

SPERRY-SUN DRILLING SERVICES

CERTIFIED SURVEY WORK SHEET

OPERATOR:	Anadarko Petroleum Corp.
WELL:	Kerr 4N-12HZ
FIELD:	DJ Basin
RIG:	H&P 308
LEGALS:	Sec. 13-T2N-R67W
COUNTY:	Weld
STATE:	Colorado
CAL. METHOD:	True N
MAG. DECL. APPLIED:	8.54
VERTICAL SEC. DIR. :	0.000

SSDS Job Number :	901640832
Start Date of Job :	10/2/2014
End Date of Job :	10/30/2014
Lead Directional Driller:	Jesse Kysar
	Brandon Watson
Other SSDS DD's :	
SSDS MWD Engineers :	Adam Sampson
	James Ramsey

ESS Survey
 First Survey Depth
 Last Survey Depth

 KOP Depth/Sidetrack MD

 First Survey Depth
 Last Survey Depth
 Bit Extrapolation to TD

Main Hole =====>	1st Side Track =====>	2nd Side Track =====>	3rd Side Track =====>	4th Side Track =====>
	Tie On	Tie On	Tie On	Tie On
25	Gyro			
1097				
6621	KOP	KOP-ST1	KOP-ST2	KOP-ST3
1203	MWD	MWD	MWD	MWD
16701	MWD	MWD	MWD	MWD
16749	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 : <i>Brandon Watson</i>	Print Name : James Ramsey	Print Name :
Sign Name : <i>[Signature]</i>	Sign Name :	Sign Name :
Print Name : Jesse Kysar	Print Name : Adam Sampson	Print Name :
Sign Name : <i>[Signature]</i>	Sign Name : <i>[Signature]</i>	Sign Name :

Examples of Survey Types:

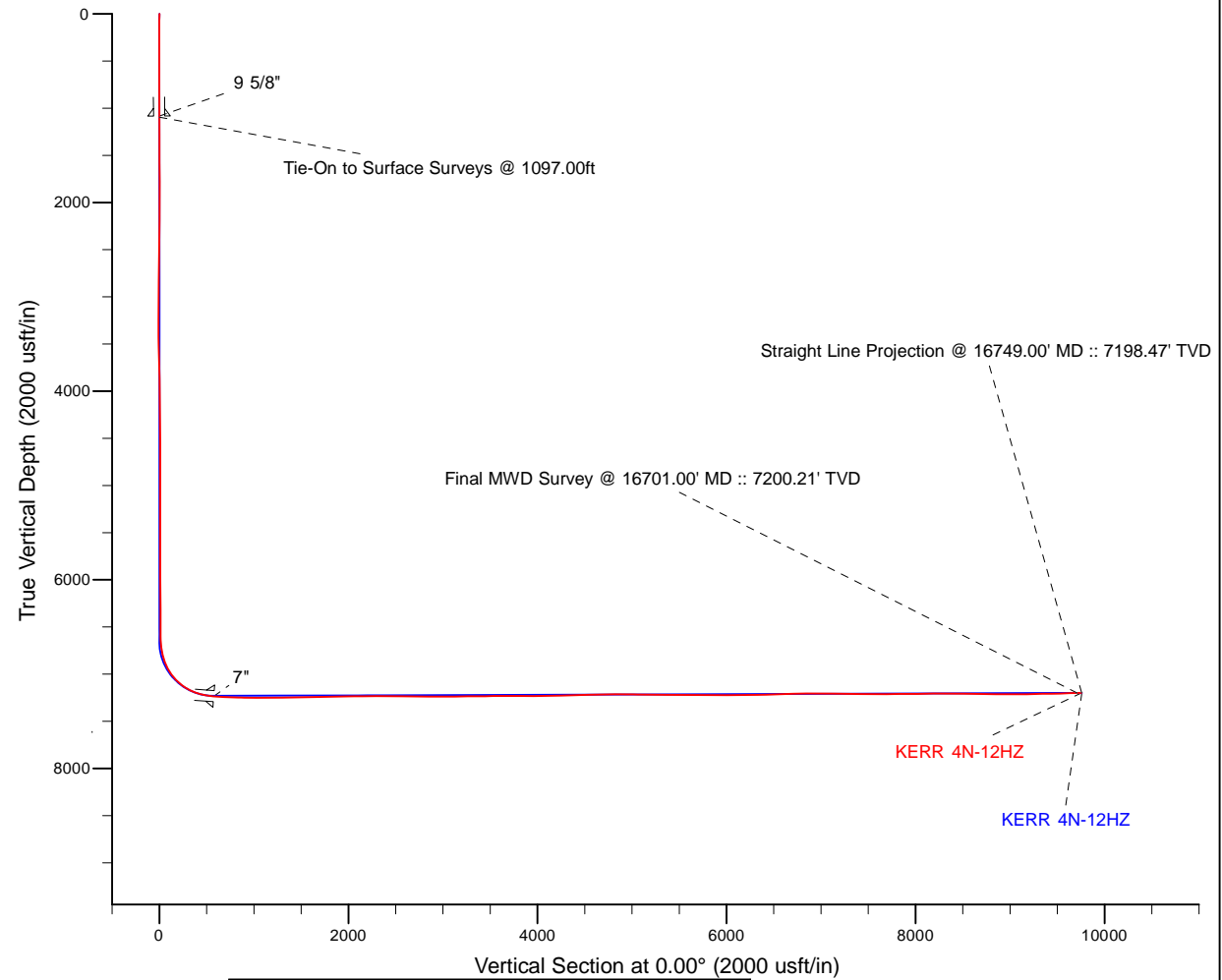
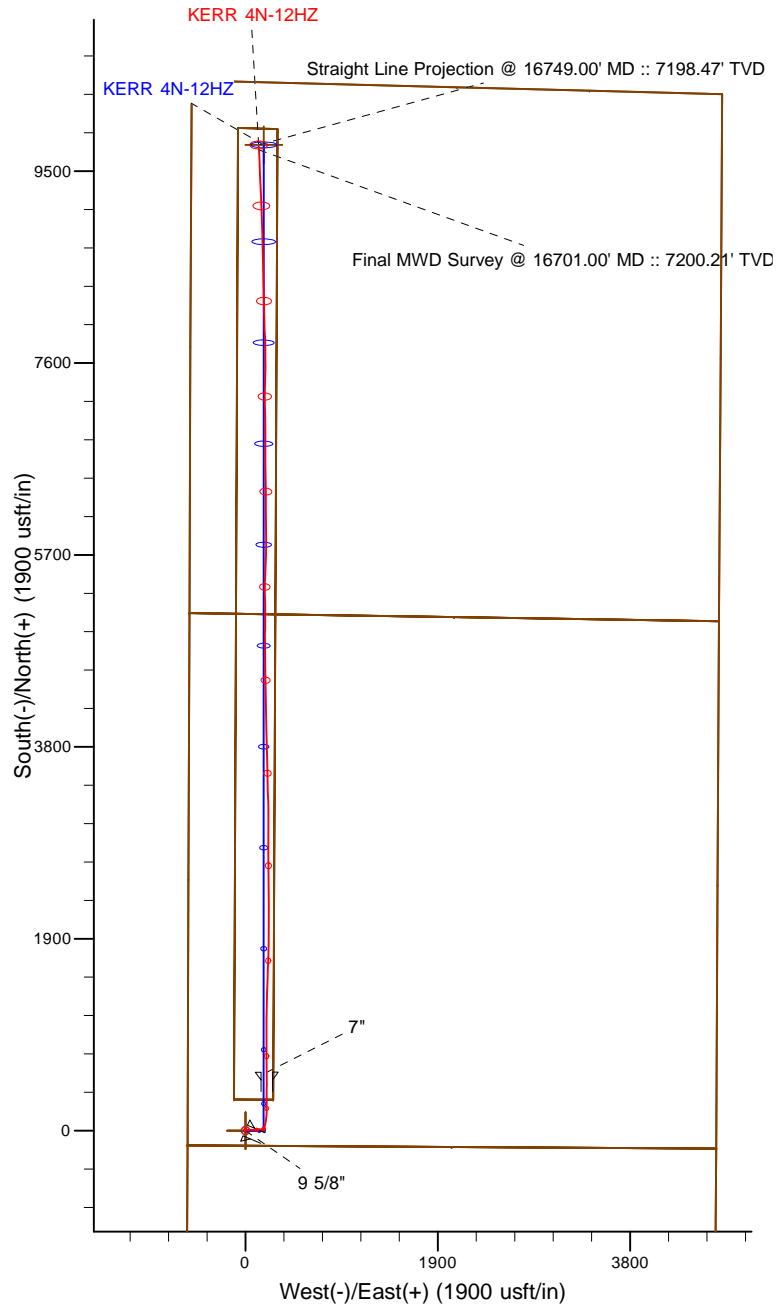
TieOn	Tie On to Surface Casing (Assumed Vertical), Tie On to existing MWD Survey (prior drilled hole)
MWD	Sperry Sun Drilling Services (SSDS) Measurement While Drilling (MWD) Survey's
ESS	Sperry Sun Drilling Services (SSDS) Electronic Survey System (ESS) Survey's
Gyro	Gyro Survey's ; Provided by third 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.

Project: Weld County, CO (NAD 83)
 Site: Sec. 13-T2N-R67W
 Well: KERR 4N-12HZ
 Wellbore: Plan A
 Design: Actual Field Surveys



LEGEND

- ▲ KERR 4N-12HZ, Plan A, Rev A0 V0
- Actual Field Surveys



7" Casing: ~728' FSL, ~782.43' FWL
 Lat/Long: 40.132766 N, -104.845795 E
 State Planes - CO Northern: 1,291,884.99' N, 3,182,919.49' E
 Location: Sec. 13-T2N-R67W

BHL: ~622.32' FNL, ~665.79' FWL
 Lat/Long: 40.157971 N, -104.846081 E
 State Planes - CO Northern: 1,301,065.94' N, 3,182,771.82' E
 Location: Sec. 12-T2N-R67W

WELL DETAILS: KERR 4N-12HZ	
Ground Level:	4891.00
RKB = 25' @ 4916.00usft (H&P 308)	
Design:	Actual Field Surveys (KERR 4N-12HZ/Plan A)
Created By: Katie Benner	Date: 12/5/2014
Reviewed: _____	Date: _____

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 13-T2N-R67W

KERR 4N-12HZ

Job Number: 901640832 :: API: 05-123-39355

Plan A

Design: Actual Field Surveys

Sperry Drilling Services

Standard Report

05 January, 2015

Surface UWI : Job Number: 901640832 :: API: 05-123-39355

Well Coordinates: 1,291,306.18 N, 3,182,713.69 E (40° 07' 52.25" N, 104° 50' 47.57" W)

Ground Level: 4,891.00 usft

Local Coordinate Origin:

Centered on Well KERR 4N-12HZ

Viewing Datum:

RKB = 25' @ 4916.00usft (H&P 308)

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 KERR 4N-12HZ - 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
20.00	0.00	0.00	20.00	0.00	0.00	0.00	0.00
71.00	0.30	267.30	71.00	-0.01	-0.13	-0.01	0.59
142.00	0.10	278.40	142.00	-0.01	-0.38	-0.01	0.29
210.00	0.30	238.20	210.00	-0.09	-0.59	-0.09	0.34
304.00	0.10	159.70	304.00	-0.30	-0.77	-0.30	0.32
384.00	0.20	269.50	384.00	-0.36	-0.89	-0.36	0.32
464.00	0.10	242.50	464.00	-0.40	-1.09	-0.40	0.15
544.00	0.20	327.80	544.00	-0.31	-1.22	-0.31	0.27
624.00	0.40	244.20	624.00	-0.32	-1.55	-0.32	0.53
704.00	0.40	308.50	704.00	-0.26	-2.02	-0.26	0.53
784.00	0.10	25.80	783.99	-0.03	-2.21	-0.03	0.49
864.00	0.00	0.00	863.99	0.04	-2.18	0.04	0.12
944.00	0.20	208.30	943.99	-0.09	-2.24	-0.09	0.25
1,024.00	0.10	278.40	1,023.99	-0.20	-2.38	-0.20	0.24
1,052.00	0.50	293.20	1,051.99	-0.15	-2.52	-0.15	1.44
1,086.00	0.50	293.20	1,085.99	-0.03	-2.79	-0.03	0.00
9 5/8"							
1,097.00	0.50	293.20	1,096.99	0.01	-2.88	0.01	0.00
Tie-On to Surface Surveys @ 1097.00ft							
1,203.00	0.40	271.90	1,202.99	0.20	-3.67	0.20	0.18
First Sperry MWD Survey @ 1203.00ft							
1,294.00	0.36	271.90	1,293.99	0.22	-4.27	0.22	0.04
1,477.00	0.46	283.14	1,476.98	0.41	-5.56	0.41	0.07
1,568.00	0.43	286.15	1,567.98	0.59	-6.25	0.59	0.04
1,771.00	0.37	299.34	1,770.97	1.12	-7.55	1.12	0.05
1,862.00	0.41	295.62	1,861.97	1.40	-8.10	1.40	0.05
2,045.00	0.58	303.44	2,044.97	2.20	-9.46	2.20	0.10
2,137.00	0.66	306.28	2,136.96	2.77	-10.28	2.77	0.09
2,228.00	0.51	322.49	2,227.96	3.40	-10.95	3.40	0.24
2,320.00	2.03	143.02	2,319.94	2.42	-10.22	2.42	2.76
2,412.00	1.61	145.43	2,411.89	0.06	-8.50	0.06	0.46
2,594.00	1.03	158.92	2,593.84	-3.58	-6.47	-3.58	0.36
2,686.00	0.62	154.24	2,685.83	-4.80	-5.95	-4.80	0.45
2,778.00	0.63	145.07	2,777.83	-5.66	-5.45	-5.66	0.11
2,871.00	0.62	153.44	2,870.82	-6.53	-4.93	-6.53	0.10
2,963.00	0.35	169.63	2,962.82	-7.25	-4.66	-7.25	0.33
3,057.00	0.35	146.24	3,056.82	-7.77	-4.44	-7.77	0.15
3,240.00	0.43	128.24	3,239.81	-8.66	-3.59	-8.66	0.08
3,333.00	0.21	83.94	3,332.81	-8.86	-3.15	-8.86	0.34
3,425.00	0.47	30.49	3,424.81	-8.52	-2.79	-8.52	0.42
3,518.00	1.20	7.94	3,517.80	-7.22	-2.46	-7.22	0.85
3,609.00	1.71	358.48	3,608.77	-4.92	-2.37	-4.92	0.62
3,793.00	1.46	329.66	3,792.70	-0.15	-3.62	-0.15	0.45
3,978.00	0.89	8.39	3,977.67	3.30	-4.61	3.30	0.51
4,070.00	0.86	11.48	4,069.66	4.69	-4.36	4.69	0.06
4,162.00	0.63	16.52	4,161.65	5.85	-4.08	5.85	0.26
4,255.00	0.68	14.96	4,254.64	6.87	-3.79	6.87	0.06
4,349.00	0.69	353.58	4,348.64	7.97	-3.71	7.97	0.27
4,443.00	0.47	330.07	4,442.63	8.87	-3.97	8.87	0.34

Design Report for KERR 4N-12HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,537.00	0.68	327.62	4,536.63	9.67	-4.46	9.67	0.22
4,631.00	0.76	317.02	4,630.62	10.60	-5.18	10.60	0.16
4,725.00	0.61	305.89	4,724.61	11.35	-6.01	11.35	0.21
4,819.00	1.56	83.99	4,818.60	11.78	-5.15	11.78	2.19
4,913.00	2.67	103.98	4,912.54	11.38	-1.75	11.38	1.40
5,007.00	4.46	107.34	5,006.35	9.76	3.86	9.76	1.92
5,101.00	4.68	95.37	5,100.06	8.32	11.17	8.32	1.04
5,195.00	3.70	87.33	5,193.80	8.10	18.02	8.10	1.21
5,289.00	5.41	87.72	5,287.50	8.42	25.48	8.42	1.82
5,383.00	7.18	91.31	5,380.93	8.46	35.78	8.46	1.93
5,477.00	8.61	91.56	5,474.04	8.13	48.68	8.13	1.52
5,571.00	10.32	92.31	5,566.76	7.60	64.13	7.60	1.82
5,665.00	8.91	92.63	5,659.43	6.93	79.82	6.93	1.50
5,759.00	9.49	84.22	5,752.23	7.37	94.80	7.37	1.56
5,854.00	8.34	81.02	5,846.08	9.24	109.40	9.24	1.32
5,948.00	8.03	89.12	5,939.13	10.40	122.70	10.40	1.27
6,043.00	7.06	86.86	6,033.30	10.82	135.16	10.82	1.07
6,137.00	6.06	83.91	6,126.69	11.67	145.86	11.67	1.12
6,231.00	5.44	80.69	6,220.21	12.91	155.19	12.91	0.74
6,326.00	3.84	95.38	6,314.90	13.34	162.81	13.34	2.08
6,421.00	3.27	90.09	6,409.72	13.04	168.68	13.04	0.69
6,515.00	1.63	90.49	6,503.63	13.03	172.70	13.03	1.74
6,610.00	1.55	88.59	6,598.59	13.05	175.34	13.05	0.10
6,657.00	3.92	39.69	6,645.54	14.30	177.00	14.30	6.65
6,704.00	6.34	24.21	6,692.35	17.90	179.09	17.90	5.89
6,751.00	10.91	24.70	6,738.81	24.31	182.01	24.31	9.72
6,799.00	13.90	20.94	6,785.68	33.83	185.97	33.83	6.45
6,847.00	16.29	17.75	6,832.02	45.63	190.09	45.63	5.27
6,892.00	19.44	13.80	6,874.85	58.91	193.80	58.91	7.50
6,939.00	25.70	9.08	6,918.23	76.59	197.28	76.59	13.86
6,986.00	30.58	8.30	6,959.66	98.50	200.61	98.50	10.41
7,033.00	35.96	7.79	6,998.95	124.02	204.21	124.02	11.46
7,081.00	41.02	4.64	7,036.51	153.70	207.40	153.70	11.30
7,128.00	45.27	0.47	7,070.80	185.79	208.78	185.79	10.89
7,175.00	49.59	0.32	7,102.59	220.40	209.02	220.40	9.19
7,222.00	54.89	359.12	7,131.36	257.54	208.82	257.54	11.46
7,270.00	60.72	359.24	7,156.92	298.14	208.24	298.14	12.15
7,317.00	65.58	0.89	7,178.14	340.06	208.31	340.06	10.80
7,365.00	69.69	1.04	7,196.41	384.43	209.05	384.43	8.57
7,412.00	73.58	1.27	7,211.21	429.02	209.95	429.02	8.29
7,459.00	77.49	0.13	7,222.95	474.52	210.51	474.52	8.64
7,506.00	82.93	359.75	7,230.94	520.81	210.46	520.81	11.60
7,526.00	85.34	359.61	7,232.98	540.71	210.34	540.71	12.07
7,562.70	86.01	359.53	7,235.75	577.30	210.07	577.30	1.83
7"							
7,630.00	87.23	359.38	7,239.72	644.48	209.43	644.48	1.83
7,724.00	87.41	359.24	7,244.11	738.37	208.30	738.37	0.24
7,819.00	87.41	358.58	7,248.41	833.25	206.49	833.25	0.69
7,913.00	88.98	0.17	7,251.37	927.20	205.47	927.20	2.38
8,008.00	90.12	0.78	7,252.11	1,022.19	206.26	1,022.19	1.36
8,102.00	90.31	0.54	7,251.76	1,116.18	207.34	1,116.18	0.33

Design Report for KERR 4N-12HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
8,197.00	90.49	1.86	7,251.10	1,211.16	209.33	1,211.16	1.40
8,291.00	90.40	2.03	7,250.37	1,305.10	212.52	1,305.10	0.20
8,386.00	90.28	1.57	7,249.80	1,400.05	215.50	1,400.05	0.50
8,480.00	92.25	1.70	7,247.73	1,493.98	218.18	1,493.98	2.10
8,575.00	91.36	1.54	7,244.74	1,588.90	220.87	1,588.90	0.95
8,669.00	91.39	1.71	7,242.48	1,682.83	223.53	1,682.83	0.18
8,763.00	91.05	1.05	7,240.48	1,776.78	225.80	1,776.78	0.79
8,858.00	90.83	0.84	7,238.92	1,871.76	227.36	1,871.76	0.32
8,952.00	91.02	0.60	7,237.40	1,965.74	228.54	1,965.74	0.33
9,047.00	90.92	0.38	7,235.80	2,060.72	229.36	2,060.72	0.25
9,141.00	90.96	0.05	7,234.25	2,154.71	229.71	2,154.71	0.35
9,236.00	90.40	0.01	7,233.13	2,249.70	229.76	2,249.70	0.59
9,330.00	89.35	359.50	7,233.33	2,343.70	229.36	2,343.70	1.24
9,424.00	89.29	359.31	7,234.45	2,437.69	228.38	2,437.69	0.21
9,518.00	89.32	358.93	7,235.59	2,531.67	226.94	2,531.67	0.41
9,610.00	89.17	359.36	7,236.80	2,623.65	225.56	2,623.65	0.49
9,702.00	89.01	359.90	7,238.26	2,715.64	224.97	2,715.64	0.61
9,793.00	90.28	0.42	7,238.82	2,806.63	225.23	2,806.63	1.51
9,885.00	89.82	0.17	7,238.74	2,898.63	225.70	2,898.63	0.57
9,976.00	91.11	0.84	7,238.01	2,989.62	226.50	2,989.62	1.60
10,067.00	90.92	359.42	7,236.39	3,080.60	226.71	3,080.60	1.57
10,159.00	90.56	358.96	7,235.21	3,172.59	225.41	3,172.59	0.63
10,250.00	90.25	358.51	7,234.56	3,263.56	223.40	3,263.56	0.60
10,342.00	89.51	358.50	7,234.76	3,355.53	221.00	3,355.53	0.80
10,434.00	90.59	358.82	7,234.67	3,447.50	218.85	3,447.50	1.22
10,525.00	90.52	358.78	7,233.79	3,538.48	216.94	3,538.48	0.09
10,616.00	90.03	358.06	7,233.36	3,629.44	214.43	3,629.44	0.96
10,709.00	90.31	358.83	7,233.08	3,722.41	211.91	3,722.41	0.88
10,801.00	90.03	358.54	7,232.81	3,814.38	209.80	3,814.38	0.44
10,893.00	89.94	358.63	7,232.83	3,906.35	207.52	3,906.35	0.14
10,986.00	89.66	358.44	7,233.16	3,999.32	205.15	3,999.32	0.36
11,079.00	90.49	359.19	7,233.03	4,092.30	203.22	4,092.30	1.20
11,171.00	92.19	359.71	7,230.88	4,184.27	202.34	4,184.27	1.93
11,262.00	91.70	359.26	7,227.79	4,275.21	201.52	4,275.21	0.73
11,355.00	91.70	358.81	7,225.04	4,368.16	199.96	4,368.16	0.48
11,447.00	91.63	358.68	7,222.36	4,460.10	197.94	4,460.10	0.16
11,540.00	91.67	358.36	7,219.68	4,553.03	195.54	4,553.03	0.35
11,631.00	91.02	359.36	7,217.55	4,643.98	193.73	4,643.98	1.31
11,723.00	91.05	358.83	7,215.89	4,735.96	192.28	4,735.96	0.58
11,815.00	90.68	359.85	7,214.50	4,827.94	191.22	4,827.94	1.18
11,907.00	89.72	1.39	7,214.18	4,919.93	192.22	4,919.93	1.97
12,000.00	88.61	0.19	7,215.53	5,012.91	193.50	5,012.91	1.76
12,092.00	89.85	0.00	7,216.77	5,104.90	193.65	5,104.90	1.36
12,185.00	89.17	359.21	7,217.56	5,197.89	193.01	5,197.89	1.12
12,277.00	89.23	358.47	7,218.85	5,289.86	191.15	5,289.86	0.81
12,371.00	89.17	0.78	7,220.16	5,383.84	190.53	5,383.84	2.46
12,465.00	89.51	3.03	7,221.24	5,477.78	193.66	5,477.78	2.42
12,559.00	89.38	2.52	7,222.15	5,571.66	198.21	5,571.66	0.56
12,654.00	89.11	1.14	7,223.41	5,666.60	201.24	5,666.60	1.48
12,749.00	89.78	0.91	7,224.33	5,761.58	202.94	5,761.58	0.75
12,843.00	90.37	0.38	7,224.20	5,855.58	204.00	5,855.58	0.84

Design Report for KERR 4N-12HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
12,938.00	90.74	359.39	7,223.28	5,950.57	203.81	5,950.57	1.11
13,032.00	90.74	358.79	7,222.07	6,044.55	202.31	6,044.55	0.64
13,126.00	89.88	359.46	7,221.56	6,138.54	200.88	6,138.54	1.16
13,220.00	90.65	0.70	7,221.13	6,232.53	201.01	6,232.53	1.55
13,315.00	90.49	359.50	7,220.18	6,327.53	201.18	6,327.53	1.27
13,409.00	91.39	358.98	7,218.64	6,421.50	199.93	6,421.50	1.11
13,503.00	92.01	358.25	7,215.85	6,515.44	197.66	6,515.44	1.02
13,597.00	91.63	359.89	7,212.86	6,609.37	196.13	6,609.37	1.79
13,692.00	92.19	359.40	7,209.70	6,704.32	195.55	6,704.32	0.78
13,786.00	91.39	359.98	7,206.76	6,798.27	195.04	6,798.27	1.05
13,880.00	90.06	0.36	7,205.57	6,892.26	195.32	6,892.26	1.47
13,974.00	89.48	359.65	7,205.95	6,986.26	195.32	6,986.26	0.98
14,069.00	89.01	358.86	7,207.20	7,081.24	194.09	7,081.24	0.97
14,163.00	88.80	358.28	7,209.00	7,175.19	191.74	7,175.19	0.66
14,257.00	88.77	0.05	7,210.99	7,269.16	190.37	7,269.16	1.88
14,352.00	89.91	1.99	7,212.09	7,364.13	192.07	7,364.13	2.37
14,446.00	89.48	1.35	7,212.59	7,458.09	194.80	7,458.09	0.82
14,541.00	90.25	0.66	7,212.81	7,553.07	196.47	7,553.07	1.09
14,635.00	89.72	359.40	7,212.83	7,647.07	196.52	7,647.07	1.45
14,729.00	90.55	358.96	7,212.61	7,741.06	195.18	7,741.06	1.00
14,824.00	90.86	358.32	7,211.44	7,836.02	192.92	7,836.02	0.75
14,919.00	89.91	356.97	7,210.81	7,930.94	189.02	7,930.94	1.74
15,013.00	90.74	358.44	7,210.27	8,024.86	185.25	8,024.86	1.80
15,108.00	90.52	359.63	7,209.23	8,119.84	183.65	8,119.84	1.27
15,202.00	90.80	358.88	7,208.15	8,213.82	182.43	8,213.82	0.85
15,296.00	91.23	358.44	7,206.48	8,307.78	180.23	8,307.78	0.65
15,390.00	89.41	358.72	7,205.95	8,401.75	177.90	8,401.75	1.96
15,485.00	89.08	358.20	7,207.21	8,496.70	175.35	8,496.70	0.65
15,579.00	88.71	357.61	7,209.02	8,590.62	171.92	8,590.62	0.74
15,674.00	88.83	359.72	7,211.06	8,685.57	169.70	8,685.57	2.22
15,768.00	88.80	359.13	7,213.00	8,779.54	168.76	8,779.54	0.63
15,862.00	89.29	358.86	7,214.57	8,873.52	167.11	8,873.52	0.60
15,957.00	89.88	358.25	7,215.26	8,968.48	164.72	8,968.48	0.89
16,051.00	90.71	357.52	7,214.77	9,062.42	161.25	9,062.42	1.18
16,145.00	90.96	356.86	7,213.40	9,156.29	156.64	9,156.29	0.75
16,240.00	91.39	356.53	7,211.46	9,251.11	151.16	9,251.11	0.57
16,334.00	90.59	358.74	7,209.83	9,345.01	147.29	9,345.01	2.50
16,429.00	91.26	358.06	7,208.30	9,439.96	144.63	9,439.96	1.00
16,523.00	91.54	357.60	7,206.00	9,533.87	141.08	9,533.87	0.57
16,617.00	91.94	357.45	7,203.15	9,627.74	137.02	9,627.74	0.45
16,701.00	92.07	356.75	7,200.21	9,711.58	132.77	9,711.58	0.85
Final MWD Survey @ 16701.00' MD :: 7200.21' TVD							
16,747.07	92.07	356.75	7,198.54	9,757.54	130.16	9,757.54	0.00
Kerr 4N-12HZ_TOE							
16,749.00	92.07	356.75	7,198.47	9,759.47	130.05	9,759.47	0.00
Straight Line Projection @ 16749.00' MD :: 7198.47' TVD - Current MWD Survey @ 7526' MD :: 7232.98' TVD							

Design Report for KERR 4N-12HZ - Actual Field Surveys**Design Annotations**

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,097.00	1,096.99	0.01	-2.88	Tie-On to Surface Surveys @ 1097.00ft
1,203.00	1,202.99	0.20	-3.67	First Sperry MWD Survey @ 1203.00ft
16,701.00	7,200.21	9,711.58	132.77	Final MWD Survey @ 16701.00' MD :: 7200.21' TVD
16,749.00	7,198.47	9,759.47	130.05	Straight Line Projection @ 16749.00' MD :: 7198.47' TVD
16,749.00	7,198.47	9,759.47	130.05	Current MWD Survey @ 7526' MD :: 7232.98' TVD

Vertical Section Information

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

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
20.00	1,097.00	Cathedral MWD Surface Surveys	MWD
1,203.00	7,526.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
7,630.00	16,749.00	MWD Lateral Surveys	MWD+IFR1+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,086.00	1,085.99	9 5/8"	9-5/8	13-1/2
7,562.70	7,235.75	7"	7	8-3/4

Design Report for KERR 4N-12HZ - Actual Field Surveys**Wellbore Targets**

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Kerr 4N-12HZ_LD	0.00	0.00	0.00	0.01	0.00	1,291,306.19	3,182,713.69	40.131181	-104.846546
- actual wellpath misses target center by 0.01usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	9,927.17	-74.96	1,301,232.13	3,182,565.58	
Point 2				0.00	9,917.01	315.77	1,301,224.85	3,182,956.36	
Point 3				0.00	5,112.10	293.66	1,296,420.10	3,182,969.66	
Point 4				0.00	308.60	272.93	1,291,616.78	3,182,984.33	
Point 5				0.00	310.82	-113.48	1,291,616.15	3,182,597.93	
Point 6				0.00	5,118.14	-93.67	1,296,423.29	3,182,582.31	
Kerr 4N-12HZ_SEC	0.00	0.00	0.00	0.01	0.00	1,291,306.19	3,182,713.69	40.131181	-104.846546
- actual wellpath misses target center by 0.01usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	10,399.25	-532.80	1,301,700.80	3,182,104.30	
Point 2				0.00	10,331.08	2,088.84	1,301,651.96	3,184,726.26	
Point 3				0.00	10,297.06	3,399.60	1,301,627.60	3,186,037.18	
Point 4				0.00	10,262.85	4,710.41	1,301,603.05	3,187,348.16	
Point 5				0.00	7,653.75	4,694.19	1,298,994.01	3,187,351.16	
Point 6				0.00	5,045.22	4,678.34	1,296,385.54	3,187,354.53	
Point 7				0.00	5,084.51	2,060.98	1,296,405.54	3,184,737.06	
Point 8				0.00	5,125.31	-553.67	1,296,427.07	3,182,122.29	
Point 9				0.00	5,084.51	2,060.98	1,296,405.54	3,184,737.06	
Point 10				0.00	5,045.22	4,678.34	1,296,385.54	3,187,354.53	
Point 11				0.00	2,434.54	4,664.96	1,293,774.94	3,187,360.39	
Point 12				0.00	-175.50	4,650.72	1,291,164.97	3,187,365.39	
Point 13				0.00	-161.56	2,037.40	1,291,159.65	3,184,752.14	
Point 14				0.00	-146.55	-575.40	1,291,155.41	3,182,139.41	
Point 15				0.00	-161.56	2,037.40	1,291,159.65	3,184,752.14	
Point 16				0.00	-175.50	4,650.72	1,291,164.97	3,187,365.39	
Point 17				0.00	-2,786.15	4,636.16	1,288,554.39	3,187,370.06	
Point 18				0.00	-5,396.92	4,621.47	1,285,943.69	3,187,374.61	
Point 19				0.00	-5,409.00	2,010.86	1,285,912.37	3,184,764.27	
Point 20				0.00	-5,408.51	-598.64	1,285,893.64	3,182,154.94	
Point 21				0.00	-5,409.00	2,010.86	1,285,912.37	3,184,764.27	
Point 22				0.00	-5,396.92	4,621.47	1,285,943.69	3,187,374.61	
Point 23				0.00	-10,700.63	4,633.19	1,280,640.43	3,187,425.41	
Point 24				0.00	-10,670.82	1,999.62	1,280,650.83	3,184,791.80	
Point 25				0.00	-10,639.73	-645.73	1,280,662.42	3,182,146.41	
Point 26				0.00	-8,001.45	-619.36	1,283,300.72	3,182,153.33	
Point 27				0.00	-5,408.51	-598.64	1,285,893.64	3,182,154.94	
Point 28				0.00	-2,781.05	-586.65	1,288,521.00	3,182,147.57	
Point 29				0.00	-146.58	-571.52	1,291,155.41	3,182,143.29	
Point 30				0.00	2,490.00	-564.46	1,293,791.86	3,182,130.92	
Point 31				0.00	5,125.31	-553.67	1,296,427.07	3,182,122.29	
Point 32				0.00	7,763.05	-545.04	1,299,064.69	3,182,111.48	
Kerr 4N-12HZ_SHL	0.00	0.00	0.00	0.01	0.00	1,291,306.19	3,182,713.69	40.131181	-104.846546
- actual wellpath misses target center by 0.01usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									
Kerr 4N-12HZ_TOE	0.00	0.00	7,201.00	9,760.44	179.73	1,301,067.28	3,182,821.48	40.157974	-104.845903
- actual wellpath misses target center by 49.71usft at 16747.07usft MD (7198.54 TVD, 9757.54 N, 130.16 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	1.32 °/100usft	Maximum Dogleg over Survey:	13.86 °/100usft at 6,939.00 usft
Net Tortousity applicable to Plans:	0.45 °/100usft	Directional Difficulty Index:	6.709

Design Report for KERR 4N-12HZ - Actual Field Surveys

Audit Info

North Reference Sheet for Sec. 13-T2N-R67W - KERR 4N-12HZ - Plan A

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to True North Reference.

Vertical Depths are relative to RKB = 25' @ 4916.00usft (H&P 308). Northing and Easting are relative to KERR 4N-12HZ

Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980

Projection method is Lambert Conformal Conic (2 parallel)

Central Meridian is -105.500000°, Longitude Origin:0.000000°, Latitude Origin:40.783333°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99995901

Grid Coordinates of Well: 1,291,306.18 usft N, 3,182,713.69 usft E

Geographical Coordinates of Well: 40° 07' 52.25" N, 104° 50' 47.57" W

Grid Convergence at Surface is: 0.42°

Based upon Minimum Curvature type calculations, at a Measured Depth of 16,749.00usft the Bottom Hole Displacement is 9,760.33usft in the Direction of 0.76° (True).

Magnetic Convergence at surface is: -8.12° (2 September 2014, , BGGM2014)

Magnetic Model: BGGM2014
 Date: 02-Sep-14
 Declination: 8.54°
 Inclination/Dip: 66.70°
 Field Strength: 52538

Grid North is 0.42° East of True North (Grid Convergence)
 Magnetic North is 8.54° East of True North (Magnetic Declination)
 Magnetic North is 8.12° East of Grid North (Magnetic Convergence)

To convert a True Direction to a Grid Direction, Subtract 0.42°
 To convert a Magnetic Direction to a True Direction, Add 8.54° East
 To convert a Magnetic Direction to a Grid Direction, Add 8.12°

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 13-T2N-R67W

KERR 4N-12HZ

Job Number: 901640832 :: API: 05-123-39355

Plan A

Design: Actual Field Surveys

Sperry Drilling Services

Geodetic Report

05 January, 2015

Well Coordinates: 1,291,306.18 N, 3,182,713.69 E (40° 07' 52.25" N, 104° 50' 47.57" W)

Ground Level: 4,891.00 usft

Local Coordinate Origin:

Centered on Well KERR 4N-12HZ

Viewing Datum:

RKB = 25' @ 4916.00usft (H&P 308)

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 KERR 4N-12HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
0.00	0.00	0.00	0.00	0.00	0.00	40.131181	-104.846546	1,291,306.18	3,182,713.69
20.00	0.00	0.00	20.00	0.00	0.00	40.131181	-104.846546	1,291,306.18	3,182,713.69
71.00	0.30	267.30	71.00	-0.01	-0.13	40.131181	-104.846547	1,291,306.17	3,182,713.56
142.00	0.10	278.40	142.00	-0.01	-0.38	40.131181	-104.846548	1,291,306.17	3,182,713.31
210.00	0.30	238.20	210.00	-0.09	-0.59	40.131181	-104.846548	1,291,306.08	3,182,713.10
304.00	0.10	159.70	304.00	-0.30	-0.77	40.131180	-104.846549	1,291,305.88	3,182,712.92
384.00	0.20	269.50	384.00	-0.36	-0.89	40.131180	-104.846549	1,291,305.81	3,182,712.81
464.00	0.10	242.50	464.00	-0.40	-1.09	40.131180	-104.846550	1,291,305.77	3,182,712.61
544.00	0.20	327.80	544.00	-0.31	-1.22	40.131180	-104.846551	1,291,305.86	3,182,712.47
624.00	0.40	244.20	624.00	-0.32	-1.55	40.131180	-104.846552	1,291,305.85	3,182,712.14
704.00	0.40	308.50	704.00	-0.26	-2.02	40.131180	-104.846553	1,291,305.90	3,182,711.67
784.00	0.10	25.80	783.99	-0.03	-2.21	40.131181	-104.846554	1,291,306.14	3,182,711.48
864.00	0.00	0.00	863.99	0.04	-2.18	40.131181	-104.846554	1,291,306.20	3,182,711.51
944.00	0.20	208.30	943.99	-0.09	-2.24	40.131181	-104.846554	1,291,306.08	3,182,711.45
1,024.00	0.10	278.40	1,023.99	-0.20	-2.38	40.131180	-104.846555	1,291,305.96	3,182,711.31
1,052.00	0.50	293.20	1,051.99	-0.15	-2.52	40.131181	-104.846555	1,291,306.01	3,182,711.18
1,086.00	0.50	293.20	1,085.99	-0.03	-2.79	40.131181	-104.846556	1,291,306.13	3,182,710.90
1,097.00	0.50	293.20	1,096.99	0.01	-2.88	40.131181	-104.846557	1,291,306.17	3,182,710.81
1,203.00	0.40	271.90	1,202.99	0.20	-3.67	40.131182	-104.846559	1,291,306.35	3,182,710.02
1,294.00	0.36	271.90	1,293.99	0.22	-4.27	40.131182	-104.846562	1,291,306.37	3,182,709.41
1,477.00	0.46	283.14	1,476.98	0.41	-5.56	40.131182	-104.846566	1,291,306.55	3,182,708.12
1,568.00	0.43	286.15	1,567.98	0.59	-6.25	40.131183	-104.846569	1,291,306.72	3,182,707.44
1,771.00	0.37	299.34	1,770.97	1.12	-7.55	40.131184	-104.846573	1,291,307.24	3,182,706.13
1,862.00	0.41	295.62	1,861.97	1.40	-8.10	40.131185	-104.846575	1,291,307.52	3,182,705.58
2,045.00	0.58	303.44	2,044.97	2.20	-9.46	40.131187	-104.846580	1,291,308.31	3,182,704.21
2,137.00	0.66	306.28	2,136.96	2.77	-10.28	40.131189	-104.846583	1,291,308.87	3,182,703.39
2,228.00	0.51	322.49	2,227.96	3.40	-10.95	40.131190	-104.846585	1,291,309.50	3,182,702.72
2,320.00	2.03	143.02	2,319.94	2.42	-10.22	40.131188	-104.846583	1,291,308.53	3,182,703.45
2,412.00	1.61	145.43	2,411.89	0.06	-8.50	40.131181	-104.846577	1,291,306.17	3,182,705.19
2,594.00	1.03	158.92	2,593.84	-3.58	-6.47	40.131171	-104.846569	1,291,302.56	3,182,707.25
2,686.00	0.62	154.24	2,685.83	-4.80	-5.95	40.131168	-104.846568	1,291,301.34	3,182,707.77
2,778.00	0.63	145.07	2,777.83	-5.66	-5.45	40.131165	-104.846566	1,291,300.48	3,182,708.29
2,871.00	0.62	153.44	2,870.82	-6.53	-4.93	40.131163	-104.846564	1,291,299.62	3,182,708.81
2,963.00	0.35	169.63	2,962.82	-7.25	-4.66	40.131161	-104.846563	1,291,298.90	3,182,709.09
3,057.00	0.35	146.24	3,056.82	-7.77	-4.44	40.131160	-104.846562	1,291,298.38	3,182,709.30
3,240.00	0.43	128.24	3,239.81	-8.66	-3.59	40.131157	-104.846559	1,291,297.49	3,182,710.16
3,333.00	0.21	83.94	3,332.81	-8.86	-3.15	40.131157	-104.846558	1,291,297.30	3,182,710.61
3,425.00	0.47	30.49	3,424.81	-8.52	-2.79	40.131158	-104.846556	1,291,297.64	3,182,710.96
3,518.00	1.20	7.94	3,517.80	-7.22	-2.46	40.131161	-104.846555	1,291,298.94	3,182,711.28
3,609.00	1.71	358.48	3,608.77	-4.92	-2.37	40.131168	-104.846555	1,291,301.24	3,182,711.36
3,793.00	1.46	329.66	3,792.70	-0.15	-3.62	40.131181	-104.846559	1,291,306.00	3,182,710.07
3,978.00	0.89	8.39	3,977.67	3.30	-4.61	40.131190	-104.846563	1,291,309.45	3,182,709.06

Design Report for KERR 4N-12HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
4,070.00	0.86	11.48	4,069.66	4.69	-4.36	40.131194	-104.846562	1,291,310.83	3,182,709.29
4,162.00	0.63	16.52	4,161.65	5.85	-4.08	40.131197	-104.846561	1,291,312.00	3,182,709.56
4,255.00	0.68	14.96	4,254.64	6.87	-3.79	40.131200	-104.846560	1,291,313.02	3,182,709.85
4,349.00	0.69	353.58	4,348.64	7.97	-3.71	40.131203	-104.846560	1,291,314.12	3,182,709.92
4,443.00	0.47	330.07	4,442.63	8.87	-3.97	40.131205	-104.846560	1,291,315.02	3,182,709.66
4,537.00	0.68	327.62	4,536.63	9.67	-4.46	40.131208	-104.846562	1,291,315.82	3,182,709.16
4,631.00	0.76	317.02	4,630.62	10.60	-5.18	40.131210	-104.846565	1,291,316.74	3,182,708.43
4,725.00	0.61	305.89	4,724.61	11.35	-6.01	40.131212	-104.846568	1,291,317.48	3,182,707.59
4,819.00	1.56	83.99	4,818.60	11.78	-5.15	40.131213	-104.846565	1,291,317.92	3,182,708.46
4,913.00	2.67	103.98	4,912.54	11.38	-1.75	40.131212	-104.846553	1,291,317.55	3,182,711.86
5,007.00	4.46	107.34	5,006.35	9.76	3.86	40.131208	-104.846532	1,291,315.97	3,182,717.48
5,101.00	4.68	95.37	5,100.06	8.32	11.17	40.131204	-104.846506	1,291,314.58	3,182,724.80
5,195.00	3.70	87.33	5,193.80	8.10	18.02	40.131203	-104.846482	1,291,314.41	3,182,731.65
5,289.00	5.41	87.72	5,287.50	8.42	25.48	40.131204	-104.846455	1,291,314.78	3,182,739.10
5,383.00	7.18	91.31	5,380.93	8.46	35.78	40.131204	-104.846418	1,291,314.90	3,182,749.40
5,477.00	8.61	91.56	5,474.04	8.13	48.68	40.131203	-104.846372	1,291,314.67	3,182,762.31
5,571.00	10.32	92.31	5,566.76	7.60	64.13	40.131202	-104.846317	1,291,314.25	3,182,777.76
5,665.00	8.91	92.63	5,659.43	6.93	79.82	40.131200	-104.846261	1,291,313.69	3,182,793.45
5,759.00	9.49	84.22	5,752.23	7.37	94.80	40.131201	-104.846207	1,291,314.25	3,182,808.43
5,854.00	8.34	81.02	5,846.08	9.24	109.40	40.131206	-104.846155	1,291,316.22	3,182,823.01
5,948.00	8.03	89.12	5,939.13	10.40	122.70	40.131210	-104.846107	1,291,317.49	3,182,836.30
6,043.00	7.06	86.86	6,033.30	10.82	135.16	40.131211	-104.846063	1,291,318.00	3,182,848.76
6,137.00	6.06	83.91	6,126.69	11.67	145.86	40.131213	-104.846025	1,291,318.92	3,182,859.46
6,231.00	5.44	80.69	6,220.21	12.91	155.19	40.131216	-104.845991	1,291,320.24	3,182,868.78
6,326.00	3.84	95.38	6,314.90	13.34	162.81	40.131218	-104.845964	1,291,320.72	3,182,876.39
6,421.00	3.27	90.09	6,409.72	13.04	168.68	40.131217	-104.845943	1,291,320.46	3,182,882.27
6,515.00	1.63	90.49	6,503.63	13.03	172.70	40.131217	-104.845929	1,291,320.48	3,182,886.28
6,610.00	1.55	88.59	6,598.59	13.05	175.34	40.131217	-104.845919	1,291,320.52	3,182,888.92
6,657.00	3.92	39.69	6,645.54	14.30	177.00	40.131220	-104.845913	1,291,321.78	3,182,890.57
6,704.00	6.34	24.21	6,692.35	17.90	179.09	40.131230	-104.845906	1,291,325.40	3,182,892.64
6,751.00	10.91	24.70	6,738.81	24.31	182.01	40.131248	-104.845895	1,291,331.83	3,182,895.51
6,799.00	13.90	20.94	6,785.68	33.83	185.97	40.131274	-104.845881	1,291,341.38	3,182,899.40
6,847.00	16.29	17.75	6,832.02	45.63	190.09	40.131306	-104.845866	1,291,353.20	3,182,903.43
6,892.00	19.44	13.80	6,874.85	58.91	193.80	40.131343	-104.845853	1,291,366.52	3,182,907.04
6,939.00	25.70	9.08	6,918.23	76.59	197.28	40.131391	-104.845841	1,291,384.22	3,182,910.39
6,986.00	30.58	8.30	6,959.66	98.50	200.61	40.131451	-104.845829	1,291,406.15	3,182,913.56
7,033.00	35.96	7.79	6,998.95	124.02	204.21	40.131521	-104.845816	1,291,431.69	3,182,916.97
7,081.00	41.02	4.64	7,036.51	153.70	207.40	40.131603	-104.845805	1,291,461.40	3,182,919.94
7,128.00	45.27	0.47	7,070.80	185.79	208.78	40.131691	-104.845800	1,291,493.50	3,182,921.09
7,175.00	49.59	0.32	7,102.59	220.40	209.02	40.131786	-104.845799	1,291,528.10	3,182,921.07
7,222.00	54.89	359.12	7,131.36	257.54	208.82	40.131888	-104.845799	1,291,565.24	3,182,920.60
7,270.00	60.72	359.24	7,156.92	298.14	208.24	40.131999	-104.845802	1,291,605.83	3,182,919.72

Design Report for KERR 4N-12HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
7,317.00	65.58	0.89	7,178.14	340.06	208.31	40.132114	-104.845801	1,291,647.75	3,182,919.48
7,365.00	69.69	1.04	7,196.41	384.43	209.05	40.132236	-104.845799	1,291,692.12	3,182,919.90
7,412.00	73.58	1.27	7,211.21	429.02	209.95	40.132359	-104.845795	1,291,736.72	3,182,920.47
7,459.00	77.49	0.13	7,222.95	474.52	210.51	40.132484	-104.845793	1,291,782.21	3,182,920.68
7,506.00	82.93	359.75	7,230.94	520.81	210.46	40.132611	-104.845794	1,291,828.51	3,182,920.29
7,526.00	85.34	359.61	7,232.98	540.71	210.34	40.132665	-104.845794	1,291,848.40	3,182,920.04
7,562.70	86.01	359.53	7,235.75	577.30	210.07	40.132766	-104.845795	1,291,884.99	3,182,919.49
7,630.00	87.23	359.38	7,239.72	644.48	209.43	40.132950	-104.845797	1,291,952.16	3,182,918.36
7,724.00	87.41	359.24	7,244.11	738.37	208.30	40.133208	-104.845801	1,292,046.03	3,182,916.53
7,819.00	87.41	358.58	7,248.41	833.25	206.49	40.133468	-104.845808	1,292,140.90	3,182,914.03
7,913.00	88.98	0.17	7,251.37	927.20	205.47	40.133726	-104.845811	1,292,234.83	3,182,912.31
8,008.00	90.12	0.78	7,252.11	1,022.19	206.26	40.133987	-104.845809	1,292,329.82	3,182,912.40
8,102.00	90.31	0.54	7,251.76	1,116.18	207.34	40.134245	-104.845805	1,292,423.81	3,182,912.79
8,197.00	90.49	1.86	7,251.10	1,211.16	209.33	40.134506	-104.845798	1,292,518.80	3,182,914.08
8,291.00	90.40	2.03	7,250.37	1,305.10	212.52	40.134764	-104.845786	1,292,612.76	3,182,916.58
8,386.00	90.28	1.57	7,249.80	1,400.05	215.50	40.135024	-104.845776	1,292,707.72	3,182,918.86
8,480.00	92.25	1.70	7,247.73	1,493.98	218.18	40.135282	-104.845766	1,292,801.67	3,182,920.85
8,575.00	91.36	1.54	7,244.74	1,588.90	220.87	40.135543	-104.845756	1,292,896.60	3,182,922.84
8,669.00	91.39	1.71	7,242.48	1,682.83	223.53	40.135800	-104.845747	1,292,990.55	3,182,924.81
8,763.00	91.05	1.05	7,240.48	1,776.78	225.80	40.136058	-104.845739	1,293,084.51	3,182,926.38
8,858.00	90.83	0.84	7,238.92	1,871.76	227.36	40.136319	-104.845733	1,293,179.49	3,182,927.25
8,952.00	91.02	0.60	7,237.40	1,965.74	228.54	40.136577	-104.845729	1,293,273.47	3,182,927.73
9,047.00	90.92	0.38	7,235.80	2,060.72	229.36	40.136838	-104.845726	1,293,368.45	3,182,927.85
9,141.00	90.96	0.05	7,234.25	2,154.71	229.71	40.137096	-104.845725	1,293,462.43	3,182,927.51
9,236.00	90.40	0.01	7,233.13	2,249.70	229.76	40.137357	-104.845725	1,293,557.42	3,182,926.86
9,330.00	89.35	359.50	7,233.33	2,343.70	229.36	40.137615	-104.845726	1,293,651.41	3,182,925.76
9,424.00	89.29	359.31	7,234.45	2,437.69	228.38	40.137873	-104.845729	1,293,745.38	3,182,924.09
9,518.00	89.32	358.93	7,235.59	2,531.67	226.94	40.138131	-104.845735	1,293,839.35	3,182,921.96
9,610.00	89.17	359.36	7,236.80	2,623.65	225.56	40.138383	-104.845740	1,293,931.31	3,182,919.91
9,702.00	89.01	359.90	7,238.26	2,715.64	224.97	40.138636	-104.845742	1,294,023.29	3,182,918.64
9,793.00	90.28	0.42	7,238.82	2,806.63	225.23	40.138885	-104.845741	1,294,114.28	3,182,918.22
9,885.00	89.82	0.17	7,238.74	2,898.63	225.70	40.139138	-104.845739	1,294,206.28	3,182,918.01
9,976.00	91.11	0.84	7,238.01	2,989.62	226.50	40.139388	-104.845736	1,294,297.27	3,182,918.15
10,067.00	90.92	359.42	7,236.39	3,080.60	226.71	40.139637	-104.845735	1,294,388.24	3,182,917.68
10,159.00	90.56	358.96	7,235.21	3,172.59	225.41	40.139890	-104.845740	1,294,480.21	3,182,915.70
10,250.00	90.25	358.51	7,234.56	3,263.56	223.40	40.140140	-104.845747	1,294,571.17	3,182,913.02
10,342.00	89.51	358.50	7,234.76	3,355.53	221.00	40.140392	-104.845756	1,294,663.11	3,182,909.95
10,434.00	90.59	358.82	7,234.67	3,447.50	218.85	40.140645	-104.845764	1,294,755.06	3,182,907.12
10,525.00	90.52	358.78	7,233.79	3,538.48	216.94	40.140894	-104.845770	1,294,846.02	3,182,904.54
10,616.00	90.03	358.06	7,233.36	3,629.44	214.43	40.141144	-104.845779	1,294,936.96	3,182,901.36
10,709.00	90.31	358.83	7,233.08	3,722.41	211.91	40.141399	-104.845788	1,295,029.89	3,182,898.15
10,801.00	90.03	358.54	7,232.81	3,814.38	209.80	40.141652	-104.845796	1,295,121.85	3,182,895.37

Design Report for KERR 4N-12HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
10,893.00	89.94	358.63	7,232.83	3,906.35	207.52	40.141904	-104.845804	1,295,213.80	3,182,892.42
10,986.00	89.66	358.44	7,233.16	3,999.32	205.15	40.142159	-104.845812	1,295,306.74	3,182,889.35
11,079.00	90.49	359.19	7,233.03	4,092.30	203.22	40.142415	-104.845819	1,295,399.70	3,182,886.74
11,171.00	92.19	359.71	7,230.88	4,184.27	202.34	40.142667	-104.845823	1,295,491.65	3,182,885.18
11,262.00	91.70	359.26	7,227.79	4,275.21	201.52	40.142917	-104.845825	1,295,582.59	3,182,883.70
11,355.00	91.70	358.81	7,225.04	4,368.16	199.96	40.143172	-104.845831	1,295,675.51	3,182,881.45
11,447.00	91.63	358.68	7,222.36	4,460.10	197.94	40.143424	-104.845838	1,295,767.43	3,182,878.75
11,540.00	91.67	358.36	7,219.68	4,553.03	195.54	40.143679	-104.845847	1,295,860.34	3,182,875.67
11,631.00	91.02	359.36	7,217.55	4,643.98	193.73	40.143929	-104.845853	1,295,951.27	3,182,873.19
11,723.00	91.05	358.83	7,215.89	4,735.96	192.28	40.144181	-104.845859	1,296,043.23	3,182,871.06
11,815.00	90.68	359.85	7,214.50	4,827.94	191.22	40.144434	-104.845862	1,296,135.20	3,182,869.32
11,907.00	89.72	1.39	7,214.18	4,919.93	192.22	40.144686	-104.845859	1,296,227.19	3,182,869.64
12,000.00	88.61	0.19	7,215.53	5,012.91	193.50	40.144942	-104.845854	1,296,320.17	3,182,870.24
12,092.00	89.85	0.00	7,216.77	5,104.90	193.65	40.145194	-104.845854	1,296,412.15	3,182,869.71
12,185.00	89.17	359.21	7,217.56	5,197.89	193.01	40.145449	-104.845856	1,296,505.14	3,182,868.38
12,277.00	89.23	358.47	7,218.85	5,289.86	191.15	40.145702	-104.845863	1,296,597.09	3,182,865.84
12,371.00	89.17	0.78	7,220.16	5,383.84	190.53	40.145960	-104.845865	1,296,691.06	3,182,864.54
12,465.00	89.51	3.03	7,221.24	5,477.78	193.66	40.146218	-104.845854	1,296,785.01	3,182,866.97
12,559.00	89.38	2.52	7,222.15	5,571.66	198.21	40.146475	-104.845837	1,296,878.92	3,182,870.83
12,654.00	89.11	1.14	7,223.41	5,666.60	201.24	40.146736	-104.845826	1,296,973.88	3,182,873.16
12,749.00	89.78	0.91	7,224.33	5,761.58	202.94	40.146997	-104.845820	1,297,068.87	3,182,874.16
12,843.00	90.37	0.38	7,224.20	5,855.58	204.00	40.147255	-104.845817	1,297,162.86	3,182,874.53
12,938.00	90.74	359.39	7,223.28	5,950.57	203.81	40.147516	-104.845817	1,297,257.85	3,182,873.64
13,032.00	90.74	358.79	7,222.07	6,044.55	202.31	40.147773	-104.845823	1,297,351.81	3,182,871.45
13,126.00	89.88	359.46	7,221.56	6,138.54	200.88	40.148031	-104.845828	1,297,445.78	3,182,869.32
13,220.00	90.65	0.70	7,221.13	6,232.53	201.01	40.148289	-104.845827	1,297,539.77	3,182,868.76
13,315.00	90.49	359.50	7,220.18	6,327.53	201.18	40.148550	-104.845827	1,297,634.76	3,182,868.23
13,409.00	91.39	358.98	7,218.64	6,421.50	199.93	40.148808	-104.845831	1,297,728.72	3,182,866.29
13,503.00	92.01	358.25	7,215.85	6,515.44	197.66	40.149066	-104.845839	1,297,822.63	3,182,863.32
13,597.00	91.63	359.89	7,212.86	6,609.37	196.13	40.149324	-104.845845	1,297,916.55	3,182,861.11
13,692.00	92.19	359.40	7,209.70	6,704.32	195.55	40.149585	-104.845847	1,298,011.48	3,182,859.82
13,786.00	91.39	359.98	7,206.76	6,798.27	195.04	40.149842	-104.845849	1,298,105.42	3,182,858.62
13,880.00	90.06	0.36	7,205.57	6,892.26	195.32	40.150100	-104.845848	1,298,199.41	3,182,858.21
13,974.00	89.48	359.65	7,205.95	6,986.26	195.32	40.150358	-104.845848	1,298,293.40	3,182,857.52
14,069.00	89.01	358.86	7,207.20	7,081.24	194.09	40.150619	-104.845852	1,298,388.37	3,182,855.59
14,163.00	88.80	358.28	7,209.00	7,175.19	191.74	40.150877	-104.845860	1,298,482.30	3,182,852.55
14,257.00	88.77	0.05	7,210.99	7,269.16	190.37	40.151135	-104.845865	1,298,576.24	3,182,850.49
14,352.00	89.91	1.99	7,212.09	7,364.13	192.07	40.151396	-104.845859	1,298,671.22	3,182,851.48
14,446.00	89.48	1.35	7,212.59	7,458.09	194.80	40.151654	-104.845849	1,298,765.19	3,182,853.53
14,541.00	90.25	0.66	7,212.81	7,553.07	196.47	40.151914	-104.845843	1,298,860.18	3,182,854.49
14,635.00	89.72	359.40	7,212.83	7,647.07	196.52	40.152172	-104.845843	1,298,954.18	3,182,853.85
14,729.00	90.55	358.96	7,212.61	7,741.06	195.18	40.152430	-104.845848	1,299,048.15	3,182,851.81

Design Report for KERR 4N-12HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
14,824.00	90.86	358.32	7,211.44	7,836.02	192.92	40.152691	-104.845856	1,299,143.09	3,182,848.86
14,919.00	89.91	356.97	7,210.81	7,930.94	189.02	40.152952	-104.845870	1,299,237.97	3,182,844.25
15,013.00	90.74	358.44	7,210.27	8,024.86	185.25	40.153209	-104.845884	1,299,331.86	3,182,839.80
15,108.00	90.52	359.63	7,209.23	8,119.84	183.65	40.153470	-104.845889	1,299,426.82	3,182,837.50
15,202.00	90.80	358.88	7,208.15	8,213.82	182.43	40.153728	-104.845894	1,299,520.79	3,182,835.58
15,296.00	91.23	358.44	7,206.48	8,307.78	180.23	40.153986	-104.845901	1,299,614.72	3,182,832.69
15,390.00	89.41	358.72	7,205.95	8,401.75	177.90	40.154244	-104.845910	1,299,708.66	3,182,829.67
15,485.00	89.08	358.20	7,207.21	8,496.70	175.35	40.154505	-104.845919	1,299,803.60	3,182,826.42
15,579.00	88.71	357.61	7,209.02	8,590.62	171.92	40.154763	-104.845931	1,299,897.48	3,182,822.29
15,674.00	88.83	359.72	7,211.06	8,685.57	169.70	40.155023	-104.845939	1,299,992.41	3,182,819.38
15,768.00	88.80	359.13	7,213.00	8,779.54	168.76	40.155281	-104.845943	1,300,086.37	3,182,817.74
15,862.00	89.29	358.86	7,214.57	8,873.52	167.11	40.155539	-104.845948	1,300,180.32	3,182,815.40
15,957.00	89.88	358.25	7,215.26	8,968.48	164.72	40.155800	-104.845957	1,300,275.27	3,182,812.31
16,051.00	90.71	357.52	7,214.77	9,062.42	161.25	40.156058	-104.845969	1,300,369.17	3,182,808.15
16,145.00	90.96	356.86	7,213.40	9,156.29	156.64	40.156315	-104.845986	1,300,463.00	3,182,802.85
16,240.00	91.39	356.53	7,211.46	9,251.11	151.16	40.156576	-104.846005	1,300,557.78	3,182,796.67
16,334.00	90.59	358.74	7,209.83	9,345.01	147.29	40.156833	-104.846019	1,300,651.64	3,182,792.10
16,429.00	91.26	358.06	7,208.30	9,439.96	144.63	40.157094	-104.846029	1,300,746.57	3,182,788.75
16,523.00	91.54	357.60	7,206.00	9,533.87	141.08	40.157352	-104.846042	1,300,840.44	3,182,784.50
16,617.00	91.94	357.45	7,203.15	9,627.74	137.02	40.157609	-104.846056	1,300,934.27	3,182,779.75
16,701.00	92.07	356.75	7,200.21	9,711.58	132.77	40.157840	-104.846071	1,301,018.07	3,182,774.89
16,747.07	92.07	356.75	7,198.54	9,757.54	130.16	40.157966	-104.846081	1,301,064.01	3,182,771.94
16,749.00	92.07	356.75	7,198.47	9,759.47	130.05	40.157971	-104.846081	1,301,065.94	3,182,771.82

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,097.00	1,096.99	0.01	-2.88	Tie-On to Surface Surveys @ 1097.00ft
1,203.00	1,202.99	0.20	-3.67	First Sperry MWD Survey @ 1203.00ft
16,701.00	7,200.21	9,711.58	132.77	Final MWD Survey @ 16701.00' MD :: 7200.21' TVD
16,749.00	7,198.47	9,759.47	130.05	Straight Line Projection @ 16749.00' MD :: 7198.47' TVD
16,749.00	7,198.47	9,759.47	130.05	Current MWD Survey @ 7526' MD :: 7232.98' TVD

Design Report for KERR 4N-12HZ - Actual Field Surveys

Vertical Section Information

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

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
20.00	1,097.00	Cathedral MWD Surface Surveys	MWD
1,203.00	7,526.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
7,630.00	16,749.00	MWD Lateral Surveys	MWD+IFR1+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,086.00	1,085.99	9 5/8"	9-5/8	13-1/2
7,562.70	7,235.75	7"	7	8-3/4

Design Targets

Shape	Target Name	TVD (')	Northing (')	Easting (')	+N/-S	+E/-W	Created	Updated
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Directional Difficulty Index

Average Dogleg over Survey:	1.32 °/100usft	Maximum Dogleg over Survey:	13.86 °/100usft at 6,939.00 usft
Net Tortousity applicable to Plans:	0.45 °/100usft	Directional Difficulty Index:	6.709

Design Report for KERR 4N-12HZ - Actual Field Surveys

Audit Info

North Reference Sheet for Sec. 13-T2N-R67W - KERR 4N-12HZ - Plan A

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to True North Reference.

Vertical Depths are relative to RKB = 25' @ 4916.00usft (H&P 308). Northing and Easting are relative to KERR 4N-12HZ

Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980

Projection method is Lambert Conformal Conic (2 parallel)

Central Meridian is -105.500000°, Longitude Origin:0.000000°, Latitude Origin:40.783333°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99995901

Grid Coordinates of Well: 1,291,306.18 usft N, 3,182,713.69 usft E

Geographical Coordinates of Well: 40° 07' 52.25" N, 104° 50' 47.57" W

Grid Convergence at Surface is: 0.42°

Based upon Minimum Curvature type calculations, at a Measured Depth of 16,749.00usft

the Bottom Hole Displacement is 9,760.33usft in the Direction of 0.76° (True).

Magnetic Convergence at surface is: -8.12° (2 September 2014, , BGGM2014)

