

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 21-T4N-R65W

JR 18-21 - Slot A3

Plan A Rev 0

Survey: Sperry MWD Surveys

Standard Survey Report

11 May, 2011

HALLIBURTON

Sperry Drilling

SPERRY-SUN DRILLING SERVICES


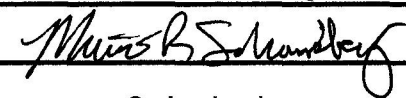

CERTIFIED SURVEY WORK SHEET

OPERATOR:	Anadarko
WELL:	JR 18-21
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. :	16.044

SSDS Job Number :	CA-MJ-0008058539
Start Date of Job :	3/29/2011
End Date of Job :	4/1/2011
Lead Directional Driller:	Justen Koenen
	Wade Tobin
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		MWD
Last Survey Depth	7892.00	MWD		MWD		MWD		MWD		MWD
Bit Extrapolation to TD	7951.00	T.D.		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 : Wade Tobin	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 Survey Types:

TieOn	Tie On to Surface Casing (Assumed Vertical), Tie On to existing MWD Survey (prior drilled hole)
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 18-21 - Slot A3
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 18-21	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:	1,353,152.22ft	Latitude:	40.299854
From:	Lat/Long	Easting:	3,230,525.51ft	Longitude:	-104.673500
Position Uncertainty:	0.00 ft	Slot Radius:	"	Grid Convergence:	0.53 °

Well	JR 18-21 - Slot A3					
Well Position	+N-S	0.00 ft	Northing:	1,353,184.27 ft	Latitude:	40.299942
	+E-W	0.00 ft	Easting:	3,230,525.49 ft	Longitude:	-104.673499
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	3/18/2011	8.80	67.01	53,092

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	16.044	

Survey Program	Date 5/11/2011				
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
74.00	7,951.00	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	0.19	73.130	74.00	0.04	0.12	0.07	0.26	0.26	0.00	
First Sperry MWD Survey at 74.00 ft										
166.00	0.40	308.800	166.00	0.28	0.01	0.27	0.58	0.23	-135.14	
260.00	0.97	23.920	259.99	1.21	0.08	1.19	1.01	0.61	79.91	
353.00	2.97	16.060	352.93	4.25	1.07	4.38	2.17	2.15	-8.45	
443.00	5.65	21.530	442.67	10.61	3.34	11.12	3.01	2.98	6.08	
531.00	8.40	17.480	530.00	20.77	6.86	21.86	3.17	3.12	-4.60	
592.00	8.58	16.040	590.33	29.40	9.45	30.87	0.46	0.30	-2.36	
708.00	8.96	15.580	704.98	46.42	14.27	48.55	0.33	0.33	-0.40	
796.00	9.19	16.260	791.88	59.76	18.08	62.43	0.29	0.26	0.77	
885.00	9.37	14.520	879.71	73.60	21.89	76.78	0.37	0.20	-1.96	
972.00	11.11	18.680	965.32	88.40	26.35	92.23	2.17	2.00	4.78	

Halliburton Company

Survey Report



Company:	Anadarko Petroleum Corp.	Local Co-ordinate Reference:	Well JR 18-21 - Slot A3
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 18-21	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	13.25	14.850	1,050.36	105.98	31.59	110.58	2.63	2.46	-4.40
1,148.00	15.22	13.930	1,136.63	127.18	37.01	132.45	2.23	2.21	-1.03
1,236.00	15.86	13.640	1,221.41	150.07	42.63	156.01	0.73	0.73	-0.33
1,326.00	16.84	14.870	1,307.77	174.63	48.88	181.33	1.15	1.09	1.37
1,414.00	17.20	13.800	1,391.91	199.58	55.25	207.08	0.54	0.41	-1.22
1,500.00	16.89	13.600	1,474.14	224.07	61.22	232.26	0.37	-0.36	-0.23
1,589.00	17.02	10.340	1,559.27	249.45	66.60	258.14	1.08	0.15	-3.66
1,677.00	16.09	8.870	1,643.62	274.17	70.79	283.06	1.16	-1.06	-1.67
1,764.00	16.75	13.290	1,727.08	298.29	75.53	307.54	1.62	0.76	5.08
1,854.00	16.00	12.330	1,813.42	323.03	81.16	332.87	0.89	-0.83	-1.07
1,942.00	16.08	15.210	1,898.00	346.63	86.95	357.16	0.91	0.09	3.27
2,030.00	16.41	18.460	1,982.49	370.19	94.08	381.77	1.10	0.37	3.69
2,118.00	15.20	16.680	2,067.16	393.03	101.33	405.73	1.48	-1.37	-2.02
2,205.00	15.54	16.950	2,151.05	415.10	108.00	428.78	0.40	0.39	0.31
2,295.00	17.00	20.510	2,237.44	438.96	116.13	453.96	1.96	1.62	3.96
2,383.00	15.19	17.610	2,321.99	462.00	124.12	478.31	2.25	-2.06	-3.30
2,473.00	13.86	16.860	2,409.11	483.55	130.82	500.87	1.49	-1.48	-0.83
2,561.00	14.29	21.830	2,494.47	503.72	137.91	522.22	1.46	0.49	5.65
2,650.00	15.12	22.630	2,580.56	524.63	146.46	544.68	0.96	0.93	0.90
2,738.00	13.34	20.530	2,665.86	544.74	154.44	566.20	2.11	-2.02	-2.39
2,827.00	13.50	17.590	2,752.43	564.25	161.18	586.82	0.79	0.18	-3.30
2,917.00	11.71	15.570	2,840.25	583.07	166.81	606.46	2.05	-1.99	-2.24
3,005.00	9.51	17.720	2,926.75	598.60	171.42	622.66	2.54	-2.50	2.44
3,093.00	6.35	21.190	3,013.89	610.06	175.39	634.77	3.63	-3.59	3.94
3,181.00	6.29	20.330	3,101.36	619.12	178.83	644.43	0.13	-0.07	-0.98
3,269.00	3.50	17.420	3,189.03	626.21	181.30	651.92	3.18	-3.17	-3.31
3,358.00	2.77	14.070	3,277.89	630.88	182.64	656.79	0.85	-0.82	-3.76
3,446.00	0.40	341.130	3,365.86	633.24	183.06	659.17	2.78	-2.69	-37.43
3,535.00	1.07	312.280	3,454.85	634.09	182.34	659.79	0.84	0.75	-32.42
3,623.00	0.46	205.120	3,542.84	634.32	181.59	659.80	1.46	-0.69	-121.77
3,710.00	0.38	302.820	3,629.84	634.16	181.19	659.54	0.73	-0.09	112.30
3,799.00	0.07	124.420	3,718.84	634.29	180.99	659.61	0.51	-0.35	-200.45
3,887.00	0.26	52.750	3,806.84	634.38	181.19	659.75	0.28	0.22	-81.44
3,976.00	0.60	9.360	3,895.84	634.96	181.43	660.38	0.50	0.38	-48.75
4,062.00	0.98	331.290	3,981.83	636.05	181.15	661.35	0.73	0.44	-44.27
4,150.00	0.79	307.590	4,069.82	637.08	180.31	662.10	0.46	-0.22	-26.93
4,237.00	1.77	180.770	4,156.81	636.11	179.82	661.03	2.68	1.13	-145.77
4,327.00	1.43	165.020	4,246.77	633.63	180.09	658.72	0.61	-0.38	-17.50
4,415.00	1.11	180.690	4,334.75	631.72	180.36	656.96	0.53	-0.36	17.81
4,503.00	0.99	197.980	4,422.74	630.14	180.12	655.38	0.38	-0.14	19.65
4,593.00	0.77	198.710	4,512.73	628.83	179.68	654.00	0.24	-0.24	0.81
4,682.00	0.18	222.830	4,601.72	628.16	179.39	653.28	0.69	-0.66	27.10
4,769.00	0.53	242.090	4,688.72	627.87	178.95	652.87	0.42	0.40	22.14
4,859.00	0.31	273.470	4,778.72	627.69	178.34	652.53	0.35	-0.24	34.87
4,945.00	0.44	328.610	4,864.72	627.99	177.93	652.71	0.43	0.15	64.12
5,033.00	0.62	4.410	4,952.71	628.75	177.79	653.40	0.42	0.20	40.68
5,121.00	0.66	331.800	5,040.71	629.67	177.59	654.23	0.41	0.05	-37.06
5,211.00	0.37	358.520	5,130.70	630.42	177.34	654.88	0.41	-0.32	29.69
5,299.00	0.11	75.420	5,218.70	630.73	177.41	655.19	0.41	-0.30	87.39
5,389.00	0.93	238.450	5,308.70	630.37	176.87	654.70	1.15	0.91	181.14
5,478.00	0.68	231.800	5,397.69	629.66	175.84	653.73	0.30	-0.28	-7.47
5,566.00	1.26	199.310	5,485.68	628.43	175.11	652.34	0.88	0.66	-36.92
5,653.00	1.19	194.240	5,572.66	626.65	174.57	650.49	0.15	-0.08	-5.83
5,741.00	1.16	197.230	5,660.64	624.91	174.08	648.68	0.08	-0.03	3.40

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Site:	Sec. 21-T4N-R65W	MD Reference:	RKB 17' @ 4866.00ft (Extreme 8)
Well:	JR 18-21	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)
5,828.00	1.16	186.240	5,747.62	623.19	173.73	646.93	0.26	0.00	-12.63
5,917.00	1.10	194.050	5,836.61	621.47	173.42	645.19	0.19	-0.07	8.78
6,005.00	1.75	195.400	5,924.58	619.36	172.86	643.01	0.74	0.74	1.53
6,093.00	1.16	204.740	6,012.55	617.25	172.13	640.78	0.72	-0.67	10.61
6,182.00	0.83	177.380	6,101.54	615.79	171.78	639.28	0.64	-0.37	-30.74
6,271.00	0.74	183.740	6,190.53	614.57	171.78	638.11	0.14	-0.10	7.15
6,359.00	0.98	176.030	6,278.52	613.25	171.79	636.85	0.30	0.27	-8.76
6,449.00	0.87	146.800	6,368.51	611.91	172.22	635.68	0.53	-0.12	-32.48
6,537.00	0.70	132.980	6,456.50	610.99	172.98	635.00	0.29	-0.19	-15.70
6,623.00	0.89	146.970	6,542.49	610.07	173.73	634.32	0.31	0.22	16.27
6,711.00	0.52	131.380	6,630.48	609.23	174.40	633.70	0.47	-0.42	-17.72
6,800.00	0.71	142.060	6,719.48	608.53	175.04	633.21	0.25	0.21	12.00
6,890.00	0.52	156.170	6,809.47	607.72	175.55	632.56	0.27	-0.21	15.68
6,979.00	0.65	126.340	6,898.47	607.05	176.12	632.08	0.37	0.15	-33.52
7,069.00	0.11	152.780	6,988.47	606.67	176.57	631.84	0.62	-0.60	29.38
7,157.00	0.76	155.810	7,076.46	606.06	176.85	631.33	0.74	0.74	3.44
7,245.00	0.66	147.930	7,164.46	605.10	177.35	630.55	0.16	-0.11	-8.95
7,333.00	0.34	142.810	7,252.45	604.46	177.78	630.05	0.37	-0.36	-5.82
7,423.00	0.47	138.830	7,342.45	603.97	178.19	629.69	0.15	0.14	-4.42
7,512.00	0.64	133.110	7,431.45	603.36	178.79	629.27	0.20	0.19	-6.43
7,600.00	0.74	155.070	7,519.44	602.51	179.39	628.62	0.32	0.11	24.95
7,689.00	0.40	162.500	7,608.44	601.69	179.72	627.92	0.39	-0.38	8.35
7,777.00	0.47	205.490	7,696.43	601.07	179.66	627.31	0.37	0.08	48.85
7,892.00	0.52	91.990	7,811.43	600.63	179.98	626.97	0.72	0.04	-98.70
Final Sperry MWD Survey at 7892.00 ft									
7,951.00	0.52	91.990	7,870.43	600.61	180.51	627.10	0.00	0.00	0.00
Straight Line Projection to TD at 7951.00 ft									

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Well:	JR 18-21	North Reference:	Grid
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Design:	Sperry MWD Survey	Database:	EDM 2003.16 Single User Db

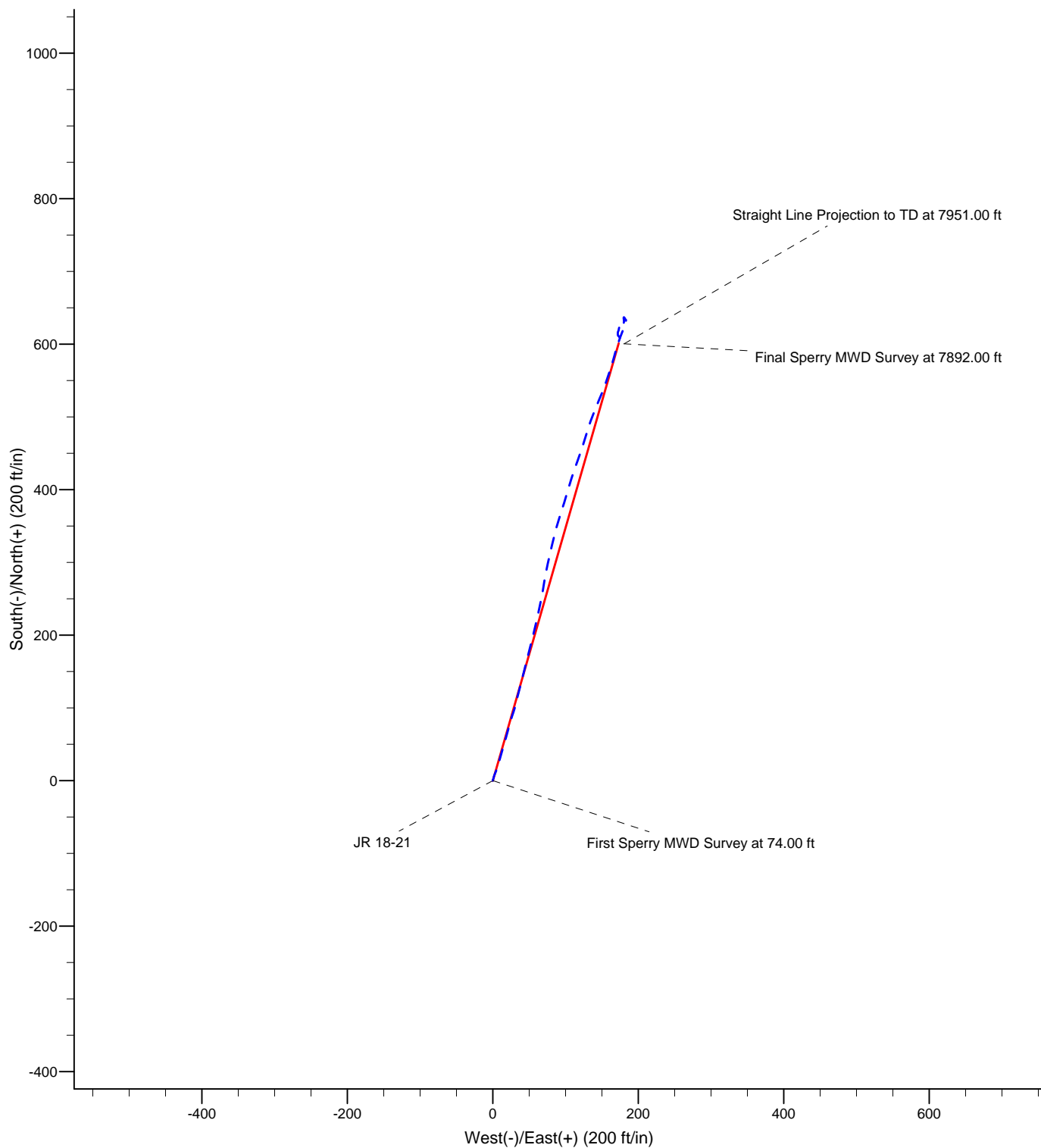
Targets									
Target Name	- hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	
- Shape		(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)	Latitude Longitude
JR 18-21 Plan A Rev		0.00	0.00	7,813.00	601.29	172.92	1,353,785.54	3,230,698.40	40.301588 -104.672859
- survey misses target center by 7.26ft at 7892.00ft MD (7811.43 TVD, 600.63 N, 179.98 E)									
- Point									
JR 18-21 Hardlines		0.00	0.00	0.00	601.29	172.92	1,353,785.53	3,230,698.40	40.301588 -104.672859
- survey misses target center by 625.66ft at 0.56ft MD (0.56 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	1,001.29	594.92	1,354,185.52	3,231,120.38	
Point 2				0.00	201.29	594.92	1,353,385.55	3,231,120.38	
Point 3				0.00	201.29	-205.08	1,353,385.55	3,230,320.42	
Point 4				0.00	1,001.29	-205.08	1,354,185.52	3,230,320.42	
JR 18-21 W. Sec. Line		0.00	0.00	0.00	0.00	0.00	1,353,184.27	3,230,525.49	40.299942 -104.673499
- survey hits target center									
- Polygon									
Point 1				0.00	1,899.00	-1,137.00	1,355,083.19	3,229,388.54	
Point 2				0.00	-723.00	-1,158.00	1,352,461.30	3,229,367.54	
JR 18-21 N. Sec. Line		0.00	0.00	0.00	0.00	0.00	1,353,184.27	3,230,525.49	40.299942 -104.673499
- survey hits target center									
- Polygon									
Point 1				0.00	1,899.00	-1,137.00	1,355,083.19	3,229,388.54	
Point 2				0.00	1,918.00	1,532.00	1,355,102.19	3,232,057.42	
JR 18-21 Plan A Rev		0.00	0.00	6,946.00	601.29	172.92	1,353,785.54	3,230,698.40	40.301588 -104.672859
- survey misses target center by 6.54ft at 7026.54ft MD (6946.01 TVD, 606.79 N, 176.45 E)									
- Circle (radius 50.00)									

Survey Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
74.00	74.00	0.04	0.12	First Sperry MWD Survey at 74.00 ft
7,892.00	7,811.43	600.63	179.98	Final Sperry MWD Survey at 7892.00 ft
7,951.00				Straight Line Projection to TD at 7951.00 ft

Checked By: _____ Approved By: _____ Date: _____

LEGEND

- JR 18-21, 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 18-21

Anadarko Petroleum Corp.

HALLIBURTON
Sperry Drilling

