

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 21-T4N-R65W

JR 32-21 - Slot A1

Plan A Rev 0

Survey: Sperry MWD Surveys

Standard Survey Report

12 May, 2011

HALLIBURTON

Sperry Drilling

SPERRY-SUN DRILLING SERVICES

CERTIFIED SURVEY WORK SHEET

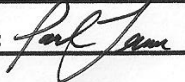
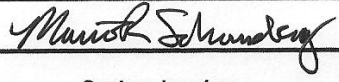
OPERATOR:	Anadarko
WELL:	JR 32-21
FIELD:	Sec. 21-T4N-R65W
RIG:	Xtreme 8
LEGALS:	Sec. 21-T4N-R65W
COUNTY:	Weld
STATE:	Colorado
CAL. METHOD:	Minimum Curvature
MAG. DECL. APPLIED:	8.26
VERTICAL SEC. DIR. :	239.798

SSDS Job Number :	CA-MJ-0008058541
Start Date of Job :	4/2/2011
End Date of Job :	4/4/2011
Lead Directional Driller:	Wade Tobin
	Paul Jevne
Other SSDS DD's :	
SSDS MWD Engineers :	Mario Schonsberg
	Osahon Igunbor

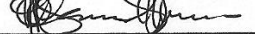
	Main Hole >	1st Side Track >	2nd Side Track >	3rd Side Track >	4th Side Track >
ESS Survey	Tie On	Tie On	Tie On	Tie On	Tie On
First Survey Depth	Gyro				
Last Survey Depth					
KOP Depth/Sidetrack MD	KOP	KOP-ST1	KOP-ST2	KOP-ST3	KOP-ST4
First Survey Depth	74.00	MWD	MWD	MWD	MWD
Last Survey Depth	7957.00	MWD	MWD	MWD	MWD
Bit Extrapolation to TD	8016.00	T.D.	T.D.	T.D.	T.D.

The following Sperry Sun Drilling Services personnel listed below, do certify the above survey information to be accurate :

Print Name : Paul Jevne Print Name : Mario Schonsberg Print Name :

Sign Name :  Sign Name :  Sign Name :

Print Name : Print Name : Osahon Igunbor Print Name :

Sign Name : Sign Name :  Sign Name :

Examples of	TieOn	Tie On to Surface Casing (Assumed Vertical), Tie On to existing MWD Survey (prior drilled hole)
Survey Types:	MWD	Sperry Sun Drilling Services (SSDS) Measurement While Drilling (MWD) Survey's
	ESS	Sperry Sun Drilling Services (SSDS) Electronic Survey System (ESS) Survey's
	Gyro	Gyro Survey's ; Provided by third party vendor, or by Sperry Sun Drilling Services (SSDS)
	SS	Single Shot (SS) Survey's ; Provided by Sperry Sun Drilling Services (SSDS) or third party vendor.

Company:	Anadarko Petroleum Corp.	Local Co-ordinate Reference:	Well JR 32-21 - Slot A1
Project:	Weld County, CO (NAD 83)	TVD Reference:	RKB 17' @ 4866.00ft (Extreme 8)
Site:	Sec. 21-T4N-R65W	MD Reference:	RKB 17' @ 4866.00ft (Extreme 8)
Well:	JR 32-21	North Reference:	Grid
Wellbore:	Plan A Rev 0	Survey Calculation Method:	Minimum Curvature
Design:	Sperry MWD Survey	Database:	EDM 2003.16 Single User Db

Project	Weld County, CO (NAD 83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

Site	Sec. 21-T4N-R65W		
Site Position:		Northing:	1,353,152.22 ft
From:	Lat/Long	Easting:	3,230,525.51 ft
Position Uncertainty:	0.00 ft	Slot Radius:	"
		Latitude:	40.299854
		Longitude:	-104.673500
		Grid Convergence:	0.53 °

Well	JR 32-21 - Slot A1		
Well Position	+N/-S	0.00 ft	Northing: 1,353,152.22 ft
	+E/-W	0.00 ft	Easting: 3,230,525.51 ft
Position Uncertainty	0.00 ft	Wellhead Elevation:	4,849.00 ft
		Ground Level:	4,849.00 ft

Wellbore	Plan A Rev 0				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2010	4/15/2011	8.79	67.00	53,083

Design	Sperry MWD Survey			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	239.798

Survey Program	Date 5/12/2011			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
74.00	8,016.00	Sperry MWD Surveys (Plan A Rev 0)	MWD	MWD - Standard

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)
0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
74.00	0.61	136.010	74.00	-0.28	0.27	-0.09	0.82	0.82	0.00
First Sperry MWD Survey at 74.00 ft									
166.00	0.70	150.940	165.99	-1.13	0.89	-0.20	0.21	0.10	16.23
260.00	1.15	195.670	259.98	-2.54	0.91	0.49	0.87	0.48	47.59
355.00	3.38	230.940	354.90	-5.22	-1.52	3.94	2.66	2.35	37.13
443.00	6.40	235.330	442.57	-9.65	-7.57	11.40	3.46	3.43	4.99
531.00	8.37	239.490	529.84	-15.69	-17.12	22.69	2.32	2.24	4.73
592.00	9.65	239.080	590.09	-20.57	-25.34	32.24	2.10	2.10	-0.67
708.00	10.43	236.580	704.31	-31.35	-42.44	52.45	0.77	0.67	-2.16
797.00	10.97	237.600	791.76	-40.32	-56.31	68.95	0.64	0.61	1.15
885.00	11.48	237.230	878.08	-49.55	-70.75	86.07	0.59	0.58	-0.42
973.00	11.89	238.770	964.25	-58.99	-85.86	103.88	0.59	0.47	1.75

Company:	Anadarko Petroleum Corp.	Local Co-ordinate Reference:	Well JR 32-21 - Slot A1
Project:	Weld County, CO (NAD 83)	TVD Reference:	RKB 17' @ 4866.00ft (Extreme 8)
Site:	Sec. 21-T4N-R65W	MD Reference:	RKB 17' @ 4866.00ft (Extreme 8)
Well:	JR 32-21	North Reference:	Grid
Wellbore:	Plan A Rev 0	Survey Calculation Method:	Minimum Curvature
Design:	Sperry MWD Survey	Database:	EDM 2003.16 Single User Db

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)
1,059.00	11.67	238.390	1,048.44	-68.14	-100.85	121.44	0.27	-0.26	-0.44
1,148.00	12.80	237.930	1,135.42	-78.09	-116.87	140.29	1.27	1.27	-0.52
1,237.00	13.89	239.900	1,222.02	-88.69	-134.46	160.83	1.33	1.22	2.21
1,326.00	14.83	239.070	1,308.24	-99.90	-153.48	182.90	1.08	1.06	-0.93
1,414.00	15.79	238.560	1,393.11	-111.93	-173.35	206.13	1.10	1.09	-0.58
1,501.00	15.93	237.780	1,476.80	-124.47	-193.55	229.90	0.29	0.16	-0.90
1,589.00	17.24	238.750	1,561.14	-137.68	-214.92	255.00	1.52	1.49	1.10
1,677.00	15.19	236.260	1,645.63	-150.85	-235.66	279.55	2.46	-2.33	-2.83
1,765.00	15.67	234.780	1,730.46	-164.11	-254.95	302.90	0.71	0.55	-1.68
1,854.00	16.38	238.670	1,816.00	-177.56	-275.49	327.42	1.45	0.80	4.37
1,943.00	15.27	239.750	1,901.63	-189.99	-296.34	351.69	1.29	-1.25	1.21
2,031.00	14.79	241.200	1,986.62	-201.24	-316.19	374.50	0.69	-0.55	1.65
2,119.00	15.10	240.550	2,071.64	-212.29	-336.01	397.19	0.40	0.35	-0.74
2,206.00	12.73	239.580	2,156.08	-222.71	-354.15	418.11	2.74	-2.72	-1.11
2,296.00	13.24	242.760	2,243.78	-232.45	-371.86	438.32	0.98	0.57	3.53
2,384.00	13.37	242.950	2,329.42	-241.69	-389.89	458.54	0.16	0.15	0.22
2,473.00	13.35	244.730	2,416.01	-250.76	-408.34	479.06	0.46	-0.02	2.00
2,561.00	13.10	241.800	2,501.68	-259.81	-426.32	499.15	0.81	-0.28	-3.33
2,650.00	13.61	241.750	2,588.27	-269.53	-444.43	519.69	0.57	0.57	-0.06
2,738.00	15.44	243.820	2,673.46	-279.60	-464.07	541.73	2.16	2.08	2.35
2,828.00	18.84	244.850	2,759.45	-291.07	-487.98	568.16	3.79	3.78	1.14
2,917.00	18.58	244.320	2,843.74	-303.32	-513.76	596.61	0.35	-0.29	-0.60
3,005.00	19.29	242.260	2,926.98	-316.16	-539.27	625.11	1.11	0.81	-2.34
3,093.00	17.30	241.790	3,010.53	-329.11	-563.66	652.71	2.27	-2.26	-0.53
3,181.00	16.60	241.050	3,094.71	-341.38	-586.19	678.35	0.83	-0.80	-0.84
3,269.00	17.54	239.420	3,178.83	-354.21	-608.61	704.18	1.20	1.07	-1.85
3,358.00	15.40	239.940	3,264.17	-366.95	-630.39	729.41	2.41	-2.40	0.58
3,446.00	14.77	237.820	3,349.14	-378.78	-649.99	752.31	0.95	-0.72	-2.41
3,535.00	15.41	241.270	3,435.07	-390.51	-669.96	775.47	1.24	0.72	3.88
3,623.00	14.50	240.040	3,520.09	-401.63	-689.76	798.17	1.10	-1.03	-1.40
3,710.00	14.45	243.520	3,604.33	-411.91	-708.91	819.90	1.00	-0.06	4.00
3,799.00	13.92	239.750	3,690.62	-422.25	-728.10	841.68	1.20	-0.60	-4.24
3,887.00	14.17	238.260	3,775.99	-433.25	-746.41	863.03	0.50	0.28	-1.69
3,976.00	15.39	236.620	3,862.04	-445.48	-765.53	885.72	1.45	1.37	-1.84
4,063.00	18.16	236.150	3,945.33	-459.39	-786.44	910.78	3.19	3.18	-0.54
4,151.00	18.22	236.960	4,028.94	-474.53	-809.36	938.21	0.30	0.07	0.92
4,237.00	17.09	236.760	4,110.88	-488.79	-831.20	964.25	1.32	-1.31	-0.23
4,327.00	15.03	236.850	4,197.37	-502.42	-852.03	989.12	2.29	-2.29	0.10
4,416.00	14.06	241.730	4,283.52	-513.85	-871.22	1,011.45	1.76	-1.09	5.48
4,504.00	14.44	242.710	4,368.81	-523.94	-890.38	1,033.09	0.51	0.43	1.11
4,594.00	14.83	238.280	4,455.89	-535.14	-910.15	1,055.81	1.32	0.43	-4.92
4,683.00	15.28	238.800	4,541.84	-547.21	-929.87	1,078.92	0.53	0.51	0.58
4,769.00	15.92	241.740	4,624.67	-558.66	-949.95	1,102.04	1.18	0.74	3.42
4,859.00	14.20	242.150	4,711.58	-569.66	-970.59	1,125.41	1.91	-1.91	0.46
4,946.00	11.72	242.340	4,796.35	-578.75	-987.85	1,144.90	2.85	-2.85	0.22
5,034.00	10.16	242.460	4,882.75	-586.49	-1,002.65	1,161.58	1.77	-1.77	0.14
5,122.00	8.89	249.940	4,969.54	-592.41	-1,015.92	1,176.03	2.01	-1.44	8.50
5,211.00	7.62	254.970	5,057.62	-596.30	-1,028.08	1,188.50	1.64	-1.43	5.65
5,300.00	7.79	251.180	5,145.81	-599.78	-1,039.49	1,200.10	0.60	0.19	-4.26
5,389.00	6.14	252.690	5,234.15	-603.14	-1,049.74	1,210.66	1.87	-1.85	1.70
5,478.00	4.87	251.470	5,322.74	-605.76	-1,057.87	1,219.00	1.43	-1.43	-1.37
5,566.00	3.72	249.430	5,410.49	-607.95	-1,064.08	1,225.47	1.32	-1.31	-2.32
5,653.00	3.28	251.420	5,497.33	-609.73	-1,069.09	1,230.69	0.52	-0.51	2.29
5,741.00	2.52	251.530	5,585.22	-611.15	-1,073.31	1,235.05	0.86	-0.86	0.12

Company:	Anadarko Petroleum Corp.	Local Co-ordinate Reference:	Well JR 32-21 - Slot A1
Project:	Weld County, CO (NAD 83)	TVD Reference:	RKB 17' @ 4866.00ft (Extreme 8)
Site:	Sec. 21-T4N-R65W	MD Reference:	RKB 17' @ 4866.00ft (Extreme 8)
Well:	JR 32-21	North Reference:	Grid
Wellbore:	Plan A Rev 0	Survey Calculation Method:	Minimum Curvature
Design:	Sperry MWD Survey	Database:	EDM 2003.16 Single User Db

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)
5,829.00	1.68	261.790	5,673.16	-611.94	-1,076.42	1,238.14	1.04	-0.95	11.66
5,917.00	2.01	254.080	5,761.11	-612.55	-1,079.18	1,240.83	0.47	0.37	-8.76
6,005.00	2.22	244.490	5,849.05	-613.71	-1,082.20	1,244.03	0.47	0.24	-10.90
6,093.00	2.44	237.210	5,936.98	-615.46	-1,085.31	1,247.60	0.42	0.25	-8.27
6,183.00	2.17	231.490	6,026.91	-617.55	-1,088.26	1,251.20	0.39	-0.30	-6.36
6,271.00	1.54	224.690	6,114.86	-619.43	-1,090.39	1,253.99	0.76	-0.72	-7.73
6,359.00	1.16	210.250	6,202.84	-621.04	-1,091.67	1,255.90	0.58	-0.43	-16.41
6,449.00	0.98	220.960	6,292.82	-622.41	-1,092.64	1,257.42	0.30	-0.20	11.90
6,537.00	1.09	205.260	6,380.81	-623.74	-1,093.49	1,258.83	0.34	0.12	-17.84
6,623.00	0.87	206.790	6,466.79	-625.06	-1,094.13	1,260.05	0.26	-0.26	1.78
6,711.00	0.90	202.430	6,554.78	-626.29	-1,094.70	1,261.16	0.08	0.03	-4.95
6,801.00	0.82	183.850	6,644.77	-627.59	-1,095.01	1,262.08	0.32	-0.09	-20.64
6,890.00	0.51	178.590	6,733.77	-628.62	-1,095.04	1,262.63	0.35	-0.35	-5.91
6,980.00	0.25	175.180	6,823.76	-629.22	-1,095.02	1,262.90	0.29	-0.29	-3.79
7,070.00	0.25	159.190	6,913.76	-629.60	-1,094.93	1,263.02	0.08	0.00	-17.77
7,157.00	0.44	162.080	7,000.76	-630.09	-1,094.76	1,263.12	0.22	0.22	3.32
7,245.00	0.22	127.360	7,088.76	-630.52	-1,094.52	1,263.13	0.33	-0.25	-39.45
7,333.00	0.72	144.390	7,176.76	-631.07	-1,094.06	1,263.01	0.58	0.57	19.35
7,423.00	0.65	127.130	7,266.75	-631.84	-1,093.33	1,262.76	0.24	-0.08	-19.18
7,513.00	0.44	105.480	7,356.75	-632.24	-1,092.59	1,262.32	0.32	-0.23	-24.06
7,600.00	0.79	120.330	7,443.74	-632.63	-1,091.75	1,261.80	0.44	0.40	17.07
7,689.00	0.74	115.790	7,532.73	-633.19	-1,090.70	1,261.17	0.09	-0.06	-5.10
7,777.00	0.83	116.500	7,620.73	-633.72	-1,089.62	1,260.50	0.10	0.10	0.81
7,865.00	0.88	111.620	7,708.72	-634.25	-1,088.42	1,259.74	0.10	0.06	-5.55
7,957.00	1.13	127.310	7,800.70	-635.06	-1,087.04	1,258.95	0.40	0.27	17.05
Final Sperry MWD Survey at 7957.00 ft									
8,016.00	1.13	127.310	7,859.69	-635.77	-1,086.12	1,258.51	0.00	0.00	0.00
Straight Line Projection to TD at 8016.00 ft									

Company:	Anadarko Petroleum Corp.	Local Co-ordinate Reference:	Well JR 32-21 - Slot A1
Project:	Weld County, CO (NAD 83)	TVD Reference:	RKB 17' @ 4866.00ft (Extreme 8)
Site:	Sec. 21-T4N-R65W	MD Reference:	RKB 17' @ 4866.00ft (Extreme 8)
Well:	JR 32-21	North Reference:	Grid
Wellbore:	Plan A Rev 0	Survey Calculation Method:	Minimum Curvature
Design:	Sperry MWD Survey	Database:	EDM 2003.16 Single User Db

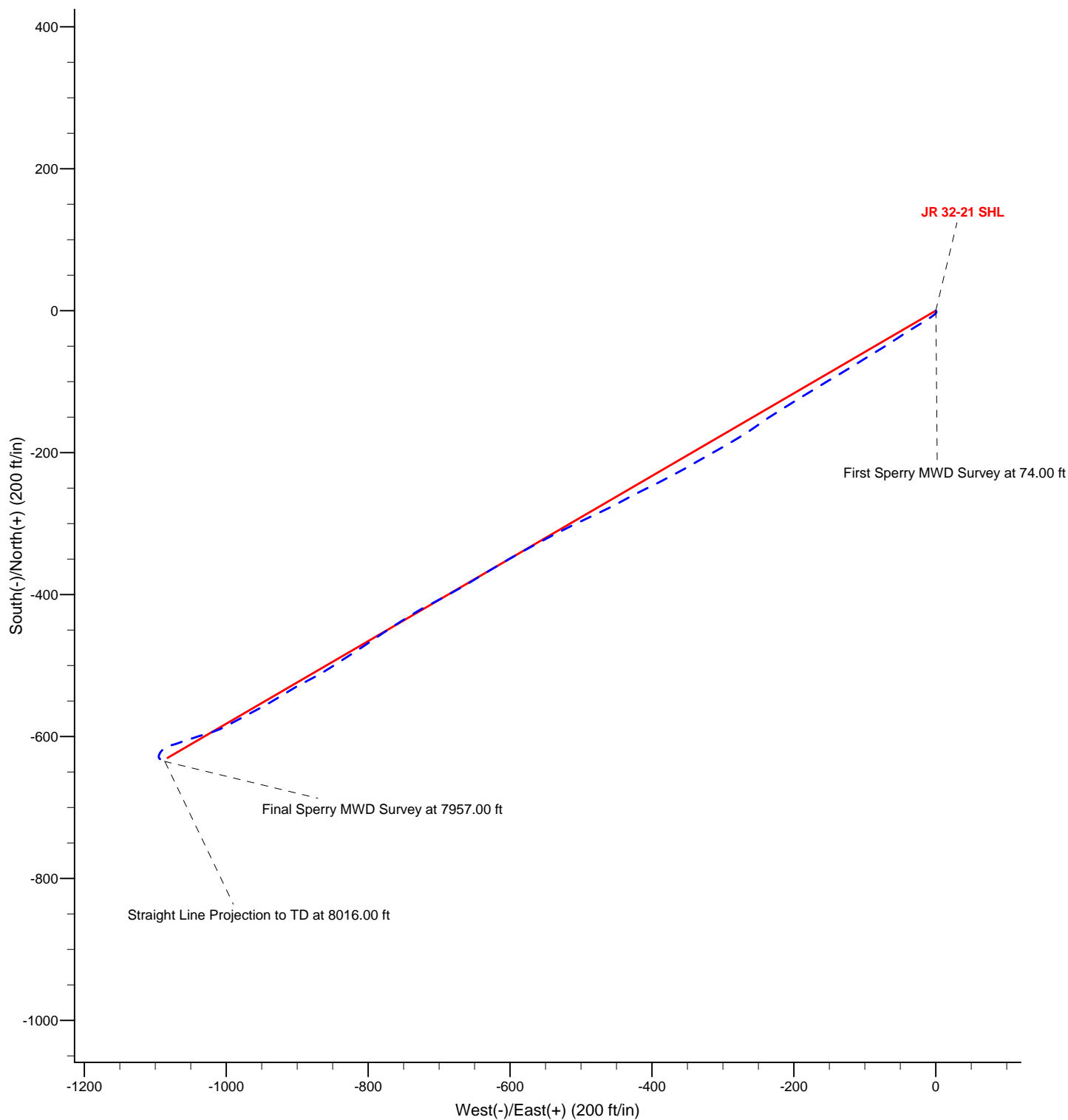
Targets									
Target Name									
- hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- Shape	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
JR 32-21 Plan A Rev	0.00	0.00	6,946.00	-630.14	-1,082.60	1,352,522.11	3,229,442.96	40.298152	-104.677402
- survey misses target center by 12.28ft at 7102.26ft MD (6946.03 TVD, -629.75 N, -1094.87 E)									
- Circle (radius 50.00)									
JR 32-21 Plan A Rev	0.00	0.00	7,813.00	-630.14	-1,082.60	1,352,522.11	3,229,442.96	40.298152	-104.677402
- survey misses target center by 13.97ft at 7957.00ft MD (7800.70 TVD, -635.06 N, -1087.04 E)									
- Point									
JR 32-21 S. Hardline	0.00	0.00	0.00	0.00	0.00	1,353,152.22	3,230,525.51	40.299854	-104.673500
- survey hits target center									
- Polygon									
Point 1			0.00	-711.00	-1,158.00	1,352,441.25	3,229,367.56		
Point 2			0.00	-711.00	4,000.00	1,352,441.25	3,234,525.34		
JR 32-21 N. Sec. Line	0.00	0.00	0.00	0.00	0.00	1,353,152.22	3,230,525.51	40.299854	-104.673500
- survey hits target center									
- Polygon									
Point 1			0.00	1,931.00	-1,137.00	1,355,083.14	3,229,388.56		
Point 2			0.00	1,950.00	1,532.00	1,355,102.14	3,232,057.44		
JR 32-21 W. Sec. Line	0.00	0.00	0.00	0.00	0.00	1,353,152.22	3,230,525.51	40.299854	-104.673500
- survey hits target center									
- Polygon									
Point 1			0.00	1,931.00	-1,137.00	1,355,083.14	3,229,388.56		
Point 2			0.00	-711.00	-1,158.00	1,352,441.25	3,229,367.56		

Survey Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
74.00	74.00	-0.28	0.27	First Sperry MWD Survey at 74.00 ft
7,957.00	7,800.70	-635.06	-1,087.04	Final Sperry MWD Survey at 7957.00 ft
8,016.00	7,859.69	-635.77	-1,086.12	Straight Line Projection to TD at 8016.00 ft

Checked By: _____ Approved By: _____ Date: _____

LEGEND

- JR 32-21, Plan A Rev 0, Plan A Rev 0 Proposal V0
- - - Sperry MWD Surveys



Project: Weld County, CO (NAD 83)
Site: Sec. 21-T4N-R65W
Well: JR 32-21

Anadarko Petroleum Corp.

HALLIBURTON
Sperry Drilling

