

HALLIBURTON

Sperry Drilling

END OF WELL REPORT

For

Anadarko Petroleum Corp.

Harris Federal 16N-18HZ

Sec. 19-T3N-R66W

Weld County, CO

Job #900609686

TABLE OF CONTENTS

Section 1 – Survey Data

Contents: Final Well Survey submitted as the official survey.

Section 2 – Proposal Report

Section 3 – BHA Data

Contents: BHA Report, BHA Schematic, Motor Performance Report, & Survey & Drilling Parameters

Section 4 – Event Log (Total Well)

Contents: Daily Morning Reports

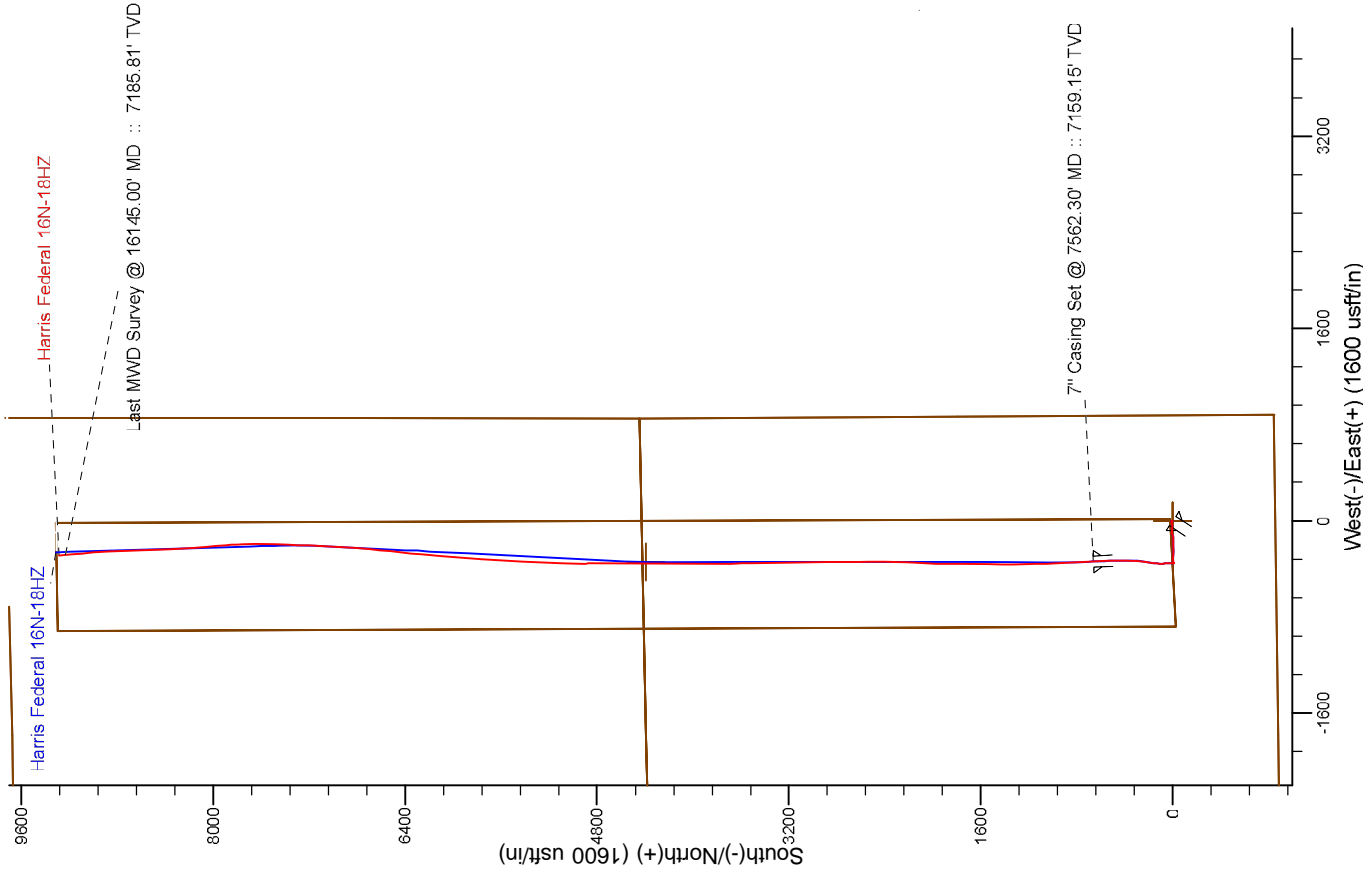
Section 5

Contents: Graphics

Section 1

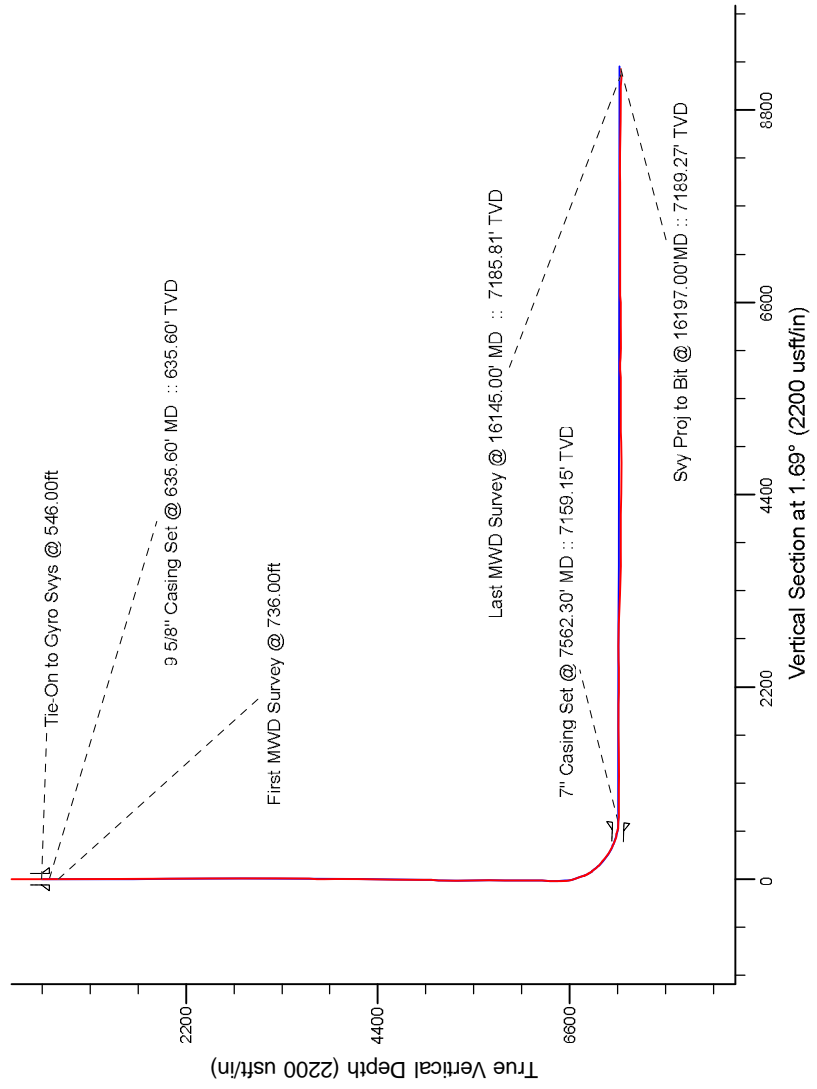
Contents: Surveys

Project: Weld County, CO (NAD 83)
Site: Sec. 19-T3N-R66W
Well: Harris Federal 16N-18HZ
Wellbore: Plan C
Design: Actual Field Surveys



LEGEND

- Harris Federal 16N-18HZ, Plan C, Rev C0 Proposal V0
- Actual Field Surveys



7" Casing: ~1520.43' FSL, ~1211.93' FEL
Lat/Long: 40.207111 N, -104.815026 E
State Planes - CO Northern: 1,319,031.59' N, 3,191,313.34' E
Location: Sec. 19-T3N-R66W

BHL: ~425.74' FNL, ~1143.85' FEL
Lat/Long: 40.230780 N, -104.814845 E
State Planes - CO Northern: 1,327,654.13' N, 3,191,297.31' E
Location: Sec. 18-T3N-R66W

WELL DETAILS: Harris Federal 16N-18HZ	
Ground Level:	4865.00
RKB = 15' @ 4881.00usft (Xtreme 22)	
Design: Actual Field Surveys (Harris Federal 16N-18HZ/Plan C)	
Created By: Clint Eshelman	Date: 11/12/2013
Reviewed:	Date:

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 19-T3N-R66W

Harris Federal 16N-18HZ

Plan C

Design: Actual Field Surveys

Sperry Drilling Services

Standard Report

12 November, 2013

Well Coordinates: 1,318,373.97 N, 3,191,656.85 E (40° 12' 19.07" N, 104° 48' 49.73" W)

Ground Level: 4,865.00 usft

Local Coordinate Origin:

Centered on Well Harris Federal 16N-18HZ

Viewing Datum:

RKB = 16' @ 4881.00usft (Xtreme 22)

TVDs to System:

N

North Reference:

True

Unit System:

Dec-Deg - API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

HALLIBURTON

Design Report for Harris Federal 16N-18HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16.00	0.00	0.00	16.00	0.00	0.00	0.00	0.00
116.00	0.04	273.95	116.00	0.00	-0.03	0.00	0.04
216.00	0.15	324.21	216.00	0.11	-0.15	0.11	0.13
316.00	0.08	102.55	316.00	0.20	-0.15	0.20	0.22
416.00	0.02	345.54	416.00	0.20	-0.09	0.20	0.09
516.00	0.08	276.82	516.00	0.23	-0.16	0.22	0.08
546.00	0.17	225.17	546.00	0.20	-0.22	0.19	0.45
Tie-On to Gyro Svys @ 546.00ft							
635.60	0.03	33.80	635.60	0.12	-0.30	0.12	0.22
9 5/8" Casing Set @ 635.60' MD :: 635.60' TVD							
736.00	0.25	42.44	736.00	0.31	-0.14	0.30	0.22
First MWD Survey @ 736.00ft							
1,021.00	0.13	291.25	1,021.00	0.88	-0.02	0.88	0.11
1,307.00	0.22	306.22	1,307.00	1.33	-0.76	1.30	0.04
1,593.00	0.44	315.11	1,592.99	2.43	-1.98	2.37	0.08
1,870.00	0.46	352.95	1,869.98	4.28	-2.87	4.20	0.11
2,146.00	0.74	350.28	2,145.97	7.14	-3.31	7.04	0.10
2,419.00	0.84	262.43	2,418.95	8.62	-5.59	8.45	0.40
2,694.00	0.47	305.25	2,693.93	9.00	-8.51	8.75	0.21
2,968.00	0.39	295.01	2,967.93	10.04	-10.27	9.74	0.04
3,243.00	0.69	164.90	3,242.92	8.84	-10.69	8.52	0.36
3,518.00	1.26	230.26	3,517.89	5.31	-12.58	4.94	0.42
3,610.00	2.41	254.74	3,609.84	4.15	-15.22	3.70	1.49
3,702.00	2.85	265.87	3,701.74	3.48	-19.37	2.91	0.73
3,793.00	5.10	270.88	3,792.52	3.38	-25.67	2.62	2.50
3,885.00	6.81	267.65	3,884.02	3.22	-35.21	2.18	1.89
3,976.00	9.05	270.76	3,974.14	3.09	-47.76	1.68	2.51
4,067.00	10.10	270.64	4,063.87	3.27	-62.90	1.42	1.15
4,159.00	9.48	271.78	4,154.53	3.60	-78.54	1.28	0.71
4,250.00	8.02	272.75	4,244.47	4.14	-92.37	1.41	1.61
4,342.00	9.12	260.30	4,335.45	3.22	-105.97	0.09	2.34
4,428.00	9.54	259.36	4,420.31	0.75	-119.69	-2.78	0.52
4,514.00	8.89	259.64	4,505.20	-1.76	-133.23	-5.69	0.76
4,599.00	8.81	271.06	4,589.20	-2.82	-146.20	-7.13	2.07
4,685.00	9.03	269.75	4,674.16	-2.73	-159.53	-7.43	0.35
4,771.00	8.81	270.15	4,759.12	-2.74	-172.87	-7.84	0.27
4,856.00	9.37	273.66	4,843.05	-2.28	-186.28	-7.77	0.93
4,942.00	11.05	267.98	4,927.69	-2.12	-201.51	-8.07	2.28
5,027.00	10.73	266.49	5,011.16	-2.89	-217.55	-9.31	0.50
5,113.00	9.96	265.48	5,095.76	-3.97	-232.95	-10.84	0.92
5,198.00	8.84	261.47	5,179.62	-5.52	-246.74	-12.79	1.53
5,284.00	8.99	266.33	5,264.58	-6.93	-259.98	-14.59	0.89
5,370.00	10.77	281.26	5,349.31	-5.79	-274.57	-13.89	3.61
5,455.00	9.66	276.21	5,432.97	-3.47	-289.45	-12.00	1.68
5,541.00	8.62	273.14	5,517.87	-2.33	-303.06	-11.27	1.34
5,627.00	7.49	271.33	5,603.02	-1.85	-315.10	-11.14	1.35
5,713.00	6.32	268.50	5,688.40	-1.85	-325.43	-11.44	1.42
5,798.00	5.18	262.13	5,772.97	-2.49	-333.91	-12.34	1.54
5,884.00	4.47	258.38	5,858.67	-3.70	-341.04	-13.76	0.90

Design Report for Harris Federal 16N-18HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,970.00	4.14	266.26	5,944.42	-4.58	-347.42	-14.82	0.79
6,055.00	2.36	262.27	6,029.28	-5.01	-352.22	-15.40	2.11
6,141.00	1.25	221.74	6,115.24	-5.95	-354.60	-16.41	1.89
6,227.00	1.23	104.14	6,201.23	-6.88	-354.32	-17.32	2.47
6,312.00	0.65	137.01	6,286.22	-7.45	-353.11	-17.86	0.91
6,398.00	0.59	187.95	6,372.22	-8.25	-352.84	-18.65	0.62
6,483.00	0.60	91.44	6,457.21	-8.69	-352.46	-19.08	1.04
6,569.00	1.44	2.05	6,543.20	-7.62	-351.97	-18.00	1.81
6,612.00	8.27	6.61	6,586.02	-4.01	-351.59	-14.37	15.90
6,655.00	14.56	3.15	6,628.15	4.47	-350.94	-5.88	14.71
6,698.00	18.72	357.54	6,669.35	16.77	-350.94	6.41	10.36
6,741.00	19.09	355.28	6,710.03	30.67	-351.81	20.28	1.91
6,784.00	19.44	354.39	6,750.62	44.80	-353.09	34.37	1.06
6,826.00	25.03	355.67	6,789.48	60.63	-354.44	50.15	13.36
6,869.00	30.65	357.74	6,827.49	80.67	-355.56	70.14	13.26
6,912.00	38.55	1.77	6,862.86	105.05	-355.58	94.52	19.12
6,955.00	41.20	4.16	6,895.86	132.57	-354.14	122.07	7.12
6,998.00	44.30	7.08	6,927.43	161.61	-351.26	151.18	8.56
7,041.00	48.47	8.75	6,957.09	192.43	-346.96	182.12	10.10
7,084.00	50.62	8.45	6,984.99	224.78	-342.07	214.60	5.03
7,127.00	52.20	7.82	7,011.81	258.06	-337.32	247.99	3.85
7,169.00	54.16	4.70	7,036.98	291.47	-333.66	281.50	7.56
7,212.00	59.96	0.77	7,060.36	327.49	-331.98	317.56	15.51
7,255.00	63.57	359.52	7,080.70	365.37	-331.89	355.42	8.78
7,341.00	71.09	359.42	7,113.82	444.66	-332.63	434.66	8.74
7,384.00	72.88	358.78	7,127.12	485.55	-333.27	475.51	4.40
7,427.00	76.03	358.55	7,138.65	526.96	-334.24	516.87	7.34
7,470.00	77.38	358.80	7,148.53	568.79	-335.21	558.66	3.19
7,512.00	83.39	358.01	7,155.55	610.17	-336.36	599.98	14.43
7,525.00	85.99	357.63	7,156.75	623.10	-336.85	612.90	20.21
7,562.30	86.63	357.51	7,159.15	660.29	-338.43	650.02	1.75
7" Casing Set @ 7562.30' MD :: 7159.15' TVD							
7,676.00	88.58	357.13	7,163.90	773.76	-343.75	763.29	1.75
7,768.00	89.20	357.19	7,165.68	865.63	-348.30	854.98	0.68
7,861.00	89.63	357.05	7,166.63	958.51	-352.98	947.68	0.49
7,953.00	89.69	357.53	7,167.18	1,050.40	-357.33	1,039.41	0.53
8,045.00	90.12	359.19	7,167.33	1,142.36	-359.96	1,131.25	1.86
8,137.00	90.43	359.26	7,166.89	1,234.35	-361.20	1,223.16	0.35
8,230.00	90.25	359.65	7,166.34	1,327.35	-362.09	1,316.09	0.46
8,322.00	90.99	0.41	7,165.34	1,419.34	-362.04	1,408.04	1.15
8,414.00	90.31	0.14	7,164.30	1,511.33	-361.60	1,500.01	0.80
8,506.00	91.11	1.22	7,163.16	1,603.32	-360.51	1,591.99	1.46
8,598.00	90.93	359.86	7,161.52	1,695.30	-359.64	1,683.95	1.49
8,690.00	90.74	0.30	7,160.18	1,787.29	-359.51	1,775.90	0.52
8,781.00	90.31	0.38	7,159.35	1,878.28	-358.97	1,866.88	0.48
8,873.00	89.88	1.63	7,159.19	1,970.26	-357.36	1,958.87	1.44
8,965.00	88.58	3.01	7,160.43	2,062.18	-353.63	2,050.85	2.06
9,057.00	89.20	2.74	7,162.21	2,154.04	-349.02	2,142.81	0.74
9,147.00	89.38	2.94	7,163.33	2,243.92	-344.56	2,232.79	0.30
9,239.00	91.05	1.26	7,162.98	2,335.86	-341.19	2,324.78	2.57
9,331.00	90.93	0.44	7,161.39	2,427.83	-339.83	2,416.75	0.90

Design Report for Harris Federal 16N-18HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
9,422.00	90.80	359.52	7,160.02	2,518.82	-339.86	2,507.70	1.02
9,514.00	91.36	358.74	7,158.28	2,610.79	-341.26	2,599.59	1.04
9,604.00	90.12	359.36	7,157.12	2,700.77	-342.75	2,689.49	1.54
9,695.00	88.76	0.23	7,158.01	2,791.76	-343.07	2,780.43	1.77
9,786.00	88.15	358.96	7,160.47	2,882.72	-343.72	2,871.33	1.55
9,878.00	88.95	358.68	7,162.79	2,974.67	-345.61	2,963.19	0.92
9,968.00	85.79	359.74	7,166.92	3,064.56	-346.85	3,053.00	3.70
10,060.00	86.60	0.09	7,173.03	3,156.35	-346.99	3,144.75	0.96
10,151.00	87.16	359.28	7,177.98	3,247.22	-347.49	3,235.56	1.08
10,237.00	89.32	0.24	7,180.62	3,333.17	-347.85	3,321.46	2.75
10,323.00	88.21	357.62	7,182.48	3,419.13	-349.45	3,407.33	3.31
10,408.00	90.12	359.70	7,183.71	3,504.08	-351.44	3,492.20	3.32
10,494.00	87.77	357.78	7,185.30	3,590.04	-353.33	3,578.06	3.53
10,579.00	89.07	357.85	7,187.64	3,674.94	-356.57	3,662.83	1.53
10,665.00	89.38	357.91	7,188.80	3,760.88	-359.75	3,748.63	0.37
10,751.00	91.11	2.31	7,188.44	3,846.85	-359.58	3,834.57	5.50
10,836.00	90.56	0.03	7,187.20	3,931.82	-357.85	3,919.55	2.76
10,921.00	90.43	0.35	7,186.46	4,016.81	-357.57	4,004.52	0.41
11,007.00	90.62	1.08	7,185.68	4,102.80	-356.49	4,090.51	0.88
11,093.00	90.00	0.23	7,185.21	4,188.80	-355.51	4,176.49	1.22
11,178.00	88.70	359.79	7,186.17	4,273.79	-355.49	4,261.44	1.61
11,264.00	88.64	359.94	7,188.17	4,359.76	-355.70	4,347.38	0.19
11,349.00	88.76	0.10	7,190.10	4,444.74	-355.67	4,432.32	0.24
11,435.00	89.01	359.73	7,191.77	4,530.73	-355.80	4,518.26	0.52
11,521.00	89.69	1.26	7,192.75	4,616.71	-355.05	4,604.23	1.95
11,607.00	89.81	0.83	7,193.12	4,702.70	-353.48	4,690.23	0.52
11,692.00	89.75	359.99	7,193.45	4,787.70	-352.88	4,775.21	0.99
11,778.00	90.99	357.54	7,192.89	4,873.67	-354.73	4,861.08	3.19
11,864.00	91.98	0.70	7,190.67	4,959.61	-356.05	4,946.96	3.85
11,949.00	91.92	0.74	7,187.77	5,044.56	-354.98	5,031.89	0.08
12,035.00	91.54	2.77	7,185.18	5,130.47	-352.35	5,117.85	2.40
12,121.00	91.11	3.34	7,183.19	5,216.33	-347.77	5,203.80	0.83
12,206.00	88.89	2.50	7,183.19	5,301.21	-343.44	5,288.78	2.79
12,292.00	89.44	2.87	7,184.44	5,387.11	-339.41	5,374.75	0.77
12,378.00	90.19	3.66	7,184.72	5,472.97	-334.51	5,460.72	1.27
12,464.00	89.44	2.10	7,185.00	5,558.85	-330.19	5,546.70	2.01
12,572.00	91.11	4.04	7,184.48	5,666.69	-324.41	5,654.66	2.37
12,658.00	90.87	2.94	7,182.99	5,752.52	-319.17	5,740.60	1.31
12,744.00	90.12	3.04	7,182.25	5,838.39	-314.69	5,826.57	0.88
12,829.00	89.32	4.79	7,182.66	5,923.19	-308.88	5,911.51	2.26
12,915.00	88.58	4.17	7,184.24	6,008.91	-302.17	5,997.39	1.12
13,001.00	88.95	3.89	7,186.09	6,094.68	-296.13	6,083.30	0.54
13,087.00	89.81	5.64	7,187.02	6,180.37	-288.98	6,169.16	2.27
13,173.00	90.43	5.60	7,186.84	6,265.96	-280.56	6,254.96	0.72
13,258.00	90.56	5.58	7,186.11	6,350.55	-272.28	6,339.76	0.15
13,344.00	91.18	6.04	7,184.80	6,436.10	-263.58	6,425.53	0.90
13,430.00	90.37	6.42	7,183.64	6,521.58	-254.24	6,511.25	1.04
13,515.00	90.62	5.93	7,182.91	6,606.09	-245.10	6,595.98	0.65
13,601.00	90.74	5.30	7,181.89	6,691.67	-236.69	6,681.78	0.75
13,687.00	89.63	4.61	7,181.61	6,777.34	-229.26	6,767.63	1.52
13,773.00	89.63	3.97	7,182.16	6,863.10	-222.83	6,853.54	0.74

Design Report for Harris Federal 16N-18HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
13,858.00	89.88	2.53	7,182.53	6,947.96	-218.01	6,938.51	1.72
13,944.00	90.25	2.49	7,182.43	7,033.88	-214.24	7,024.50	0.43
14,030.00	91.42	3.68	7,181.18	7,119.74	-209.61	7,110.46	1.94
14,116.00	90.74	0.98	7,179.56	7,205.65	-206.12	7,196.43	3.24
14,201.00	89.75	2.11	7,179.19	7,290.61	-203.83	7,281.43	1.77
14,287.00	88.95	3.15	7,180.17	7,376.51	-199.88	7,367.41	1.53
14,373.00	90.93	2.28	7,180.26	7,462.41	-195.81	7,453.39	2.51
14,459.00	90.43	1.70	7,179.24	7,548.35	-192.82	7,539.38	0.89
14,545.00	90.49	359.75	7,178.55	7,634.34	-191.73	7,625.37	2.27
14,630.00	90.37	357.93	7,177.91	7,719.32	-193.45	7,710.25	2.15
14,716.00	90.62	357.18	7,177.17	7,805.23	-197.12	7,796.03	0.92
14,802.00	89.81	355.43	7,176.84	7,891.05	-202.67	7,881.64	2.24
14,888.00	90.31	355.67	7,176.75	7,976.79	-209.34	7,967.15	0.64
14,973.00	89.57	355.11	7,176.84	8,061.52	-216.17	8,051.63	1.09
15,059.00	90.12	356.50	7,177.07	8,147.28	-222.46	8,137.18	1.74
15,145.00	89.81	356.46	7,177.13	8,233.12	-227.74	8,222.82	0.36
15,231.00	88.83	356.46	7,178.15	8,318.95	-233.05	8,308.46	1.14
15,316.00	89.07	356.73	7,179.70	8,403.78	-238.10	8,393.11	0.42
15,402.00	89.57	358.51	7,180.73	8,489.70	-241.67	8,478.88	2.15
15,488.00	87.90	358.18	7,182.62	8,575.64	-244.15	8,564.71	1.98
15,573.00	88.64	357.79	7,185.19	8,660.55	-247.14	8,649.49	0.98
15,659.00	88.58	357.81	7,187.28	8,746.46	-250.44	8,735.27	0.07
15,745.00	90.62	357.92	7,187.88	8,832.39	-253.64	8,821.07	2.38
15,830.00	89.75	355.88	7,187.60	8,917.26	-258.24	8,905.77	2.61
15,916.00	89.57	355.66	7,188.11	9,003.03	-264.58	8,991.31	0.33
16,002.00	89.32	355.07	7,188.95	9,088.74	-271.53	9,076.78	0.75
16,087.00	89.51	355.18	7,189.81	9,173.43	-278.75	9,161.22	0.26
16,145.00	90.56	355.37	7,189.78	9,231.23	-283.53	9,218.85	1.84
Last MWD Survey @ 16145.00' MD :: 7185.81' TVD							
16,197.00	90.56	355.37	7,189.27	9,283.06	-287.73	9,270.54	0.00
Svy Proj to Bit @ 16197.00'MD :: 7189.27' TVD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
546.00	546.00	0.20	-0.22	Tie-On to Gyro Svys @ 546.00ft
736.00	736.00	0.31	-0.14	First MWD Survey @ 736.00ft
16,145.00	7,189.78	9,231.23	-283.53	Last MWD Survey @ 16145.00' MD :: 7185.81' TVD
16,197.00	7,189.27	9,283.06	-287.73	Svy Proj to Bit @ 16197.00'MD :: 7189.27' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (usft)	Origin +E/-W (usft)	Start TVD (usft)
User	No Target (Freehand)	1.69	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
16.00	546.00	MS Energy Services	NS-GYRO-MS