



**Scientific  
Drilling**

## **Survey Certification**

7327 West Barton Road  
Casper, WY 82604  
(307)-472-6621 Fax (307) 472-5439

<b>Operator</b>	<u>KP Kauffman Co, Inc.</u>
<b>Well Name &amp; No.</b>	<u>Lewis 1-C</u>
<b>County &amp; State</b>	<u>Weld County, CO</u>
<b>SDI Job No.</b>	<u>410613k26666</u>
<b>Rig</b>	<u>Haliburton 212</u>
<b>Survey Date</b>	<u>27-Jun-2013</u>

I, Steven F. Gottschalk, having personal knowledge of all the facts, hereby certify that the attached directional survey run from a measured depth of 0 feet to a measured depth of 7125 feet is true and correct as determined from all available records.

  
Signature

16-Aug-2013  
Date

**Steven F. Gottschalk**  
Rockies Region Well Planner  
Scientific Drilling - Rocky Mountain District

# **KP Kauffman Co, Inc.**

**Weld County, CO**

**Lewis**

**Lewis 1-C**

**OH**

**Design: OH**

## **Standard Survey Report**

**06 August, 2013**



# Scientific Drilling International

## Survey Report

<b>Company:</b>	KP Kauffman Co, Inc.	<b>Local Co-ordinate Reference:</b>	Well Lewis 1-C
<b>Project:</b>	Weld County, CO	<b>TVD Reference:</b>	GL 4709' @ 4709.00ft (Haliburton)
<b>Site:</b>	Lewis	<b>MD Reference:</b>	GL 4709' @ 4709.00ft (Haliburton)
<b>Well:</b>	Lewis 1-C	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	Casper District

<b>Project</b>	Weld County, CO		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	Colorado Northern Zone		

Site	Lewis				
Site Position:		Northing:	1,359,217.01 usft	Latitude:	40° 19' 2.496 N
From:	Lat/Long	Easting:	3,194,102.61 usft	Longitude:	104° 48' 14.076 W
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in	Grid Convergence:	0.45 °

Well	Lewis 1-C, 478 FNL 600 FWL SEC 17 T4N R66W					
Well Position	+N/-S	0.00 ft	Northing:	1,359,369.08 usft	Latitude:	40° 19' 4.116 N
	+E/-W	0.00 ft	Easting:	3,192,587.22 usft	Longitude:	104° 48' 33.624 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level:	4,709.00 ft

<b>Wellbore</b>	OH				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	BGGM2013	6/27/2013	8.63	66.90	52,805

<b>Design</b>	OH				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	28.12	

<b>Survey Program</b>	<b>Date</b>	8/6/2013			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
100.00	7,125.00	Survey #1 Surface Gyros (OH)	SDI Standard Keeper 103	SDI Standard Wireline Keeper ver 1.0.3	

<b>Survey</b>									
<b>Measured Depth (ft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Vertical Section (ft)</b>	<b>Dogleg Rate (°/100ft)</b>	<b>Build Rate (°/100ft)</b>	<b>Turn Rate (°/100ft)</b>
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.26	212.65	100.00	-0.19	-0.12	-0.23	0.26	0.26	0.00
<b>First SDI Gyro Survey</b>									
200.00	0.37	234.05	200.00	-0.57	-0.51	-0.74	0.16	0.11	21.40
300.00	0.19	159.47	300.00	-0.92	-0.71	-1.14	0.37	-0.18	-74.58
400.00	0.17	185.14	400.00	-1.22	-0.66	-1.39	0.08	-0.02	25.67
500.00	0.19	167.56	500.00	-1.53	-0.64	-1.65	0.06	0.02	-17.58
600.00	0.18	177.06	600.00	-1.85	-0.60	-1.91	0.03	-0.01	9.50
700.00	0.17	157.48	700.00	-2.14	-0.53	-2.14	0.06	-0.01	-19.58
800.00	0.23	185.24	799.99	-2.48	-0.50	-2.42	0.11	0.06	27.76
900.00	0.15	212.27	899.99	-2.79	-0.58	-2.73	0.12	-0.08	27.03

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## Survey Report

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<b>Project:</b>	Weld County, CO	<b>TVD Reference:</b>	GL 4709' @ 4709.00ft (Haliburton)
<b>Site:</b>	Lewis	<b>MD Reference:</b>	GL 4709' @ 4709.00ft (Haliburton)
<b>Well:</b>	Lewis 1-C	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	Casper District

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
1,000.00	0.14	215.93	999.99	-3.00	-0.72	-2.99	0.01	-0.01	3.66
1,100.00	0.08	214.55	1,099.99	-3.16	-0.84	-3.18	0.06	-0.06	-1.38
1,200.00	0.05	42.55	1,199.99	-3.18	-0.85	-3.20	0.13	-0.03	-172.00
1,300.00	0.07	348.32	1,299.99	-3.09	-0.83	-3.11	0.06	0.02	-54.23
1,400.00	0.05	191.85	1,399.99	-3.07	-0.85	-3.11	0.12	-0.02	-156.47
1,500.00	0.09	51.62	1,499.99	-3.07	-0.80	-3.08	0.13	0.04	-140.23
1,600.00	0.01	203.72	1,599.99	-3.02	-0.74	-3.02	0.10	-0.08	152.10
1,700.00	0.05	291.23	1,699.99	-3.02	-0.78	-3.03	0.05	0.04	87.51
1,800.00	0.04	1.18	1,799.99	-2.97	-0.82	-3.00	0.05	-0.01	69.95
1,900.00	0.10	357.16	1,899.99	-2.84	-0.83	-2.90	0.06	0.06	-4.02
2,000.00	0.27	36.03	1,999.99	-2.57	-0.69	-2.59	0.20	0.17	38.87
2,100.00	0.33	30.20	2,099.99	-2.13	-0.41	-2.07	0.07	0.06	-5.83
2,200.00	0.32	35.17	2,199.99	-1.65	-0.10	-1.50	0.03	-0.01	4.97
2,300.00	0.26	36.43	2,299.99	-1.24	0.19	-1.00	0.06	-0.06	1.26
2,400.00	0.17	10.38	2,399.99	-0.91	0.35	-0.64	0.13	-0.09	-26.05
2,500.00	0.21	303.41	2,499.99	-0.66	0.23	-0.48	0.21	0.04	-66.97
2,600.00	0.18	11.12	2,599.99	-0.41	0.10	-0.31	0.22	-0.03	67.71
2,700.00	0.21	350.50	2,699.99	-0.07	0.10	-0.02	0.08	0.03	-20.62
2,800.00	0.44	35.50	2,799.98	0.42	0.30	0.51	0.33	0.23	45.00
2,900.00	0.40	17.69	2,899.98	1.06	0.63	1.23	0.14	-0.04	-17.81
3,000.00	0.44	24.09	2,999.98	1.75	0.89	1.96	0.06	0.04	6.40
3,100.00	0.51	36.85	3,099.98	2.45	1.31	2.78	0.13	0.07	12.76
3,200.00	0.51	10.66	3,199.97	3.25	1.66	3.65	0.23	0.00	-26.19
3,300.00	0.54	357.57	3,299.97	4.16	1.72	4.48	0.12	0.03	-13.09
3,400.00	0.60	339.47	3,399.96	5.12	1.52	5.23	0.19	0.06	-18.10
3,500.00	0.73	346.56	3,499.96	6.23	1.19	6.05	0.15	0.13	7.09
3,600.00	0.24	357.17	3,599.95	7.06	1.03	6.71	0.50	-0.49	10.61
3,700.00	0.32	356.23	3,699.95	7.54	1.00	7.13	0.08	0.08	-0.94
3,800.00	0.35	24.72	3,799.95	8.10	1.11	7.67	0.17	0.03	28.49
3,900.00	0.34	29.07	3,899.95	8.64	1.38	8.27	0.03	-0.01	4.35
4,000.00	0.35	18.79	3,999.95	9.19	1.63	8.87	0.06	0.01	-10.28
4,100.00	0.35	28.66	4,099.94	9.74	1.87	9.47	0.06	0.00	9.87
4,200.00	0.39	24.69	4,199.94	10.32	2.16	10.12	0.05	0.04	-3.97
4,300.00	0.25	68.24	4,299.94	10.71	2.50	10.63	0.27	-0.14	43.55
4,400.00	0.28	59.67	4,399.94	10.91	2.92	11.00	0.05	0.03	-8.57
4,500.00	0.33	90.63	4,499.94	11.03	3.42	11.34	0.17	0.05	30.96
4,600.00	0.27	72.58	4,599.94	11.10	3.93	11.64	0.11	-0.06	-18.05
4,700.00	0.31	91.05	4,699.94	11.17	4.42	11.93	0.10	0.04	18.47
4,800.00	0.29	89.21	4,799.93	11.17	4.95	12.18	0.02	-0.02	-1.84
4,900.00	0.20	118.64	4,899.93	11.09	5.35	12.30	0.15	-0.09	29.43
5,000.00	0.11	139.64	4,999.93	10.93	5.57	12.26	0.10	-0.09	21.00
5,100.00	0.07	133.36	5,099.93	10.81	5.68	12.21	0.04	-0.04	-6.28
5,200.00	0.19	164.56	5,199.93	10.61	5.76	12.08	0.14	0.12	31.20

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## Survey Report

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<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	Casper District

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
5,300.00	0.21	158.64	5,299.93	10.28	5.88	11.84	0.03	0.02	-5.92	
5,400.00	0.12	177.91	5,399.93	10.01	5.95	11.63	0.10	-0.09	19.27	
5,500.00	0.14	146.35	5,499.93	9.80	6.02	11.48	0.07	0.02	-31.56	
5,600.00	0.60	88.29	5,599.93	9.71	6.61	11.68	0.54	0.46	-58.06	
5,700.00	0.48	84.79	5,699.92	9.77	7.55	12.17	0.12	-0.12	-3.50	
5,800.00	0.39	40.51	5,799.92	10.06	8.19	12.73	0.34	-0.09	-44.28	
5,900.00	0.29	53.00	5,899.92	10.47	8.61	13.30	0.12	-0.10	12.49	
6,000.00	0.26	20.42	5,999.92	10.84	8.89	13.75	0.16	-0.03	-32.58	
6,100.00	0.13	300.54	6,099.92	11.11	8.87	13.98	0.27	-0.13	-79.88	
6,200.00	0.21	312.04	6,199.92	11.29	8.64	14.03	0.09	0.08	11.50	
6,300.00	0.20	1.49	6,299.92	11.59	8.51	14.23	0.17	-0.01	49.45	
6,400.00	0.30	281.30	6,399.92	11.81	8.26	14.31	0.33	0.10	-80.19	
6,500.00	0.32	279.70	6,499.92	11.91	7.72	14.15	0.02	0.02	-1.60	
6,600.00	0.27	291.23	6,599.91	12.04	7.23	14.03	0.08	-0.05	11.53	
6,700.00	0.39	254.27	6,699.91	12.04	6.68	13.77	0.24	0.12	-36.96	
6,800.00	0.17	305.32	6,799.91	12.03	6.23	13.55	0.31	-0.22	51.05	
6,900.00	0.14	85.41	6,899.91	12.13	6.23	13.63	0.29	-0.03	140.09	
7,000.00	0.04	150.36	6,999.91	12.11	6.37	13.68	0.13	-0.10	64.95	
7,100.00	0.13	195.02	7,099.91	11.97	6.36	13.55	0.11	0.09	44.66	
7,125.00	0.28	94.62	7,124.91	11.93	6.41	13.55	1.32	0.60	-401.60	
Last SDI Gyro Survey										

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
100.00	100.00	-0.19	-0.12	First SDI Gyro Survey	
7,125.00	7,124.91	11.93	6.41	Last SDI Gyro Survey	

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_