



HOBBS OCD

JAN 02 2018

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Lea Unit No. 59H

Lea County, NM

June 13, 2017

Job No. LNM5137919

Survey Completion Report



PRODIRECTIONAL

Survey Certification Letter

June 13, 2017



Operator Name: Legacy
Well Name: Reserves Lea
County/Parish: Unit No. 59H
State: Lea County, NM
Rig Name: McVay 4
Job Number: LNM5137919

This is to certify the surveys performed on the referenced well by Professional Directional Ent., Inc. are true and correct MWD Surveys, data provided as follows:

<u>Surveyor</u>	<u>Surveyed Depths</u>	<u>Projection to Bit</u>	<u>Dates Performed</u>	<u>Type of Survey</u>
ProDirectional	199' MD – 18,743' MD	18,800' MD	04/17/17 – 05/13/17	MWD-OWSG

Sincerely,

Mike Coats
Well Planning
Professional Directional

850 Conroe Park West Drive | Conroe, TX 77303 | Phone: 936.441.7266

prodirectional.com



Legacy Reserves

Lea County, NM

Lea Unit

No. 59H

OH

Survey: ProDirectional

Survey Report

13 June, 2017



Company:	Legacy Reserves	Local Co-ordinate Reference:	Well 59H
Project:	Lea County, NM (NAD27)	TVD Reference:	GL 3676'+KB 18' @ 3694.00usft (McVay 4)
Site:	Lea Unit	MD Reference:	GL 3676'+KB 18' @ 3694.00usft (McVay 4)
Well:	59H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	MWD	Database:	WellPlanner1

Project	Lea County, NM (NAD27)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Lea Unit		
Site Position:		Northing:	567,540.50 usft
From:	Map	Easting:	757,874.60 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 33' 26.964 N
		Longitude:	103° 29' 46.949 W
		Grid Convergence:	0.45 °

Well	59H		
Well Position	+N/-S	0.00 usft	Northing:
	+E/-W	0.00 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 33' 26.944 N
		Longitude:	103° 30' 9.147 W
		Ground Level:	3,676.00 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination (°)
	HDGM	4/17/2017	6.75
			Dip Angle (°)
			60.57
			Field Strength (nT)
			48,319.20

Design	MWD		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)
	0.00	0.00	0.00
			Direction (°)
			0.20

Survey Program	Date 5/14/2017		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
199.00	18,800.00	Surveys (OH)	MWD - OWSG
			Description
			MWD - OWSG



ProDirectional Survey Report



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Project: Lea County, NM (NAD27)
Site: Lea Unit
Well: 59H
Wellbore: OH
Design: MWD

Local Co-ordinate Reference: Well 59H
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MD Reference: GL 3676'+KB 18' @ 3694.00usft (McVay 4)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: WellPlanner1

Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	567,523.60	755,974.70	
199.00	0.60	343.60	199.00	1.00	1.00	-0.29	1.04	343.60	567,524.60	755,974.41	
Pro MWD First Survey: 199' MD											
385.00	0.40	320.30	384.99	2.43	2.43	-0.98	2.62	337.99	567,526.03	755,973.72	
476.00	0.30	274.20	475.99	2.69	2.70	-1.42	3.05	332.14	567,526.30	755,973.28	
658.00	0.40	279.90	657.98	2.83	2.84	-2.53	3.80	318.35	567,526.44	755,972.17	
748.00	0.30	252.50	747.98	2.81	2.82	-3.06	4.16	312.69	567,526.42	755,971.64	
838.00	0.50	277.50	837.98	2.79	2.80	-3.67	4.62	307.34	567,526.40	755,971.03	
929.00	0.40	290.20	928.98	2.95	2.96	-4.37	5.28	304.18	567,526.56	755,970.33	
1,020.00	0.20	352.40	1,019.98	3.22	3.23	-4.68	5.69	304.60	567,526.83	755,970.02	
1,110.00	0.60	313.30	1,109.97	3.69	3.71	-5.05	6.27	306.32	567,527.31	755,969.65	
1,201.00	0.40	312.90	1,200.97	4.23	4.25	-5.63	7.05	307.08	567,527.85	755,969.07	
1,293.00	0.40	336.60	1,292.97	4.75	4.77	-5.99	7.66	308.51	567,528.37	755,968.71	
1,384.00	0.30	328.40	1,383.97	5.24	5.26	-6.24	8.16	310.13	567,528.86	755,968.46	
1,478.00	0.30	321.30	1,477.97	5.64	5.66	-6.52	8.64	310.96	567,529.26	755,968.18	
1,573.00	0.40	307.00	1,572.96	6.03	6.06	-6.94	9.21	311.09	567,529.66	755,967.76	
1,667.00	0.40	292.90	1,666.96	6.36	6.38	-7.51	9.85	310.36	567,529.98	755,967.19	
1,761.00	0.40	274.10	1,760.96	6.50	6.53	-8.14	10.44	308.75	567,530.13	755,966.56	
1,951.00	0.30	258.70	1,950.96	6.45	6.48	-9.29	11.33	304.91	567,530.08	755,965.41	
2,045.00	0.30	79.20	2,044.96	6.45	6.48	-9.29	11.32	304.91	567,530.08	755,965.41	
2,139.00	0.40	56.90	2,138.95	6.68	6.71	-8.77	11.04	307.40	567,530.31	755,965.93	
2,233.00	0.20	61.00	2,232.95	6.94	6.96	-8.35	10.88	309.82	567,530.56	755,966.35	
2,327.00	0.30	16.80	2,326.95	7.25	7.28	-8.14	10.92	311.81	567,530.88	755,966.56	
2,516.00	0.20	355.20	2,515.95	8.05	8.08	-8.02	11.39	315.21	567,531.68	755,966.68	
2,705.00	0.30	348.20	2,704.95	8.87	8.90	-8.15	12.07	317.50	567,532.50	755,966.55	
2,893.00	0.20	112.60	2,892.95	9.22	9.25	-7.95	12.20	319.33	567,532.85	755,966.75	
3,083.00	1.10	63.10	3,082.93	9.93	9.95	-6.02	11.63	328.84	567,533.55	755,968.68	



ProDirectional
Survey Report



Company: Legacy Reserves
Project: Lea County, NM (NAD27)
Site: Lea Unit
Well: 59H
Wellbore: OH
Design: MWD

Local Co-ordinate Reference: Well 59H
TVD Reference: GL 3676'+KB 18' @ 3694.00usft (McVay 4)
MD Reference: GL 3676'+KB 18' @ 3694.00usft (McVay 4)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: WellPlanner1

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)
3,271.00	1.50	54.90	3,270.89	12.17	12.18	-2.39	12.41	348.88	567,535.78	755,972.31
3,366.00	1.50	48.90	3,365.85	13.71	13.71	-0.44	13.72	358.16	567,537.31	755,974.26
3,460.00	1.50	51.90	3,459.82	15.29	15.28	1.46	15.35	5.44	567,538.88	755,976.16
3,555.00	1.70	46.30	3,554.78	17.03	17.02	3.45	17.37	11.47	567,540.62	755,978.15
3,649.00	1.90	47.10	3,648.74	19.06	19.05	5.60	19.85	16.39	567,542.65	755,980.30
3,743.00	2.10	44.40	3,742.68	21.36	21.34	7.95	22.77	20.43	567,544.94	755,982.65
3,838.00	2.20	37.30	3,837.61	24.07	24.03	10.27	26.13	23.14	567,547.63	755,984.97
3,932.00	2.60	39.10	3,931.53	27.16	27.12	12.71	29.95	25.11	567,550.72	755,987.41
4,121.00	2.70	38.30	4,120.33	34.00	33.94	18.17	38.50	28.17	567,557.54	755,992.87
4,215.00	2.70	41.80	4,214.22	37.40	37.33	21.02	42.84	29.38	567,560.93	755,995.72
4,309.00	3.00	38.40	4,308.11	40.99	40.91	24.02	47.44	30.43	567,564.51	755,998.72
4,404.00	3.10	37.90	4,402.97	44.98	44.88	27.15	52.45	31.17	567,568.48	756,001.85
4,498.00	2.70	41.20	4,496.85	48.66	48.55	30.17	57.16	31.85	567,572.15	756,004.87
4,592.00	2.70	46.60	4,590.75	51.86	51.74	33.23	61.49	32.71	567,575.34	756,007.93
4,687.00	3.00	34.30	4,685.63	55.46	55.33	36.26	66.15	33.24	567,578.93	756,010.96
4,781.00	3.40	31.40	4,779.48	59.88	59.74	39.10	71.40	33.20	567,583.34	756,013.80
4,876.00	3.30	43.80	4,874.32	64.27	64.12	42.46	76.90	33.51	567,587.72	756,017.16
5,064.00	3.10	41.00	5,062.03	72.04	71.86	49.54	87.28	34.58	567,595.46	756,024.24
5,159.00	3.20	41.00	5,156.89	75.99	75.80	52.96	92.47	34.94	567,599.40	756,027.66
5,253.00	3.20	39.70	5,250.74	80.00	79.80	56.36	97.70	35.23	567,603.40	756,031.06
5,347.00	3.30	41.50	5,344.59	84.05	83.85	59.83	103.00	35.51	567,607.45	756,034.53
5,441.00	3.30	46.70	5,438.43	87.95	87.73	63.59	108.35	35.94	567,611.33	756,038.29
5,536.00	3.30	45.60	5,533.28	91.75	91.52	67.53	113.74	36.43	567,615.12	756,042.23
5,660.00	2.60	59.10	5,657.11	95.71	95.46	72.50	119.87	37.22	567,619.06	756,047.20
5,754.00	2.30	56.70	5,751.03	97.85	97.59	75.90	123.63	37.88	567,621.19	756,050.60
5,849.00	1.50	33.60	5,845.97	99.94	99.67	78.18	126.68	38.11	567,623.27	756,052.88
5,943.00	2.50	5.10	5,939.92	103.01	102.74	79.05	129.63	37.58	567,626.34	756,053.75

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Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)	
6,038.00	2.40	309.50	6,034.84	106.34	106.07	77.70	131.48	36.22	567,629.67	756,052.40	
6,133.00	4.30	280.20	6,129.68	108.22	107.96	72.66	130.13	33.94	567,631.56	756,047.36	
6,227.00	6.90	272.90	6,223.23	109.09	108.87	63.55	126.06	30.27	567,632.47	756,038.25	
6,322.00	7.50	272.30	6,317.48	109.59	109.41	51.65	120.99	25.27	567,633.01	756,026.35	
6,417.00	7.40	273.00	6,411.68	110.12	109.98	39.35	116.81	19.69	567,633.58	756,014.05	
6,511.00	7.30	272.40	6,504.90	110.64	110.55	27.34	113.88	13.89	567,634.15	756,002.04	
6,605.00	8.30	270.60	6,598.03	110.92	110.87	14.59	111.82	7.49	567,634.47	755,989.29	
6,700.00	8.60	269.50	6,692.00	110.88	110.88	0.63	110.88	0.32	567,634.48	755,975.33	
6,795.00	8.40	269.30	6,785.96	110.68	110.73	-13.42	111.54	353.09	567,634.33	755,961.28	
6,889.00	8.00	269.30	6,879.00	110.47	110.57	-26.82	113.77	346.36	567,634.17	755,947.88	
6,984.00	8.10	270.30	6,973.06	110.38	110.52	-40.12	117.58	340.05	567,634.12	755,934.58	
7,078.00	8.00	270.30	7,066.14	110.40	110.59	-53.29	122.76	334.27	567,634.19	755,921.41	
7,173.00	7.70	268.50	7,160.25	110.23	110.46	-66.26	128.81	329.04	567,634.06	755,908.44	
7,267.00	9.40	271.00	7,253.20	110.15	110.43	-80.23	136.50	324.00	567,634.03	755,894.47	
7,362.00	9.00	269.10	7,346.98	110.11	110.45	-95.42	145.96	319.17	567,634.05	755,879.28	
7,456.00	9.10	269.20	7,439.81	109.84	110.23	-110.20	155.87	315.01	567,633.83	755,864.50	
7,550.00	9.00	267.90	7,532.64	109.42	109.85	-124.98	166.40	311.31	567,633.45	755,849.72	
7,645.00	8.80	269.30	7,626.49	109.00	109.49	-139.67	177.48	308.09	567,633.09	755,835.03	
7,739.00	8.90	266.50	7,719.37	108.42	108.96	-154.12	188.75	305.26	567,632.56	755,820.58	
7,833.00	8.70	267.30	7,812.27	107.59	108.18	-168.48	200.22	302.70	567,631.78	755,806.22	
7,928.00	8.80	266.30	7,906.16	106.74	107.37	-182.91	212.10	300.41	567,630.97	755,791.79	
8,022.00	8.50	267.60	7,999.09	105.93	106.62	-197.03	224.03	298.42	567,630.22	755,777.67	
8,117.00	8.60	267.30	8,093.04	105.25	105.99	-211.14	236.25	296.66	567,629.59	755,763.56	
8,211.00	8.60	265.20	8,185.98	104.28	105.07	-225.16	248.47	295.02	567,628.67	755,749.54	
8,305.00	8.60	265.00	8,278.92	103.04	103.87	-239.17	260.75	293.48	567,627.47	755,735.53	
8,399.00	8.30	265.10	8,371.90	101.80	102.68	-252.93	272.97	292.10	567,626.28	755,721.77	
8,494.00	7.90	264.50	8,465.95	100.54	101.47	-266.26	284.94	290.86	567,625.07	755,708.44	



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Wellbore: OH
Design: MWD

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8,588.00	7.30	263.00	8,559.13	99.15	100.12	-278.62	296.06	289.77	567,623.72	755,696.08	
8,682.00	7.60	265.10	8,652.33	97.85	98.86	-290.74	307.08	288.78	567,622.46	755,683.96	
8,777.00	7.20	261.90	8,746.54	96.43	97.49	-302.89	318.19	287.84	567,621.09	755,671.81	
8,871.00	7.10	263.00	8,839.81	94.85	95.95	-314.49	328.80	286.97	567,619.55	755,660.21	
8,965.00	6.90	262.30	8,933.11	93.35	94.48	-325.85	339.27	286.17	567,618.08	755,648.85	
9,060.00	5.40	260.00	9,027.56	91.77	92.94	-335.91	348.53	285.47	567,616.54	755,638.79	
9,154.00	4.10	272.40	9,121.24	91.12	92.32	-343.62	355.80	285.04	567,615.92	755,631.08	
9,249.00	4.20	274.50	9,215.99	91.51	92.73	-350.48	362.54	284.82	567,616.33	755,624.22	
9,343.00	3.90	276.60	9,309.76	92.12	93.37	-357.09	369.09	284.65	567,616.97	755,617.61	
9,437.00	4.40	278.20	9,403.51	92.98	94.25	-363.83	375.84	284.52	567,617.85	755,610.87	
9,532.00	4.30	278.30	9,498.24	93.99	95.28	-370.96	383.01	284.41	567,618.88	755,603.74	
9,626.00	3.70	268.80	9,592.01	94.41	95.73	-377.48	389.43	284.23	567,619.33	755,597.22	
9,720.00	3.90	263.00	9,685.80	93.94	95.28	-383.69	395.34	283.95	567,618.88	755,591.01	
9,815.00	4.00	259.60	9,780.58	92.92	94.28	-390.15	401.39	283.59	567,617.88	755,584.55	
9,909.00	4.10	263.00	9,874.34	91.90	93.28	-396.71	407.53	283.23	567,616.88	755,577.99	
10,003.00	3.60	256.70	9,968.13	90.79	92.19	-402.92	413.34	282.89	567,615.79	755,571.78	
10,098.00	3.90	252.40	10,062.93	89.10	90.53	-408.90	418.81	282.48	567,614.13	755,565.80	
10,192.00	2.70	236.70	10,156.77	86.90	88.35	-413.80	423.13	282.05	567,611.95	755,560.90	
10,286.00	2.60	242.50	10,250.67	84.69	86.15	-417.54	426.34	281.66	567,609.75	755,557.16	
10,376.00	3.30	247.60	10,340.55	82.75	84.22	-421.75	430.08	281.29	567,607.82	755,552.95	
10,470.00	3.80	243.90	10,434.37	80.33	81.82	-427.05	434.82	280.85	567,605.42	755,547.65	
10,517.00	3.40	239.80	10,481.28	78.93	80.43	-429.65	437.11	280.60	567,604.03	755,545.05	
10,565.00	3.40	244.20	10,529.19	77.59	79.10	-432.16	439.34	280.37	567,602.70	755,542.54	
10,612.00	5.90	270.20	10,576.04	76.98	78.50	-435.83	442.85	280.21	567,602.10	755,538.87	
10,659.00	9.00	292.80	10,622.65	78.39	79.93	-441.64	448.82	280.26	567,603.53	755,533.06	
10,706.00	11.70	309.90	10,668.89	82.85	84.41	-448.69	456.56	280.65	567,608.01	755,526.01	
10,753.00	13.10	324.90	10,714.80	90.24	91.83	-455.41	464.58	281.40	567,615.43	755,519.29	



ProDirectional Survey Report



Company: Legacy Reserves
Project: Lea County, NM (NAD27)
Site: Lea Unit
Well: 59H
Wellbore: OH
Design: MWD

Local Co-ordinate Reference: Well 59H
TVD Reference: GL 3676'+KB 18' @ 3694.00usft (McVay 4)
MD Reference: GL 3676'+KB 18' @ 3694.00usft (McVay 4)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: WellPlanner1

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)
10,800.00	16.10	341.40	10,760.30	100.76	102.37	-460.55	471.80	282.53	567,625.97	755,514.15
10,848.00	21.50	349.20	10,805.73	115.71	117.33	-464.33	478.92	284.18	567,640.93	755,510.37
10,895.00	29.30	352.40	10,848.15	135.59	137.23	-467.47	487.19	286.36	567,660.83	755,507.23
10,942.00	34.50	356.80	10,888.05	160.29	161.94	-469.73	496.86	289.02	567,685.54	755,504.97
10,989.00	37.20	0.90	10,926.15	187.80	189.44	-470.25	506.98	291.94	567,713.04	755,504.45
11,036.00	41.60	1.90	10,962.46	217.62	219.26	-469.51	518.19	295.03	567,742.86	755,505.19
11,084.00	46.60	4.50	10,996.92	250.95	252.59	-467.62	531.48	298.38	567,776.19	755,507.08
11,132.00	53.10	6.10	11,027.85	287.47	289.10	-464.20	546.87	301.91	567,812.70	755,510.50
11,179.00	60.20	5.60	11,053.67	326.52	328.13	-460.21	565.21	305.49	567,851.73	755,514.49
11,226.00	64.00	4.20	11,075.66	367.91	369.51	-456.67	587.44	308.98	567,893.11	755,518.03
11,273.00	68.70	3.30	11,094.51	410.87	412.45	-453.87	613.28	312.26	567,936.05	755,520.83
11,320.00	74.20	4.50	11,109.46	455.31	456.89	-450.83	641.87	315.38	567,980.49	755,523.87
11,367.00	80.90	5.50	11,119.59	501.02	502.58	-446.83	672.49	318.36	568,026.18	755,527.87
11,433.00	91.80	5.10	11,123.78	566.53	568.07	-440.75	719.00	322.19	568,091.67	755,533.95
11,527.00	93.40	3.90	11,119.52	660.16	661.68	-433.38	790.97	326.78	568,185.28	755,541.32
11,557.00	93.14	3.77	11,117.81	690.05	691.56	-431.38	815.07	328.05	568,215.16	755,543.32
FTP: 11557' MD										
11,621.00	92.60	3.50	11,114.60	753.86	755.35	-427.33	867.85	330.50	568,278.95	755,547.37
11,716.00	90.70	2.50	11,111.86	848.70	850.18	-422.36	949.31	333.58	568,373.78	755,552.34
11,810.00	91.40	2.40	11,110.14	942.61	944.07	-418.34	1,032.61	336.10	568,467.67	755,556.36
11,904.00	89.30	1.40	11,109.57	1,036.56	1,038.02	-415.22	1,117.98	338.20	568,561.62	755,559.48
11,998.00	89.00	0.60	11,110.96	1,130.54	1,131.99	-413.58	1,205.18	339.93	568,655.59	755,561.12
12,092.00	88.80	1.00	11,112.76	1,224.52	1,225.96	-412.27	1,293.43	341.41	568,749.56	755,562.43
12,186.00	89.10	0.60	11,114.49	1,318.50	1,319.94	-410.96	1,382.43	342.71	568,843.54	755,563.74
12,280.00	89.40	0.70	11,115.72	1,412.48	1,413.92	-409.89	1,472.14	343.83	568,937.52	755,564.81
12,374.00	89.30	359.90	11,116.78	1,506.48	1,507.92	-409.40	1,562.50	344.81	569,031.52	755,565.30
12,468.00	88.60	359.70	11,118.51	1,600.46	1,601.90	-409.73	1,653.47	345.65	569,125.50	755,564.97



ProDirectional
Survey Report



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Project: Lea County, NM (NAD27)
Site: Lea Unit
Well: 59H
Wellbore: OH
Design: MWD

Local Co-ordinate Reference: Well 59H
TVD Reference: GL 3676'+KB 18' @ 3694.00usft (McVay 4)
MD Reference: GL 3676'+KB 18' @ 3694.00usft (McVay 4)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: WellPlanner1

Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)	
12,563.00	89.80	359.00	11,119.83	1,695.44	1,696.88	-410.81	1,745.90	346.39	569,220.48	755,563.89	
12,657.00	90.90	358.80	11,119.26	1,789.41	1,790.86	-412.61	1,837.78	347.03	569,314.46	755,562.09	
12,751.00	90.30	358.80	11,118.27	1,883.38	1,884.83	-414.58	1,929.89	347.60	569,408.43	755,560.12	
12,845.00	90.20	359.20	11,117.86	1,977.35	1,978.82	-416.22	2,022.12	348.12	569,502.42	755,558.48	
12,939.00	93.60	359.60	11,114.75	2,071.28	2,072.75	-417.20	2,114.32	348.62	569,596.35	755,557.50	
13,033.00	92.10	359.80	11,110.07	2,165.16	2,166.63	-417.70	2,206.52	349.09	569,690.23	755,557.00	
13,128.00	89.90	359.90	11,108.42	2,260.13	2,261.61	-417.94	2,299.90	349.53	569,785.21	755,556.76	
13,222.00	90.50	359.90	11,108.09	2,354.13	2,355.61	-418.11	2,392.42	349.94	569,879.21	755,556.59	
13,316.00	91.20	0.10	11,106.69	2,448.12	2,449.59	-418.11	2,485.02	350.31	569,973.19	755,556.59	
13,410.00	89.50	0.00	11,106.12	2,542.11	2,543.59	-418.03	2,577.71	350.67	570,067.19	755,556.67	
13,504.00	89.90	359.20	11,106.61	2,636.11	2,637.58	-418.68	2,670.61	350.98	570,161.18	755,556.02	
13,598.00	90.10	359.40	11,106.61	2,730.10	2,731.58	-419.83	2,763.65	351.26	570,255.18	755,554.87	
13,692.00	88.50	359.70	11,107.76	2,824.08	2,825.56	-420.57	2,856.69	351.53	570,349.16	755,554.13	
13,786.00	88.50	358.60	11,110.22	2,918.03	2,919.52	-421.96	2,949.86	351.78	570,443.12	755,552.74	
13,880.00	89.40	357.40	11,111.94	3,011.94	3,013.44	-425.24	3,043.30	351.97	570,537.04	755,549.46	
13,975.00	91.10	357.80	11,111.53	3,106.84	3,108.36	-429.22	3,137.85	352.14	570,631.96	755,545.48	
14,069.00	89.60	359.50	11,110.96	3,200.80	3,202.32	-431.44	3,231.25	352.33	570,725.92	755,543.26	
14,163.00	88.30	0.50	11,112.68	3,294.78	3,296.30	-431.44	3,324.42	352.54	570,819.90	755,543.26	
14,257.00	88.50	0.30	11,115.30	3,388.74	3,390.26	-430.78	3,417.52	352.76	570,913.86	755,543.92	
14,351.00	88.60	0.00	11,117.68	3,482.71	3,484.23	-430.53	3,510.73	352.96	571,007.83	755,544.17	
14,445.00	88.50	359.90	11,120.06	3,576.68	3,578.20	-430.62	3,604.02	353.14	571,101.80	755,544.08	
14,539.00	89.00	1.30	11,122.11	3,670.65	3,672.17	-429.63	3,697.22	353.33	571,195.77	755,545.07	
14,634.00	89.40	1.20	11,123.44	3,765.63	3,767.14	-427.56	3,791.33	353.52	571,290.74	755,547.14	
14,728.00	91.20	2.00	11,122.94	3,859.59	3,861.10	-424.93	3,884.41	353.72	571,384.70	755,549.77	
14,822.00	92.00	1.70	11,120.32	3,953.52	3,955.01	-421.90	3,977.45	353.91	571,478.61	755,552.80	
14,916.00	88.80	1.60	11,119.66	4,047.47	4,048.96	-419.20	4,070.60	354.09	571,572.56	755,555.50	
15,011.00	89.40	1.20	11,121.16	4,142.44	4,143.92	-416.87	4,164.83	354.26	571,667.52	755,557.83	



ProDirectional
Survey Report



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Design: MWD

Local Co-ordinate Reference: Well 59H
TVD Reference: GL 3676'+KB 18' @ 3694.00usft (McVay 4)
MD Reference: GL 3676'+KB 18' @ 3694.00usft (McVay 4)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: WellPlanner1

Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)	
15,105.00	90.00	0.50	11,121.65	4,236.43	4,237.91	-415.48	4,258.22	354.40	571,761.51	755,559.22	
15,199.00	91.40	0.60	11,120.50	4,330.42	4,331.89	-414.58	4,351.69	354.53	571,855.49	755,560.12	
15,293.00	93.60	0.90	11,116.40	4,424.32	4,425.79	-413.35	4,445.05	354.66	571,949.39	755,561.35	
15,387.00	90.60	0.50	11,112.96	4,518.24	4,519.71	-412.20	4,538.47	354.79	572,043.31	755,562.50	
15,481.00	91.30	0.30	11,111.40	4,612.23	4,613.69	-411.55	4,632.01	354.90	572,137.29	755,563.15	
15,575.00	90.90	359.20	11,109.59	4,706.21	4,707.67	-411.96	4,725.66	355.00	572,231.27	755,562.74	
15,669.00	90.70	358.20	11,108.28	4,800.16	4,801.64	-414.09	4,819.46	355.07	572,325.24	755,560.61	
15,764.00	91.20	357.60	11,106.71	4,895.07	4,896.56	-417.57	4,914.33	355.13	572,420.16	755,557.13	
15,858.00	91.20	356.80	11,104.74	4,988.92	4,990.43	-422.16	5,008.25	355.16	572,514.03	755,552.54	
15,952.00	91.90	356.30	11,102.19	5,082.70	5,084.22	-427.81	5,102.19	355.19	572,607.82	755,546.89	
16,046.00	92.80	356.00	11,098.34	5,176.38	5,177.93	-434.12	5,196.10	355.21	572,701.53	755,540.58	
16,140.00	92.00	354.90	11,094.40	5,269.97	5,271.55	-441.57	5,290.01	355.21	572,795.15	755,533.13	
16,235.00	91.30	353.60	11,091.67	5,364.42	5,366.03	-451.08	5,384.95	355.19	572,889.63	755,523.62	
16,329.00	92.10	353.90	11,088.88	5,457.78	5,459.43	-461.31	5,478.88	355.17	572,983.03	755,513.39	
16,423.00	92.10	357.10	11,085.43	5,551.39	5,553.06	-468.68	5,572.81	355.18	573,076.66	755,506.02	
16,517.00	91.20	358.80	11,082.73	5,645.28	5,646.96	-472.04	5,666.65	355.22	573,170.56	755,502.66	
16,612.00	91.30	358.70	11,080.65	5,740.22	5,741.91	-474.12	5,761.45	355.28	573,265.51	755,500.58	
16,706.00	91.80	0.50	11,078.11	5,834.18	5,835.87	-474.77	5,855.15	355.35	573,359.47	755,499.93	
16,800.00	91.70	1.90	11,075.24	5,928.12	5,929.81	-472.80	5,948.63	355.44	573,453.41	755,501.90	
16,894.00	92.00	1.40	11,072.21	6,022.04	6,023.72	-470.10	6,042.03	355.54	573,547.32	755,504.60	
16,988.00	92.40	0.80	11,068.60	6,115.96	6,117.63	-468.30	6,135.53	355.62	573,641.23	755,506.40	
17,082.00	92.70	0.30	11,064.42	6,209.86	6,211.53	-467.39	6,229.09	355.70	573,735.13	755,507.31	
17,176.00	92.90	0.50	11,059.82	6,303.75	6,305.42	-466.74	6,322.67	355.77	573,829.02	755,507.96	
17,270.00	92.50	1.30	11,055.40	6,397.64	6,399.30	-465.26	6,416.19	355.84	573,922.90	755,509.44	
17,365.00	92.00	0.10	11,051.67	6,492.56	6,494.22	-464.10	6,510.78	355.91	574,017.82	755,510.60	
17,459.00	91.60	358.90	11,048.71	6,586.50	6,588.17	-464.92	6,604.55	355.96	574,111.77	755,509.78	
17,553.00	91.70	357.90	11,046.01	6,680.42	6,682.09	-467.55	6,698.43	356.00	574,205.69	755,507.15	

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MD Reference: GL 3676'+KB 18' @ 3694.00usft (McVay 4)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: WellPlanner1

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)
17,647.00	91.40	358.10	11,043.46	6,774.31	6,776.00	-470.83	6,792.34	356.03	574,299.60	755,503.87
17,741.00	90.80	359.50	11,041.66	6,868.27	6,869.96	-472.79	6,886.21	356.06	574,393.56	755,501.91
17,836.00	90.20	0.30	11,040.83	6,963.26	6,964.95	-472.96	6,980.99	356.12	574,488.55	755,501.74
17,930.00	89.30	1.80	11,041.24	7,057.24	7,058.93	-471.24	7,074.64	356.18	574,582.53	755,503.46
18,024.00	90.10	1.40	11,041.73	7,151.21	7,152.89	-468.61	7,168.23	356.25	574,676.49	755,506.09
18,118.00	90.80	1.00	11,040.99	7,245.20	7,246.87	-466.64	7,261.88	356.32	574,770.47	755,508.06
18,213.00	90.90	0.40	11,039.58	7,340.18	7,341.85	-465.48	7,356.59	356.37	574,865.45	755,509.22
18,307.00	90.90	1.60	11,038.11	7,434.16	7,435.82	-463.84	7,450.28	356.43	574,959.42	755,510.86
18,401.00	91.40	1.20	11,036.22	7,528.12	7,529.78	-461.55	7,543.91	356.49	575,053.38	755,513.15
18,496.00	91.40	0.90	11,033.90	7,623.08	7,624.73	-459.81	7,638.58	356.55	575,148.33	755,514.89
18,590.00	92.00	0.40	11,031.11	7,717.04	7,718.68	-458.74	7,732.30	356.60	575,242.28	755,515.96
18,684.00	92.20	359.80	11,027.67	7,810.97	7,812.62	-458.58	7,826.07	356.64	575,336.22	755,516.12
18,743.00	92.30	359.30	11,025.35	7,869.92	7,871.57	-459.04	7,884.95	356.66	575,395.17	755,515.66
Last Survey: 18743' MD, 11025.35' TVD										
18,800.00	92.30	359.30	11,023.06	7,926.87	7,928.52	-459.74	7,941.84	356.68	575,452.12	755,514.96
PTB: 18800' MD, 11023.06' TVD										

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
199.00	199.00	1.00	-0.29	Pro MWD First Survey: 199' MD
11,557.00	11,117.81	691.56	-431.38	FTP: 11557' MD
18,743.00	11,025.35	7,871.57	-459.04	Last Survey: 18743' MD, 11025.35' TVD
18,800.00	11,023.06	7,928.52	-459.74	PTB: 18800' MD, 11023.06' TVD