

Apollo Operating, LLC

Loewen Multi Well Plan

Sec. 32, T4N, R68W

Loewen 21-32D - Slot 21-32D

Wellbore #1

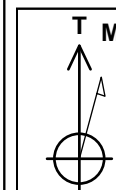
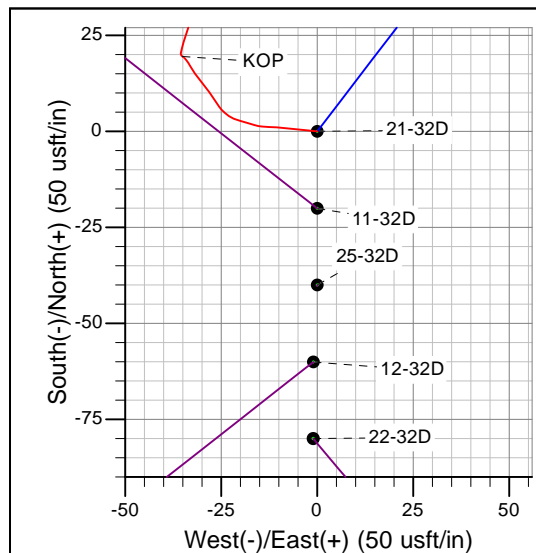
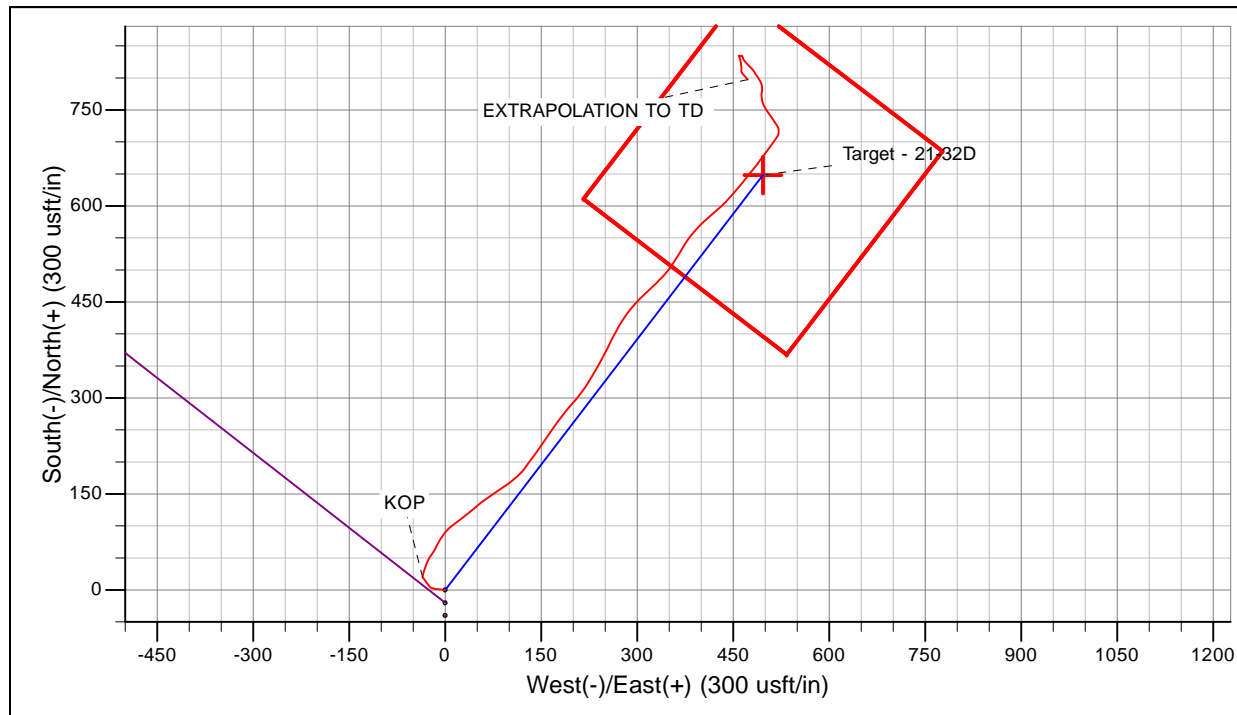
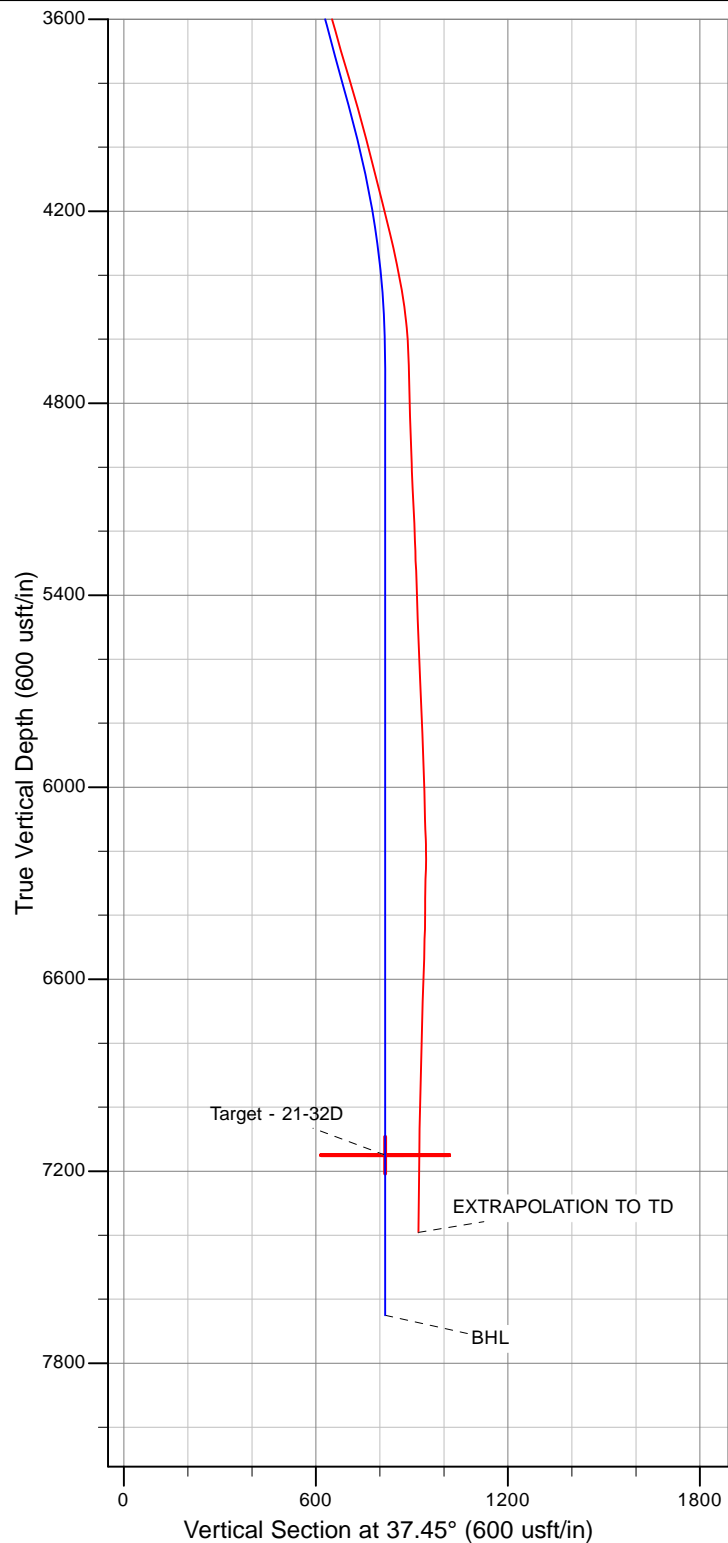
12 August, 2011

Survey: FINAL SURVEYS



Apollo Operating, LLC

Project: Loewen Multi Well Plan
 Site: Sec. 32, T4N, R68W
 Well: Loewen 21-32D
 Wellbore: Wellbore #1
 Design: FINAL SURVEYS



Azimuths to True North
 Magnetic North: 9.01°

Magnetic Field
 Strength: 53046.3snT
 Dip Angle: 66.91°
 Date: 04/05/2011
 Model: IGRF2010



Survey: FINAL SURVEYS (Loewen 21-32D/Wellbore #1)

Created By: Roopa Dattan Date: 7:26, August 12 2011

Survey Report



Company:	Apollo Operating, LLC	Local Co-ordinate Reference:	Well Loewen 21-32D - Slot 21-32D
Project:	Loewen Multi Well Plan	TVD Reference:	Est. KB @ 5020.0usft (Original Well Elev)
Site:	Sec. 32, T4N, R68W	MD Reference:	Est. KB @ 5020.0usft (Original Well Elev)
Well:	Loewen 21-32D	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	Database:	EDM_5000_1_7

Project	Loewen Multi Well Plan		
Map System:	Universal Transverse Mercator (US Survey Fee	System Datum:	Mean Sea Level
Geo Datum:	NAD83 Colorado - HARN		
Map Zone:	Zone 13N (108 W to 102 W)		

Site		Sec. 32, T4N, R68W			
Site Position:		Northing:	14,626,180.41 usft	Latitude:	40° 16' 23.124 N
From:	Lat/Long	Easting:	1,631,853.45 usft	Longitude:	105° 1' 50.520 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"	Grid Convergence:	-0.02 °

Well	Loewen 21-32D - Slot 21-32D					
Well Position	+N-S	0.0 usft	Northing:	14,626,180.41 usft	Latitude:	40° 16' 23.124 N
	+E-W	0.0 usft	Easting:	1,631,853.45 usft	Longitude:	105° 1' 50.520 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,999.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	04/05/2011	9.01	66.91	53,046

Design	FINAL SURVEYS				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	37.45	

Survey Program	Date	12/08/2011			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
301.9	7,515.0	FINAL SURVEYS (Wellbore #1)	MWD	MWD - Standard	

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
TIE ON TO SURFACE										
0.0	0.00	0.00	0.0	5,020.0	0.0	0.0	0.0	0.00	0.00	0.00
301.9	4.00	275.90	301.7	4,718.3	1.1	-10.5	-5.5	1.32	1.32	0.00
331.5	3.80	270.50	331.2	4,688.8	1.2	-12.5	-6.6	1.41	-0.68	-18.24
359.0	3.91	274.00	358.6	4,661.4	1.3	-14.3	-7.7	0.94	0.40	12.73
389.0	3.69	289.47	388.6	4,631.4	1.7	-16.3	-8.6	3.48	-0.73	51.57
420.0	3.60	283.84	419.5	4,600.5	2.2	-18.1	-9.3	1.19	-0.29	-18.16
453.0	3.52	286.39	452.4	4,567.6	2.8	-20.1	-10.0	0.54	-0.24	7.73
513.0	2.59	303.80	512.3	4,507.7	4.0	-23.0	-10.8	2.17	-1.55	29.02
544.0	2.37	312.23	543.3	4,476.7	4.9	-24.1	-10.8	1.37	-0.71	27.19
574.0	2.07	315.22	573.3	4,446.7	5.7	-24.9	-10.7	1.07	-1.00	9.97
602.0	2.15	329.28	601.3	4,418.7	6.5	-25.5	-10.4	1.87	0.29	50.21
799.0	4.10	321.00	798.0	4,222.0	15.1	-31.9	-7.4	1.01	0.99	-4.20

Survey Report



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Site:	Sec. 32, T4N, R68W	MD Reference:	Est. KB @ 5020.0usft (Original Well Elev)
Well:	Loewen 21-32D	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	Database:	EDM_5000_1_7

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
830.0	4.40	333.20	828.9	4,191.1	17.0	-33.1	-6.6	3.07	0.97	39.35
861.0	2.90	318.60	859.8	4,160.2	18.7	-34.2	-5.9	5.65	-4.84	-47.10
KOP										
892.0	1.90	301.50	890.8	4,129.2	19.5	-35.1	-5.8	3.93	-3.23	-55.16
923.0	1.80	0.80	921.8	4,098.2	20.3	-35.5	-5.5	5.91	-0.32	191.29
955.0	3.20	20.20	953.8	4,066.2	21.6	-35.2	-4.2	5.05	4.37	60.62
985.0	3.40	11.30	983.7	4,036.3	23.3	-34.8	-2.6	1.83	0.67	-29.67
1,016.0	4.60	22.70	1,014.6	4,005.4	25.4	-34.1	-0.6	4.63	3.87	36.77
1,047.0	6.20	13.40	1,045.5	3,974.5	28.1	-33.2	2.1	5.87	5.16	-30.00
1,078.0	7.40	14.20	1,076.3	3,943.7	31.7	-32.4	5.5	3.88	3.87	2.58
1,109.0	7.80	21.20	1,107.0	3,913.0	35.6	-31.1	9.3	3.25	1.29	22.58
1,140.0	8.30	17.40	1,137.7	3,882.3	39.7	-29.7	13.5	2.35	1.61	-12.26
1,171.0	8.50	25.90	1,168.4	3,851.6	43.9	-28.0	17.8	4.05	0.65	27.42
1,202.0	9.80	28.50	1,199.0	3,821.0	48.3	-25.7	22.7	4.40	4.19	8.39
1,233.0	10.50	32.20	1,229.5	3,790.5	53.0	-23.0	28.1	3.08	2.26	11.94
1,264.0	11.70	35.60	1,259.9	3,760.1	57.9	-19.6	34.0	4.41	3.87	10.97
1,295.0	11.00	31.70	1,290.3	3,729.7	63.0	-16.3	40.1	3.35	-2.26	-12.58
1,327.0	10.10	25.70	1,321.8	3,698.2	68.1	-13.4	45.9	4.43	-2.81	-18.75
1,357.0	10.80	24.80	1,351.3	3,668.7	73.0	-11.1	51.2	2.40	2.33	-3.00
1,388.0	10.90	32.92	1,381.7	3,638.3	78.1	-8.3	57.0	4.94	0.32	26.19
1,419.0	12.10	34.10	1,412.1	3,607.9	83.3	-4.9	63.1	3.94	3.87	3.81
1,450.0	12.30	37.93	1,442.4	3,577.6	88.6	-1.0	69.7	2.69	0.65	12.35
1,481.9	12.40	44.25	1,473.5	3,546.5	93.7	3.4	76.5	4.25	0.31	19.84
1,543.0	12.90	52.52	1,533.2	3,486.8	102.6	13.4	89.6	3.07	0.82	13.53
1,607.0	13.50	53.13	1,595.5	3,424.5	111.4	25.1	103.7	0.96	0.94	0.95
1,730.0	12.50	49.26	1,715.3	3,304.7	128.7	46.6	130.5	1.08	-0.81	-3.15
1,854.0	13.30	55.68	1,836.2	3,183.8	145.5	68.6	157.2	1.32	0.65	5.18
1,947.0	14.99	56.42	1,926.4	3,093.6	158.2	87.4	178.8	1.83	1.82	0.80
2,041.0	16.80	51.02	2,016.8	3,003.2	173.4	108.1	203.5	2.48	1.93	-5.74
2,135.0	16.34	34.85	2,106.9	2,913.1	192.9	126.3	229.9	4.91	-0.49	-17.20
2,229.0	14.41	37.22	2,197.6	2,822.4	213.0	140.9	254.8	2.16	-2.05	2.52
2,322.0	15.03	33.80	2,287.5	2,732.5	232.3	154.6	278.4	1.15	0.67	-3.68
2,415.0	14.72	34.41	2,377.4	2,642.6	252.0	168.0	302.2	0.37	-0.33	0.66
2,510.0	14.77	38.37	2,469.3	2,550.7	271.5	182.3	326.4	1.06	0.05	4.17
2,603.0	14.32	41.80	2,559.3	2,460.7	289.3	197.4	349.7	1.04	-0.48	3.69
2,696.0	14.77	36.87	2,649.3	2,370.7	307.4	212.1	373.0	1.42	0.48	-5.30
2,790.0	15.64	31.16	2,740.0	2,280.0	327.8	225.9	397.6	1.84	0.93	-6.07
2,884.0	15.03	28.87	2,830.7	2,189.3	349.4	238.3	422.3	0.91	-0.65	-2.44
2,978.0	15.34	27.99	2,921.4	2,098.6	371.0	250.0	446.6	0.41	0.33	-0.94
3,072.0	16.57	26.32	3,011.8	2,008.2	394.0	261.8	472.0	1.40	1.31	-1.78
3,135.0	16.88	28.52	3,072.1	1,947.9	410.1	270.2	489.8	1.12	0.49	3.49
3,197.0	17.01	34.94	3,131.4	1,888.6	425.4	279.7	507.8	3.02	0.21	10.35
3,258.0	17.18	39.51	3,189.7	1,830.3	439.7	290.5	525.7	2.22	0.28	7.49
3,351.0	17.45	46.36	3,278.5	1,741.5	459.9	309.3	553.2	2.21	0.29	7.37
3,446.0	18.76	46.54	3,368.8	1,651.2	480.3	330.7	582.4	1.38	1.38	0.19
3,477.0	18.02	43.46	3,398.2	1,621.8	487.2	337.7	592.1	3.94	-2.39	-9.94
3,602.0	15.95	31.51	3,517.8	1,502.2	515.9	359.9	628.4	3.24	-1.66	-9.56
3,664.0	15.03	29.48	3,577.6	1,442.4	530.1	368.3	644.8	1.72	-1.48	-3.27
3,727.0	15.56	33.88	3,638.3	1,381.7	544.2	377.1	661.4	2.02	0.84	6.98
3,789.0	16.13	39.60	3,698.0	1,322.0	557.8	387.2	678.3	2.68	0.92	9.23
3,883.0	17.01	48.47	3,788.1	1,231.9	577.0	405.8	704.8	2.85	0.94	9.44
3,976.0	16.22	48.82	3,877.2	1,142.8	594.5	425.8	730.9	0.86	-0.85	0.38
4,070.0	14.63	42.50	3,967.8	1,052.2	611.9	443.7	755.6	2.46	-1.69	-6.72

Survey Report



Company:	Apollo Operating, LLC	Local Co-ordinate Reference:	Well Loewen 21-32D - Slot 21-32D
Project:	Loewen Multi Well Plan	TVD Reference:	Est. KB @ 5020.0usft (Original Well Elev)
Site:	Sec. 32, T4N, R68W	MD Reference:	Est. KB @ 5020.0usft (Original Well Elev)
Well:	Loewen 21-32D	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	Database:	EDM_5000_1_7

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,132.0	14.28	39.51	4,027.9	992.1	623.6	453.8	771.0	1.33	-0.56	-4.82
4,194.0	14.28	39.86	4,088.0	932.0	635.4	463.6	786.3	0.14	0.00	0.56
4,288.0	14.15	38.63	4,179.1	840.9	653.3	478.2	809.4	0.35	-0.14	-1.31
4,350.0	13.80	36.70	4,239.2	780.8	665.1	487.4	824.4	0.94	-0.56	-3.11
4,381.0	13.89	34.23	4,269.3	750.7	671.1	491.7	831.8	1.93	0.29	-7.97
4,413.0	12.92	37.93	4,300.5	719.5	677.1	496.0	839.2	4.05	-3.03	11.56
4,444.0	11.78	37.66	4,330.8	689.2	682.4	500.1	845.8	3.68	-3.68	-0.87
4,475.0	11.73	37.84	4,361.1	658.9	687.4	504.0	852.1	0.20	-0.16	0.58
4,506.0	11.19	36.70	4,391.5	628.5	692.3	507.7	858.3	1.89	-1.74	-3.68
4,537.0	10.20	35.60	4,421.9	598.1	696.9	511.1	864.0	3.26	-3.19	-3.55
4,569.0	9.40	36.40	4,453.5	566.5	701.3	514.3	869.5	2.54	-2.50	2.50
4,600.0	8.20	33.12	4,484.1	535.9	705.2	517.0	874.2	4.19	-3.87	-10.58
4,662.0	6.48	22.09	4,545.6	474.4	712.2	520.7	882.0	3.57	-2.77	-17.79
4,756.0	4.60	333.94	4,639.2	380.8	720.5	521.1	888.8	5.14	-2.00	-51.22
4,850.0	3.16	330.43	4,733.0	287.0	726.1	518.1	891.5	1.55	-1.53	-3.73
4,944.0	5.80	323.83	4,826.7	193.3	732.2	514.0	893.9	2.86	2.81	-7.02
5,037.0	6.42	328.05	4,919.2	100.8	740.4	508.5	897.0	0.82	0.67	4.54
5,107.0	6.33	321.55	4,988.7	31.3	746.7	504.0	899.3	1.04	-0.13	-9.29
5,131.0	6.42	327.26	5,012.6	7.4	748.9	502.5	900.1	2.67	0.37	23.79
5,162.0	5.89	328.23	5,043.4	-23.4	751.7	500.7	901.3	1.74	-1.71	3.13
5,193.0	6.68	331.30	5,074.2	-54.2	754.7	499.0	902.5	2.77	2.55	9.90
5,225.0	6.46	336.05	5,106.0	-86.0	757.9	497.4	904.2	1.83	-0.69	14.84
5,256.0	5.36	342.20	5,136.8	-116.8	760.9	496.2	905.8	4.09	-3.55	19.84
5,287.0	4.09	342.47	5,167.7	-147.7	763.3	495.5	907.3	4.10	-4.10	0.87
5,318.0	3.34	346.86	5,198.7	-178.7	765.3	494.9	908.5	2.59	-2.42	14.16
5,381.0	2.33	358.99	5,261.6	-241.6	768.3	494.5	910.7	1.86	-1.60	19.25
5,412.0	2.90	3.56	5,292.6	-272.6	769.7	494.5	911.8	1.96	1.84	14.74
5,443.0	3.34	4.18	5,323.5	-303.5	771.4	494.6	913.2	1.42	1.42	2.00
5,474.0	3.30	354.07	5,354.5	-334.5	773.2	494.6	914.6	1.89	-0.13	-32.61
5,506.0	2.68	356.35	5,386.4	-366.4	774.9	494.5	915.8	1.97	-1.94	7.12
5,537.0	2.29	6.64	5,417.4	-397.4	776.2	494.5	916.9	1.91	-1.26	33.19
5,599.0	2.07	9.10	5,479.3	-459.3	778.6	494.8	919.0	0.39	-0.35	3.97
5,693.0	2.46	5.23	5,573.3	-553.3	782.2	495.3	922.2	0.45	0.41	-4.12
5,818.0	3.87	346.60	5,698.1	-678.1	789.0	494.5	927.1	1.38	1.13	-14.90
5,849.0	4.17	342.64	5,729.0	-709.0	791.1	494.0	928.4	1.32	0.97	-12.77
5,880.0	5.76	334.12	5,759.9	-739.9	793.6	492.9	929.8	5.64	5.13	-27.48
5,911.0	6.37	332.10	5,790.7	-770.7	796.5	491.5	931.2	2.08	1.97	-6.52
5,943.0	6.46	324.10	5,822.5	-802.5	799.5	489.6	932.4	2.81	0.28	-25.00
5,974.0	6.81	321.81	5,853.3	-833.3	802.4	487.4	933.4	1.42	1.13	-7.39
6,005.0	7.16	328.84	5,884.1	-864.1	805.5	485.3	934.5	2.98	1.13	22.68
6,036.0	7.91	327.70	5,914.8	-894.8	808.9	483.1	936.0	2.47	2.42	-3.68
6,067.0	8.35	323.83	5,945.5	-925.5	812.6	480.7	937.4	2.26	1.42	-12.48
6,099.0	8.57	315.48	5,977.2	-957.2	816.1	477.6	938.4	3.90	0.69	-26.09
6,130.0	8.17	312.76	6,007.8	-987.8	819.3	474.4	938.9	1.82	-1.29	-8.77
6,161.0	7.34	322.25	6,038.5	-1,018.5	822.3	471.6	939.6	4.91	-2.68	30.61
6,192.0	6.10	313.38	6,069.3	-1,049.3	825.0	469.2	940.3	5.21	-4.00	-28.61
6,224.0	4.88	324.10	6,101.2	-1,081.2	827.3	467.1	940.8	4.97	-3.81	33.50
6,255.0	4.75	337.90	6,132.1	-1,112.1	829.6	465.9	941.9	3.75	-0.42	44.52
6,286.0	4.04	338.86	6,163.0	-1,143.0	831.8	465.0	943.1	2.30	-2.29	3.10
6,317.0	2.59	342.47	6,193.9	-1,173.9	833.5	464.4	944.0	4.72	-4.68	11.65
6,348.0	1.63	309.42	6,224.9	-1,204.9	834.4	463.8	944.5	4.88	-3.10	-106.61
6,379.0	2.28	263.45	6,255.9	-1,235.9	834.6	462.9	944.1	5.29	2.10	-148.29
6,411.0	3.25	264.77	6,287.9	-1,267.9	834.5	461.3	943.0	3.04	3.03	4.12

Survey Report



Company:	Apollo Operating, LLC	Local Co-ordinate Reference:	Well Loewen 21-32D - Slot 21-32D
Project:	Loewen Multi Well Plan	TVD Reference:	Est. KB @ 5020.0usft (Original Well Elev)
Site:	Sec. 32, T4N, R68W	MD Reference:	Est. KB @ 5020.0usft (Original Well Elev)
Well:	Loewen 21-32D	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	Database:	EDM_5000_1_7

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
6,442.0	2.66	281.21	6,318.8	-1,298.8	834.5	459.8	942.1	3.31	-1.90	53.03
6,473.0	1.17	299.84	6,349.8	-1,329.8	834.8	458.8	941.7	5.15	-4.81	60.10
6,504.0	0.40	139.79	6,380.8	-1,360.8	834.9	458.6	941.7	5.01	-2.48	-516.29
6,567.0	2.86	159.22	6,443.8	-1,423.8	833.3	459.3	940.8	3.95	3.90	30.84
6,598.0	3.03	159.30	6,474.7	-1,454.7	831.8	459.8	939.9	0.55	0.55	0.26
6,629.0	2.64	165.37	6,505.7	-1,485.7	830.3	460.3	939.1	1.59	-1.26	19.58
6,660.0	2.68	160.18	6,536.7	-1,516.7	828.9	460.7	938.2	0.79	0.13	-16.74
6,723.0	2.99	169.85	6,599.6	-1,579.6	825.9	461.5	936.3	0.90	0.49	15.35
6,786.0	2.90	176.97	6,662.5	-1,642.5	822.7	461.9	934.0	0.60	-0.14	11.30
6,848.0	2.11	164.49	6,724.4	-1,704.4	820.1	462.3	932.1	1.54	-1.27	-20.13
6,910.0	1.89	166.77	6,786.4	-1,766.4	818.0	462.8	930.8	0.38	-0.35	3.68
6,972.0	1.89	173.70	6,848.4	-1,828.4	816.0	463.2	929.4	0.37	0.00	11.18
7,035.0	1.49	198.40	6,911.3	-1,891.3	814.1	463.0	927.9	1.30	-0.63	39.21
7,098.0	1.76	192.00	6,974.3	-1,954.3	812.4	462.6	926.2	0.52	0.43	-10.16
7,128.0	1.80	174.90	7,004.3	-1,984.3	811.5	462.5	925.5	1.77	0.13	-57.00
7,191.0	1.80	163.87	7,067.3	-2,047.3	809.6	462.9	924.2	0.55	0.00	-17.51
7,252.0	2.02	147.44	7,128.2	-2,108.2	807.7	463.7	923.2	0.96	0.36	-26.93
7,345.0	3.38	134.34	7,221.1	-2,201.1	804.4	466.6	922.3	1.60	1.46	-14.09
7,470.0	3.03	141.20	7,345.9	-2,325.9	799.3	471.3	921.1	0.41	-0.28	5.49
EXTRAPOLATION TO TD										
7,515.0	3.03	141.20	7,390.9	-2,370.9	797.4	472.8	920.5	0.00	0.00	0.00

Targets									
Target Name	- hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	
- Shape									Latitude Longitude
Target - 21-32D		0.00	0.00	7,150.0	648.2	496.5	14,626,828.45	1,632,350.16	40° 16' 29.532 N 105° 1' 44.112 W
- survey misses target center by 162.0usft at 7280.4usft MD (7156.6 TVD, 806.8 N, 464.4 E)									
- Rectangle (sides W400.0 H400.0 D0.0)									

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
0.0	0.0	0.0	0.0	TIE ON TO SURFACE
892.0	890.8	19.5	-35.1	KOP
7,515.0	7,390.9	797.4	472.8	EXTRAPOLATION TO TD

Checked By: _____ Approved By: _____ Date: _____