



Scientific Drilling

Orca Operating Company

McPherson County Kansas

Section 36-19S-1W

Alfred 1-36H

Lateral #1

Design: Lateral #1

Survey Completion Report

18 October, 2010



Scientific Drilling

Company: Orca Operating Company	Local Co-ordinate Reference: Well Alfred 1-36H
Project: McPherson County Kansas	TVD Reference: 1-36H @ 1582.0usft
Site: Section 36-19S-1W	MD Reference: 1-36H @ 1582.0usft
Well: Alfred 1-36H	North Reference: True
Wellbore: Lateral #1	Survey Calculation Method: Minimum Curvature
Design: Lateral #1	Database: EDMOKC

Project McPherson County Kansas, McPherson County, South Central Kansas			
Map System: US State Plane 1983	System Datum: Mean Sea Level		
Geo Datum: North American Datum 1983			
Map Zone: Kansas Southern Zone			

Site Section 36-19S-1W			
Site Position:	Northing: 1,931,663.88 usft	Latitude: 38° 21' 44.339 N	
From: Lat/Long	Easting: 1,630,558.55 usft	Longitude: 97° 23' 24.477 W	
Position Uncertainty: 0.0 usft	Slot Radius: 0"	Grid Convergence: 0.68 °	

Well Alfred 1-36H, Mississippi			
Well Position	+N/-S 0.0 usft	Northing: 1,931,663.88 usft	Latitude: 38° 21' 44.339 N
	+E/-W 0.0 usft	Easting: 1,630,558.55 usft	Longitude: 97° 23' 24.477 W
Position Uncertainty 0.0 usft		Wellhead Elevation: 1,582.0 usft	Ground Level: 1,566.0 usft

Wellbore Lateral #1					
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	04/07/10	4.45	66.47	52,823

Design Lateral #1					
Audit Notes:					
Version: 1.0	Phase: ACTUAL	Tie On Depth: 3,233.0			
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	155.00	

Survey Program		Date 10/13/10			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
496.0	3,233.0	Survey #1 MWD (Sump Hole)	MWD	MWD - Standard	
3,260.0	6,955.0	Survey #1 Lat #1 MWD (Lateral #1)	MWD	MWD - Standard	

Survey								
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.00
496.0	1.36	114.80	496.0	-2.5	5.3	4.5	0.27	
752.0	1.00	112.61	751.9	-4.6	10.2	8.5	0.14	
1,007.0	0.47	113.99	1,006.9	-5.9	13.2	10.9	0.21	
1,263.0	0.57	123.91	1,262.9	-7.0	15.2	12.8	0.05	
1,519.0	0.17	137.87	1,518.9	-8.0	16.5	14.2	0.16	
1,769.0	0.24	333.51	1,768.9	-7.8	16.5	14.1	0.16	
1,871.0	0.18	183.48	1,870.9	-7.8	16.4	14.0	0.40	
1,901.0	0.38	143.93	1,900.9	-7.9	16.5	14.1	0.89	
1,930.0	0.50	171.82	1,929.9	-8.1	16.5	14.3	0.83	
1,959.0	1.20	154.35	1,958.9	-8.5	16.7	14.8	2.55	

Company:	Orca Operating Company	Local Co-ordinate Reference:	Well Alfred 1-36H
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Site:	Section 36-19S-1W	MD Reference:	1-36H @ 1582.0usft
Well:	Alfred 1-36H	North Reference:	True
Wellbore:	Lateral #1	Survey Calculation Method:	Minimum Curvature
Design:	Lateral #1	Database:	EDMOKC

Survey								
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	
1,989.0	3.04	167.03	1,988.8	-9.6	17.0	15.9	6.29	
2,019.0	5.15	167.68	2,018.8	-11.7	17.5	18.0	7.03	
2,049.0	7.40	165.65	2,048.6	-14.9	18.2	21.2	7.54	
2,079.0	10.30	161.79	2,078.2	-19.3	19.6	25.7	9.86	
2,108.0	12.57	160.50	2,106.6	-24.7	21.4	31.4	7.88	
2,139.0	14.64	162.54	2,136.8	-31.6	23.7	38.7	6.85	
2,170.0	16.31	163.77	2,166.6	-39.5	26.1	46.9	5.49	
2,197.0	17.18	162.62	2,192.5	-47.0	28.4	54.6	3.45	
2,228.0	18.77	163.68	2,222.0	-56.1	31.1	64.0	5.24	
2,258.0	19.99	164.98	2,250.3	-65.7	33.8	73.9	4.31	
2,289.0	21.94	160.65	2,279.2	-76.3	37.1	84.9	8.03	
2,320.0	24.23	160.54	2,307.7	-87.8	41.1	96.9	7.39	
2,351.0	25.72	160.13	2,335.8	-100.1	45.6	110.0	4.84	
2,381.0	27.83	159.04	2,362.6	-112.8	50.3	123.4	7.22	
2,410.0	30.36	157.86	2,388.0	-125.9	55.5	137.5	8.95	
2,441.0	32.91	158.56	2,414.4	-141.0	61.5	153.8	8.31	
2,471.0	34.84	157.39	2,439.3	-156.5	67.8	170.5	6.79	
2,503.0	36.76	156.30	2,465.2	-173.7	75.1	189.2	6.32	
2,533.0	37.84	155.73	2,489.1	-190.3	82.5	207.3	3.78	
2,564.0	39.77	156.12	2,513.2	-208.0	90.4	226.8	6.28	
2,595.0	41.93	155.30	2,536.7	-226.5	98.8	247.0	7.18	
2,624.0	42.61	155.44	2,558.1	-244.2	106.9	266.5	2.37	
2,655.0	45.01	155.51	2,580.5	-263.8	115.8	288.0	7.74	
2,686.0	47.28	155.47	2,602.0	-284.1	125.1	310.4	7.32	
2,715.0	48.65	155.27	2,621.4	-303.7	134.1	331.9	4.75	
2,746.0	50.41	155.85	2,641.5	-325.2	143.8	355.5	5.85	
2,773.0	52.57	155.39	2,658.3	-344.4	152.5	376.6	8.11	
2,802.0	54.76	153.40	2,675.5	-365.5	162.6	400.0	9.36	
2,833.0	57.07	152.85	2,692.9	-388.4	174.3	425.6	7.60	
2,863.0	58.32	152.53	2,708.9	-410.9	185.9	450.9	4.26	
2,895.0	58.07	152.34	2,725.8	-435.0	198.5	478.1	0.93	
2,926.0	58.61	152.37	2,742.1	-458.4	210.7	504.5	1.74	
2,958.0	60.14	153.19	2,758.4	-482.9	223.3	532.0	5.27	
2,988.0	60.54	154.27	2,773.2	-506.2	234.8	558.0	3.40	
3,019.0	60.42	154.34	2,788.5	-530.5	246.5	585.0	0.43	
3,050.0	60.20	154.04	2,803.8	-554.8	258.3	611.9	1.10	
3,082.0	60.04	153.84	2,819.8	-579.7	270.5	639.7	0.74	
3,112.0	59.97	153.59	2,834.8	-603.0	282.0	665.7	0.76	
3,143.0	59.68	154.48	2,850.4	-627.1	293.7	692.5	2.65	
3,174.0	59.93	154.56	2,866.0	-651.3	305.2	719.3	0.84	
3,203.0	60.03	155.87	2,880.5	-674.1	315.7	744.4	3.93	
3,233.0	60.49	156.02	2,895.3	-697.9	326.4	770.4	1.59	
3,260.0	68.00	156.41	2,907.1	-720.1	336.2	794.7	27.85	
3,289.0	74.96	158.59	2,916.3	-745.5	346.7	822.1	25.03	

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Well:	Alfred 1-36H	North Reference:	True
Wellbore:	Lateral #1	Survey Calculation Method:	Minimum Curvature
Design:	Lateral #1	Database:	EDMOKC

Survey								
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	
3,321.0	82.13	158.64	2,922.6	-774.7	358.1	853.4	22.41	
3,353.0	84.33	160.40	2,926.4	-804.4	369.2	885.1	8.78	
3,385.0	86.26	159.87	2,929.0	-834.4	380.0	916.9	6.25	
3,417.0	87.30	160.93	2,930.8	-864.5	390.8	948.7	4.64	
3,449.0	88.11	161.37	2,932.1	-894.8	401.1	980.5	2.88	
3,481.0	89.69	160.84	2,932.7	-925.1	411.5	1,012.3	5.21	
3,513.0	90.84	161.89	2,932.6	-955.4	421.7	1,044.1	4.87	
3,545.0	91.19	161.72	2,932.0	-985.8	431.7	1,075.8	1.22	
3,577.0	90.75	160.66	2,931.5	-1,016.1	442.0	1,107.7	3.59	
3,609.0	89.87	159.52	2,931.3	-1,046.1	452.9	1,139.5	4.50	
3,641.0	88.90	159.78	2,931.6	-1,076.1	464.0	1,171.4	3.14	
3,673.0	88.81	159.35	2,932.3	-1,106.1	475.2	1,203.3	1.37	
3,704.0	89.16	159.78	2,932.8	-1,135.2	486.0	1,234.2	1.79	
3,736.0	89.16	159.08	2,933.3	-1,165.1	497.2	1,266.1	2.19	
3,768.0	88.81	158.82	2,933.8	-1,195.0	508.7	1,298.0	1.36	
3,800.0	89.08	157.94	2,934.4	-1,224.7	520.5	1,330.0	2.88	
3,832.0	89.87	158.11	2,934.7	-1,254.4	532.5	1,361.9	2.53	
3,864.0	90.31	157.15	2,934.7	-1,284.0	544.7	1,393.9	3.30	
3,896.0	90.22	156.80	2,934.5	-1,313.4	557.2	1,425.9	1.13	
3,928.0	89.96	156.01	2,934.5	-1,342.8	570.0	1,457.9	2.60	
3,960.0	90.13	156.27	2,934.5	-1,372.0	582.9	1,489.8	0.97	
3,992.0	90.04	155.34	2,934.4	-1,401.2	596.1	1,521.8	2.92	
4,024.0	90.40	155.57	2,934.3	-1,430.3	609.4	1,553.8	1.33	
4,056.0	90.57	155.39	2,934.0	-1,459.4	622.6	1,585.8	0.77	
4,088.0	90.92	156.01	2,933.6	-1,488.6	635.8	1,617.8	2.22	
4,120.0	90.84	155.39	2,933.1	-1,517.8	649.0	1,649.8	1.95	
4,152.0	90.75	155.30	2,932.7	-1,546.8	662.3	1,681.8	0.40	
4,184.0	89.25	154.25	2,932.7	-1,575.8	676.0	1,713.8	5.72	
4,215.0	89.60	154.95	2,933.0	-1,603.8	689.2	1,744.8	2.52	
4,247.0	89.52	155.21	2,933.2	-1,632.8	702.7	1,776.8	0.85	
4,279.0	89.08	155.21	2,933.6	-1,661.9	716.1	1,808.8	1.38	
4,311.0	88.46	156.18	2,934.3	-1,691.0	729.3	1,840.8	3.60	
4,343.0	90.40	156.88	2,934.6	-1,720.4	742.1	1,872.8	6.45	
4,375.0	90.84	158.03	2,934.3	-1,749.9	754.3	1,904.8	3.85	
4,407.0	90.48	157.50	2,933.9	-1,779.5	766.4	1,936.7	2.00	
4,439.0	90.75	158.03	2,933.6	-1,809.2	778.5	1,968.7	1.86	
4,471.0	89.78	159.43	2,933.4	-1,839.0	790.2	2,000.6	5.32	
4,503.0	89.34	158.47	2,933.7	-1,868.8	801.6	2,032.5	3.30	
4,535.0	89.60	158.90	2,934.0	-1,898.7	813.3	2,064.5	1.57	
4,567.0	89.08	158.10	2,934.3	-1,928.4	825.0	2,096.4	2.98	
4,599.0	89.34	158.20	2,934.8	-1,958.1	836.9	2,128.4	0.87	
4,630.0	89.16	158.10	2,935.2	-1,986.9	848.4	2,159.3	0.66	
4,662.0	89.52	158.64	2,935.5	-2,016.6	860.2	2,191.2	2.03	
4,694.0	89.87	157.94	2,935.7	-2,046.4	872.1	2,223.2	2.45	
4,726.0	90.40	158.03	2,935.6	-2,076.0	884.1	2,255.1	1.68	

Company:	Orca Operating Company	Local Co-ordinate Reference:	Well Alfred 1-36H
Project:	McPherson County Kansas	TVD Reference:	1-36H @ 1582.0usft
Site:	Section 36-19S-1W	MD Reference:	1-36H @ 1582.0usft
Well:	Alfred 1-36H	North Reference:	True
Wellbore:	Lateral #1	Survey Calculation Method:	Minimum Curvature
Design:	Lateral #1	Database:	EDMOKC

Survey								
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	
4,758.0	91.01	158.73	2,935.2	-2,105.8	895.9	2,287.1	2.90	
4,790.0	90.57	159.43	2,934.8	-2,135.7	907.3	2,319.0	2.58	
4,822.0	90.40	159.61	2,934.5	-2,165.6	918.5	2,350.9	0.77	
4,854.0	89.87	159.61	2,934.5	-2,195.6	929.6	2,382.8	1.66	
4,886.0	89.78	158.38	2,934.5	-2,225.5	941.1	2,414.7	3.85	
4,918.0	90.22	159.17	2,934.5	-2,255.3	952.7	2,446.7	2.83	
4,950.0	90.13	158.55	2,934.5	-2,285.2	964.2	2,478.6	1.96	
4,982.0	89.43	158.91	2,934.6	-2,315.0	975.8	2,510.5	2.46	
5,014.0	89.60	158.99	2,934.8	-2,344.9	987.3	2,542.4	0.59	
5,046.0	90.04	158.82	2,934.9	-2,374.7	998.8	2,574.4	1.47	
5,078.0	90.31	158.55	2,934.8	-2,404.5	1,010.5	2,606.3	1.19	
5,110.0	90.57	158.99	2,934.6	-2,434.4	1,022.1	2,638.2	1.60	
5,142.0	90.66	158.73	2,934.3	-2,464.2	1,033.6	2,670.1	0.86	
5,174.0	90.92	158.47	2,933.8	-2,494.0	1,045.3	2,702.1	1.15	
5,206.0	91.10	158.38	2,933.3	-2,523.7	1,057.0	2,734.0	0.63	
5,237.0	90.66	158.47	2,932.8	-2,552.6	1,068.4	2,765.0	1.45	
5,269.0	91.10	159.08	2,932.3	-2,582.4	1,080.0	2,796.9	2.35	
5,301.0	91.10	158.55	2,931.7	-2,612.2	1,091.6	2,828.8	1.66	
5,333.0	90.48	158.64	2,931.2	-2,642.0	1,103.3	2,860.7	1.96	
5,365.0	90.13	158.73	2,931.1	-2,671.8	1,114.9	2,892.7	1.13	
5,397.0	89.69	158.91	2,931.1	-2,701.7	1,126.5	2,924.6	1.49	
5,429.0	89.52	158.69	2,931.3	-2,731.5	1,138.0	2,956.5	0.87	
5,461.0	88.11	157.94	2,932.0	-2,761.2	1,149.9	2,988.5	4.99	
5,493.0	88.29	157.06	2,933.0	-2,790.8	1,162.1	3,020.4	2.81	
5,525.0	88.81	157.94	2,933.8	-2,820.3	1,174.3	3,052.4	3.19	
5,557.0	89.08	157.94	2,934.4	-2,850.0	1,186.4	3,084.3	0.84	
5,589.0	89.43	157.94	2,934.8	-2,879.6	1,198.4	3,116.3	1.09	
5,621.0	89.96	157.60	2,935.0	-2,909.3	1,210.5	3,148.3	1.97	
5,653.0	90.22	157.68	2,934.9	-2,938.9	1,222.6	3,180.2	0.85	
5,684.0	90.48	157.40	2,934.7	-2,967.5	1,234.5	3,211.2	1.23	
5,716.0	90.31	157.15	2,934.5	-2,997.0	1,246.9	3,243.2	0.94	
5,748.0	89.25	157.41	2,934.6	-3,026.5	1,259.2	3,275.1	3.41	
5,780.0	89.69	157.94	2,934.9	-3,056.1	1,271.4	3,307.1	2.15	
5,812.0	90.22	157.76	2,935.0	-3,085.8	1,283.4	3,339.1	1.75	
5,844.0	90.84	157.94	2,934.7	-3,115.4	1,295.5	3,371.0	2.02	
5,876.0	89.16	157.94	2,934.7	-3,145.1	1,307.5	3,403.0	5.25	
5,908.0	88.11	157.41	2,935.4	-3,174.7	1,319.7	3,434.9	3.68	
5,940.0	88.11	157.85	2,936.5	-3,204.2	1,331.8	3,466.9	1.37	
5,972.0	88.64	157.24	2,937.4	-3,233.8	1,344.1	3,498.8	2.52	
6,004.0	89.08	157.15	2,938.0	-3,263.3	1,356.5	3,530.8	1.40	
6,036.0	88.99	157.15	2,938.6	-3,292.8	1,368.9	3,562.8	0.28	
6,068.0	88.72	156.97	2,939.2	-3,322.2	1,381.4	3,594.8	1.01	
6,100.0	89.34	157.85	2,939.8	-3,351.8	1,393.6	3,626.7	3.36	
6,132.0	89.60	158.11	2,940.0	-3,381.4	1,405.6	3,658.7	1.15	

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Project: McPherson County Kansas	TVD Reference: 1-36H @ 1582.0usft
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Well: Alfred 1-36H	North Reference: True
Wellbore: Lateral #1	Survey Calculation Method: Minimum Curvature
Design: Lateral #1	Database: EDMOKC

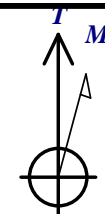
Survey								
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	
6,164.0	88.99	156.98	2,940.4	-3,411.0	1,417.9	3,690.6	4.01	
6,200.0	89.34	156.27	2,941.0	-3,444.1	1,432.1	3,726.6	2.20	
6,232.0	90.22	155.92	2,941.1	-3,473.3	1,445.1	3,758.6	2.96	
6,264.0	90.48	155.21	2,940.9	-3,502.4	1,458.3	3,790.6	2.36	
6,296.0	90.22	156.36	2,940.7	-3,531.6	1,471.5	3,822.6	3.68	
6,327.0	90.04	155.57	2,940.6	-3,559.9	1,484.1	3,853.6	2.61	
6,359.0	89.78	155.65	2,940.7	-3,589.1	1,497.3	3,885.6	0.85	
6,391.0	89.87	155.48	2,940.8	-3,618.2	1,510.5	3,917.6	0.60	
6,423.0	90.31	155.30	2,940.7	-3,647.3	1,523.9	3,949.6	1.49	
6,455.0	90.66	155.13	2,940.5	-3,676.4	1,537.3	3,981.6	1.22	
6,487.0	91.28	155.39	2,939.9	-3,705.4	1,550.7	4,013.6	2.10	
6,519.0	91.10	155.65	2,939.3	-3,734.5	1,563.9	4,045.6	0.99	
6,551.0	91.28	155.48	2,938.6	-3,763.7	1,577.2	4,077.6	0.77	
6,583.0	91.80	155.30	2,937.7	-3,792.7	1,590.5	4,109.6	1.72	
6,615.0	91.98	155.21	2,936.7	-3,821.8	1,603.9	4,141.5	0.63	
6,647.0	92.15	155.13	2,935.5	-3,850.8	1,617.3	4,173.5	0.59	
6,678.0	92.07	154.86	2,934.4	-3,878.9	1,630.4	4,204.5	0.91	
6,710.0	92.51	155.04	2,933.1	-3,907.9	1,643.9	4,236.5	1.49	
6,742.0	92.77	154.69	2,931.6	-3,936.8	1,657.5	4,268.4	1.36	
6,774.0	93.21	155.48	2,930.0	-3,965.8	1,671.0	4,300.4	2.82	
6,806.0	93.47	155.65	2,928.1	-3,994.9	1,684.2	4,332.3	0.97	
6,838.0	93.74	155.13	2,926.1	-4,023.9	1,697.5	4,364.3	1.83	
6,870.0	93.74	155.74	2,924.0	-4,052.9	1,710.8	4,396.2	1.90	
6,902.0	94.00	155.21	2,921.8	-4,082.0	1,724.0	4,428.1	1.84	
6,913.0	94.09	155.83	2,921.1	-4,092.0	1,728.6	4,439.1	5.68	
6,955.0	94.43	158.20	2,917.9	-4,130.5	1,744.9	4,481.0	5.69	
TGT Lateral 1 Alfred 1-36H								

Checked By: _____	Approved By: _____	Date: _____
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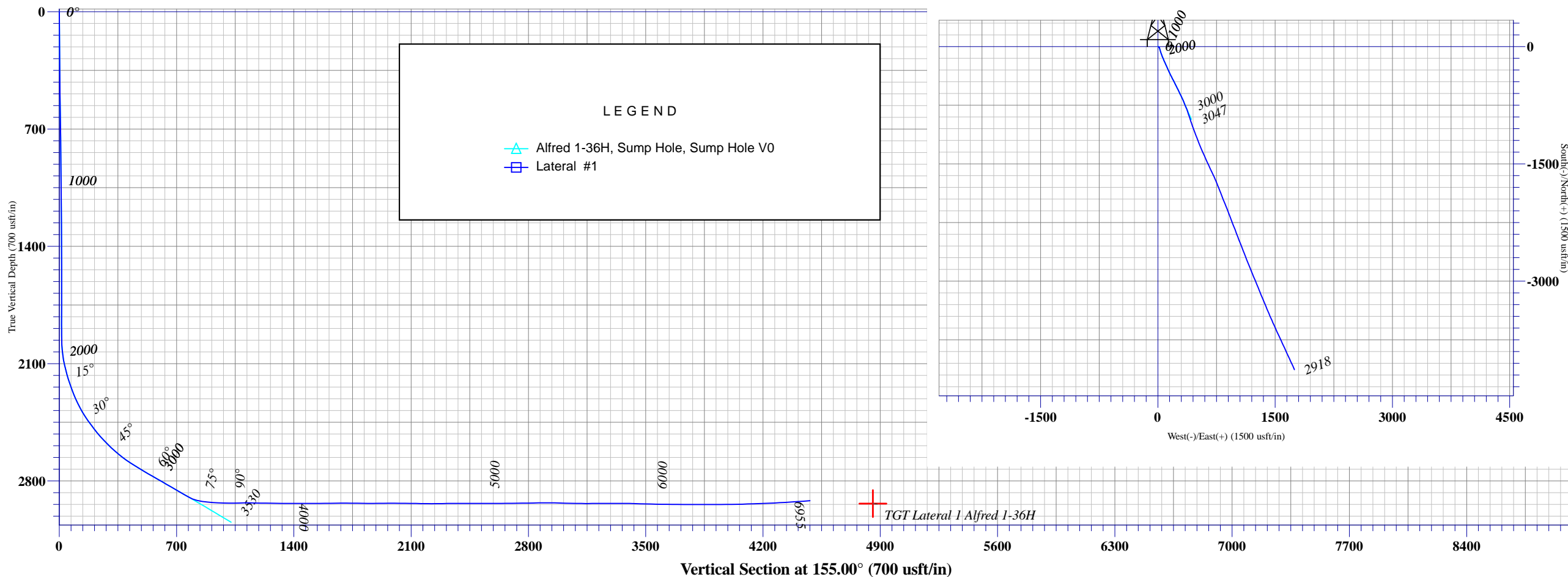
Orca Operating Company

Field: McPherson County Kansas
 Site: Section 36-19S-1W
 Well: Alfred 1-36H
 Wellpath: Lateral #1
 Plan: Lateral #1



Azimuths to True North
 Magnetic North: 4.45°

Magnetic Field
 Strength: 52822.6snT
 Dip Angle: 66.47°
 Date: 04/07/2010
 Model: IGRF2010



Vertical Section Azimuth
 155.00

Sump Hole
 Bottom Hole from Surface:
 3046.8' TVD 931.9' S & 428.6' E
 3530.0' MD 1025.8' VS @ 155.0 Azimuth

Lateral #1
 Bottom Hole From Surface:
 2917.9' TVD 4130.5' S & 1744.9' E
 6955.0' MD 4481.0' VS @ 155.0 Az.



Design: Lateral #1 (Alfred 1-36H/Lateral #1)

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1931663.88	1630558.55	38° 21' 44.339 N	97° 23' 24.477 W	

Created By: Genie Lightfoot Date: 15:07, October 18 2010