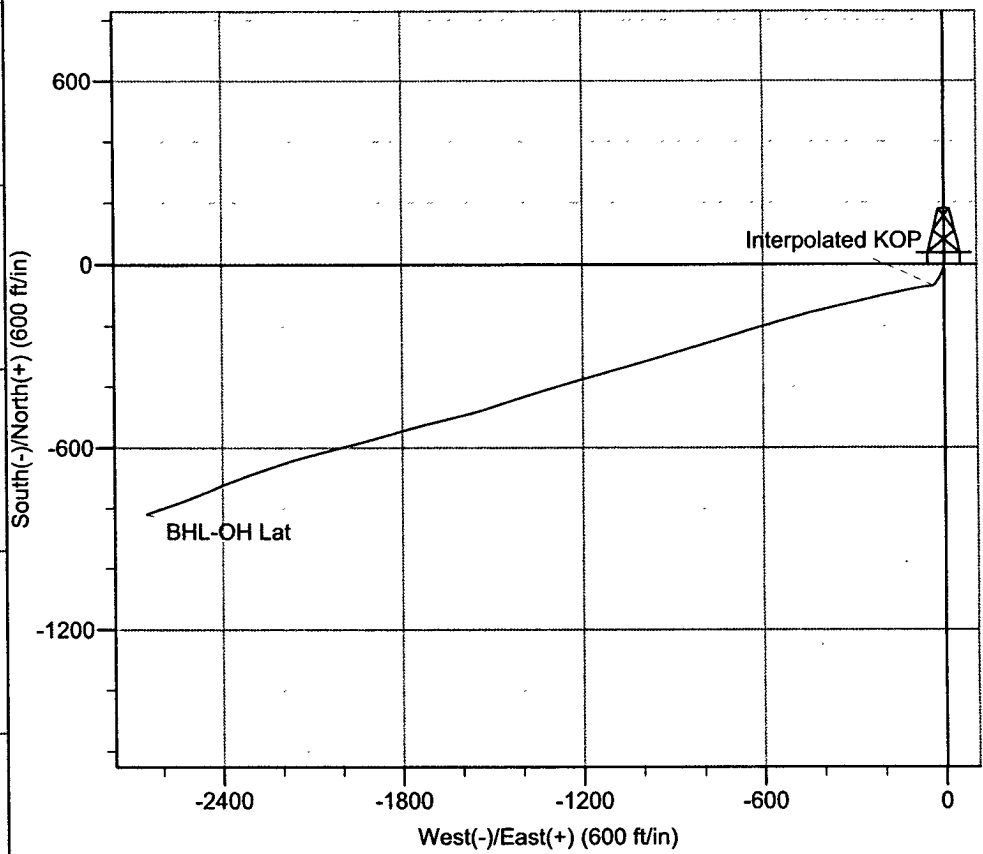
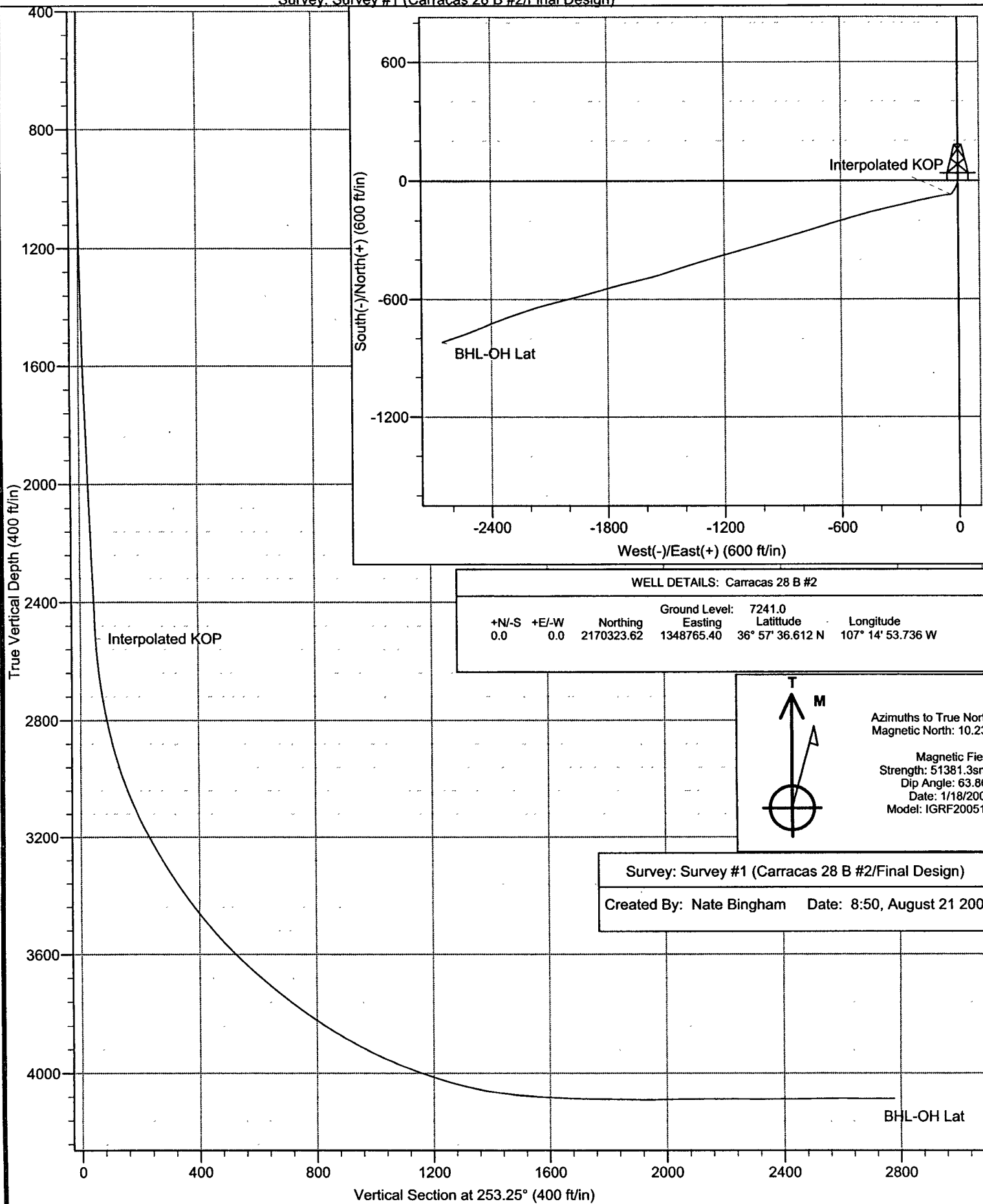
BH MD 6115
TVd 4087

↓
File 'As Drilled' plat
↑

PATHFINDER
ENERGY SERVICES

8

Survey: Survey #1 (Carracas 28 B #2/Final Design)



WELL DETAILS: Carracas 28 B #2

+N/-S	+E/-W	Northing	Ground Level: 7241.0	Easting	Latitude	Longitude
0.0	0.0	2170323.62		1348765.40	36° 57' 36.612 N	107° 14' 53.736 W



Azimuths to True North
Magnetic North: 10.23°

Magnetic Field
Strength: 51381.3snT
Dip Angle: 63.86°
Date: 1/18/2007
Model: IGRF200510

Survey: Survey #1 (Carracas 28 B #2/Final Design)

Created By: Nate Bingham Date: 8:50, August 21 2007

Company:	Energen Resources	Local Co-ordinate Reference:	Well Carracas 28 B #2
Project:	Carson National Forest-S28, T32N, R4W	TVD Reference:	KB @ 7256.0ft (Patterson 741)
Site:	Carracas Mesa	MD Reference:	KB @ 7256.0ft (Patterson 741)
Well:	Carracas 28 B #2	North Reference:	True
Wellbore:	Final Design	Survey Calculation Method:	Minimum Curvature
Design:	Final Design	Database:	EDM 2003.16 Single User Db

Project	Carson National Forest-S28, T32N, R4W		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Central Zone		

Site	Carracas Mesa		
Site Position:		Northing:	2,170,323.62 ft
From:	Lat/Long	Easting:	1,348,765.40 ft
Position Uncertainty:	0.0 ft	Slot Radius:	"
		Latitude:	36° 57' 36.612 N
		Longitude:	107° 14' 53.736 W
		Grid Convergence:	-0.60

Well	Carracas 28 B #2		
Well Position	+N/-S 0.0 ft	Northing:	2,170,323.62 ft
	+E/-W 0.0 ft	Easting:	1,348,765.40 ft
Position Uncertainty	0.0 ft	Wellhead Elevation:	7,241.0 ft
		Ground Level:	7,241.0 ft

Wellbore	Final Design				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	1/18/2007	10.23	63.86	51,381

Design	Final Design				
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	253.25	

Survey Program	Date 8/21/2007				
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
336.0	6,115.0	Survey #1 (Final Design)	Pathfinder	Pathfinder MWD	

Survey							
MD (ft)	Inc (°)	Azi (°)	TVD (ft)	N/S (ft)	E/W (ft)	DLeg (°/100ft)	V. Sec (ft)
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.0
336.0	0.18	84.40	336.0	0.1	0.5	0.05	-0.5
765.0	0.97	173.44	765.0	-3.5	1.6	0.23	-0.5
1,204.0	1.93	201.04	1,203.8	-14.1	-0.6	0.26	4.7
1,580.0	2.90	204.17	1,579.5	-28.7	-6.8	0.26	14.8
2,014.0	3.34	209.95	2,012.9	-49.6	-17.6	0.12	31.2
2,408.0	2.64	223.66	2,406.3	-66.1	-29.6	0.25	47.4
2,439.0	2.73	224.93	2,437.3	-67.2	-30.6	0.35	48.7
2,469.0	2.73	226.00	2,467.2	-68.2	-31.6	0.17	49.9
2,498.0	3.08	229.43	2,496.2	-69.2	-32.7	1.35	51.3
2,525.0	2.83	238.37	2,523.2	-70.0	-33.8	1.94	52.6
Interpolated KOP							

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Wellbore: Final Design
Design: Final Design

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North Reference: True
Survey Calculation Method: Minimum Curvature
Database: EDM 2003.16 Single User Db

Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	N/S (ft)	E/W (ft)	DLeg (°/100ft)	V. Sec (ft)
2,529.0	3.52	239.52	2,527.2	-70.1	-34.0	17.34	52.8
2,558.0	4.22	252.41	2,556.1	-70.9	-35.8	3.84	54.7
2,589.0	5.10	260.71	2,587.0	-71.5	-38.2	3.57	57.2
2,620.0	6.42	266.37	2,617.8	-71.8	-41.3	4.63	60.3
2,650.0	7.47	267.84	2,647.6	-72.0	-45.0	3.55	63.8
2,679.0	8.35	265.34	2,676.3	-72.2	-48.9	3.26	67.7
2,710.0	9.32	263.83	2,707.0	-72.7	-53.7	3.22	72.3
2,739.0	10.29	264.78	2,735.6	-73.1	-58.6	3.39	77.2
2,769.0	11.08	264.43	2,765.0	-73.7	-64.1	2.64	82.6
2,800.0	11.78	261.72	2,795.4	-74.4	-70.2	2.85	88.7
2,829.0	12.57	259.09	2,823.8	-75.4	-76.3	3.33	94.8
2,860.0	13.54	258.39	2,854.0	-76.8	-83.1	3.17	101.7
2,890.0	14.68	257.72	2,883.1	-78.3	-90.3	3.84	109.0
2,920.0	15.74	258.76	2,912.0	-79.9	-98.0	3.65	116.9
2,950.0	16.88	259.44	2,940.8	-81.5	-106.3	3.85	125.2
2,980.0	17.67	258.76	2,969.4	-83.2	-115.0	2.72	134.1
3,011.0	18.91	257.86	2,998.9	-85.2	-124.5	4.10	143.8
3,040.0	20.31	258.24	3,026.2	-87.2	-134.1	4.85	153.5
3,071.0	21.54	257.88	3,055.2	-89.5	-144.9	3.99	164.5
3,101.0	22.86	257.98	3,082.9	-91.9	-156.0	4.40	175.8
3,131.0	24.09	258.96	3,110.4	-94.2	-167.7	4.30	187.7
3,161.0	25.15	259.01	3,137.7	-96.6	-179.9	3.53	200.2
3,192.0	26.20	257.44	3,165.7	-99.4	-193.1	4.04	213.5
3,221.0	27.26	257.03	3,191.6	-102.3	-205.8	3.71	226.6
3,252.0	28.14	256.93	3,219.0	-105.5	-219.9	2.84	240.9
3,282.0	29.28	256.03	3,245.3	-108.9	-233.9	4.06	255.3
3,313.0	30.34	256.71	3,272.2	-112.5	-248.8	3.59	270.7
3,343.0	31.30	256.69	3,298.0	-116.0	-263.8	3.20	286.0
3,374.0	32.36	256.48	3,324.3	-119.8	-279.7	3.44	302.4
3,405.0	33.77	257.02	3,350.3	-123.7	-296.2	4.65	319.3
3,436.0	34.73	256.61	3,375.9	-127.7	-313.2	3.18	336.7
3,467.0	35.61	256.35	3,401.3	-131.9	-330.5	2.88	354.5
3,498.0	36.76	257.41	3,426.3	-136.0	-348.3	4.22	372.8
3,529.0	37.81	256.88	3,450.9	-140.2	-366.6	3.54	391.5
3,561.0	38.87	256.53	3,476.0	-144.8	-386.0	3.38	411.3
3,592.0	40.10	256.35	3,500.0	-149.4	-405.1	3.98	431.0
3,622.0	41.42	256.88	3,522.7	-153.9	-424.2	4.55	450.5
3,653.0	42.65	256.53	3,545.7	-158.7	-444.4	4.04	471.3
3,683.0	43.88	256.00	3,567.6	-163.6	-464.4	4.28	491.8
3,714.0	45.20	254.59	3,589.7	-169.1	-485.4	5.32	513.5
3,746.0	46.52	254.77	3,611.9	-175.2	-507.5	4.14	536.5
3,777.0	47.66	254.24	3,633.0	-181.2	-529.4	3.88	559.2
3,808.0	48.36	254.15	3,653.8	-187.5	-551.6	2.27	582.2
3,840.0	48.89	253.90	3,674.9	-194.1	-574.7	1.76	606.2

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Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	N/S (ft)	E/W (ft)	DLeg (°/100ft)	V. Sec (ft)
3,871.0	49.77	254.15	3,695.1	-200.6	-597.3	2.90	629.7
3,902.0	50.83	254.15	3,714.9	-207.1	-620.2	3.42	653.6
3,934.0	51.97	253.98	3,734.9	-214.0	-644.3	3.59	678.6
3,965.0	52.94	253.36	3,753.8	-220.9	-667.8	3.51	703.2
3,997.0	54.08	253.54	3,772.8	-228.2	-692.5	3.59	728.9
4,029.0	54.87	253.10	3,791.4	-235.7	-717.5	2.71	754.9
4,060.0	55.66	253.01	3,809.1	-243.1	-741.8	2.56	780.4
4,091.0	56.63	252.75	3,826.3	-250.7	-766.4	3.21	806.2
4,122.0	58.30	252.57	3,843.0	-258.5	-791.4	5.41	832.3
4,154.0	59.18	253.10	3,859.6	-266.5	-817.5	3.09	859.6
4,184.0	60.06	253.56	3,874.8	-274.0	-842.3	3.22	885.5
4,216.0	60.94	253.63	3,890.6	-281.8	-869.0	2.76	913.4
4,247.0	61.91	253.89	3,905.4	-289.4	-895.2	3.21	940.6
4,278.0	62.87	253.82	3,919.8	-297.1	-921.5	3.10	968.1
4,309.0	64.19	253.80	3,933.6	-304.8	-948.2	4.26	995.8
4,341.0	65.60	253.77	3,947.1	-312.9	-976.0	4.41	1,024.8
4,373.0	67.09	254.00	3,960.0	-321.0	-1,004.2	4.70	1,054.1
4,404.0	68.15	253.88	3,971.8	-329.0	-1,031.7	3.44	1,082.8
4,435.0	68.94	254.02	3,983.1	-337.0	-1,059.4	2.58	1,111.6
4,466.0	70.26	254.23	3,993.9	-344.9	-1,087.4	4.31	1,140.7
4,498.0	71.23	254.19	4,004.5	-353.1	-1,116.5	3.03	1,170.9
4,529.0	72.28	254.29	4,014.2	-361.1	-1,144.8	3.40	1,200.3
4,560.0	72.98	253.91	4,023.4	-369.2	-1,173.3	2.54	1,229.9
4,592.0	74.04	254.33	4,032.5	-377.6	-1,202.8	3.54	1,260.6
4,623.0	75.01	254.06	4,040.8	-385.8	-1,231.5	3.24	1,290.4
4,654.0	76.68	253.62	4,048.4	-394.1	-1,260.4	5.56	1,320.5
4,685.0	78.44	253.37	4,055.1	-402.7	-1,289.4	5.73	1,350.8
4,716.0	80.46	252.94	4,060.7	-411.6	-1,318.6	6.66	1,381.2
4,748.0	81.60	252.71	4,065.7	-420.9	-1,348.8	3.63	1,412.8
4,779.0	82.83	252.90	4,069.9	-430.0	-1,378.1	4.01	1,443.6
4,811.0	83.80	252.59	4,073.6	-439.4	-1,408.5	3.18	1,475.3
4,835.0	84.62	252.20	4,076.1	-446.6	-1,431.2	3.78	1,499.2
4,842.0	84.86	252.09	4,076.7	-448.8	-1,437.9	3.77	1,506.2
4,872.0	85.82	252.04	4,079.1	-458.0	-1,466.3	3.20	1,536.1
4,903.0	86.53	251.87	4,081.2	-467.5	-1,495.7	2.35	1,567.0
4,934.0	86.85	253.11	4,083.0	-476.9	-1,525.2	4.12	1,597.9
4,969.0	87.21	254.66	4,084.8	-486.6	-1,558.8	4.54	1,632.9
5,013.0	87.67	256.61	4,086.8	-497.5	-1,601.4	4.55	1,676.8
5,045.0	88.46	256.26	4,087.9	-505.0	-1,632.5	2.70	1,708.7
5,076.0	88.99	256.41	4,088.6	-512.3	-1,662.6	1.78	1,739.7
5,108.0	89.43	256.26	4,089.0	-519.8	-1,693.7	1.45	1,771.6
5,138.0	89.60	255.82	4,089.2	-527.1	-1,722.8	1.57	1,801.6
5,169.0	88.90	255.47	4,089.7	-534.8	-1,752.8	2.52	1,832.6
5,201.0	88.64	255.41	4,090.3	-542.8	-1,783.8	0.83	1,864.5
5,232.0	88.90	254.78	4,091.0	-550.8	-1,813.7	2.20	1,895.5

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Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	N/S (ft)	E/W (ft)	DLeg (°/100ft)	V. Sec (ft)
5,263.0	90.04	253.92	4,091.3	-559.1	-1,843.6	4.61	1,926.5
5,295.0	91.19	255.25	4,090.9	-567.6	-1,874.4	5.49	1,958.5
5,326.0	91.01	254.33	4,090.4	-575.8	-1,904.3	3.02	1,989.5
5,357.0	90.92	254.98	4,089.8	-584.0	-1,934.2	2.12	2,020.5
5,389.0	90.84	255.97	4,089.3	-592.0	-1,965.2	3.10	2,052.4
5,419.0	90.40	255.26	4,089.0	-599.5	-1,994.3	2.78	2,082.4
5,450.0	90.40	255.36	4,088.8	-607.3	-2,024.2	0.32	2,113.4
5,481.0	90.04	256.49	4,088.7	-614.9	-2,054.3	3.83	2,144.3
5,511.0	89.96	256.12	4,088.7	-622.0	-2,083.5	1.26	2,174.3
5,542.0	89.69	254.81	4,088.8	-629.7	-2,113.5	4.31	2,205.3
5,604.0	89.87	252.82	4,089.0	-647.0	-2,173.0	3.22	2,267.3
5,634.0	89.69	252.28	4,089.1	-656.0	-2,201.6	1.90	2,297.3
5,666.0	90.92	251.22	4,089.0	-666.0	-2,232.0	5.07	2,329.3
5,698.0	90.57	251.37	4,088.5	-676.3	-2,262.3	1.19	2,361.2
5,729.0	90.04	251.42	4,088.4	-686.2	-2,291.7	1.72	2,392.2
5,760.0	90.40	250.55	4,088.3	-696.3	-2,321.0	3.04	2,423.2
5,792.0	90.22	248.82	4,088.1	-707.4	-2,351.0	5.44	2,455.1
5,823.0	91.01	248.75	4,087.8	-718.6	-2,379.9	2.56	2,486.0
5,854.0	90.84	247.46	4,087.3	-730.2	-2,408.7	4.20	2,516.9
5,885.0	90.84	247.75	4,086.8	-742.0	-2,437.3	0.94	2,547.8
5,913.0	90.48	247.58	4,086.5	-752.6	-2,463.2	1.42	2,575.6
5,944.0	89.96	247.99	4,086.4	-764.3	-2,491.9	2.14	2,606.5
5,976.0	88.90	249.59	4,086.7	-775.9	-2,521.8	6.00	2,638.4
6,007.0	89.34	250.72	4,087.1	-786.4	-2,550.9	3.91	2,669.3
6,045.0	90.04	250.96	4,087.4	-798.9	-2,586.8	1.95	2,707.3
6,115.0	90.04	250.96	4,087.3	-821.7	-2,653.0	0.00	2,777.2

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Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Drill Window - survey hits target - Rectangle (sides W1,970.0 H1,320.0 D0.0)	0.00	0.35	0.0	0.0	0.0	2,170,323.62	1,348,765.40	36° 57' 36.612 N	107° 14' 53.736 W
KOP - survey misses by 77.8ft at 2523.3ft MD (2521.5 TVD, -70.0 N, -33.8 E) - Point	0.00	0.35	2,525.0	0.0	0.0	2,170,323.62	1,348,765.40	36° 57' 36.612 N	107° 14' 53.736 W
Build Curve - survey misses by 23.0ft at 4623.7ft MD (4041.0 TVD, -385.9 N, -1232.2 E) - Point	0.00	0.35	4,058.3	-370.8	-1,232.0	2,169,965.75	1,347,529.58	36° 57' 32.945 N	107° 15' 8.915 W
TD Lateral - survey misses by 24.2ft at 6114.7ft MD (4087.3 TVD, -821.7 N, -2652.7 E) - Point	0.00	0.35	4,095.0	-800.0	-2,660.2	2,169,551.54	1,346,096.96	36° 57' 28.701 N	107° 15' 26.511 W
Land Curve - survey misses by 15.0ft at 5043.3ft MD (4087.8 TVD, -504.6 N, -1630.8 E) - Point	0.00	0.35	4,095.0	-491.7	-1,633.7	2,169,849.07	1,347,126.63	36° 57' 31.750 N	107° 15' 13.864 W

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	+E/-W (ft)	Comment
2,525.0	2,523.2	-70.0	-33.8	Interpolated KOP
6,115.0	4,087.3	-446.6	-1,431.2	Straight Line Projection to Bit

Checked By: _____ Approved By: _____ Date: _____