

SPERRY-SUN DRILLING SERVICES

CERTIFIED SURVEY WORK SHEET



OPERATOR:	Anadarko Petroleum Corp.
WELL:	Kerr 13N-25HZ
FIELD:	DJ Basin
RIG:	H&P 308
LEGALS:	Sec. 13-T2N-R67W
COUNTY:	Weld
STATE:	Colorado
CAL. METHOD:	Min Curv / True North
MAG. DECL. APPLIED:	8.54
VERTICAL SEC. DIR. :	180.33

SSDS Job Number :	901640431
Start Date of Job :	10/31/2014
End Date of Job :	11/11/2014
Lead Directional Driller:	Jesse Kysar
	Brian Saunders
Other SSDS DD's :	Brandon Watson
SSDS MWD Engineers :	Adam Sampson
	James Ramsay
	Jonathan Parish

	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	20.00	Gyro								
Last Survey Depth	1108.00									
KOP Depth/Sidetrack MD	6640.00	KOP		KOP-ST1		KOP-ST2		KOP-ST3		KOP-ST4
First Survey Depth	1209.00	MWD		MWD		MWD		MWD		MWD
Last Survey Depth	17477.00	MWD		MWD		MWD		MWD		MWD
Bit Extrapolation to TD	17525.00	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 : Jesse Kysar Print Name : Adam Sampson Print Name :

Sign Name :  Sign Name :  Sign Name :

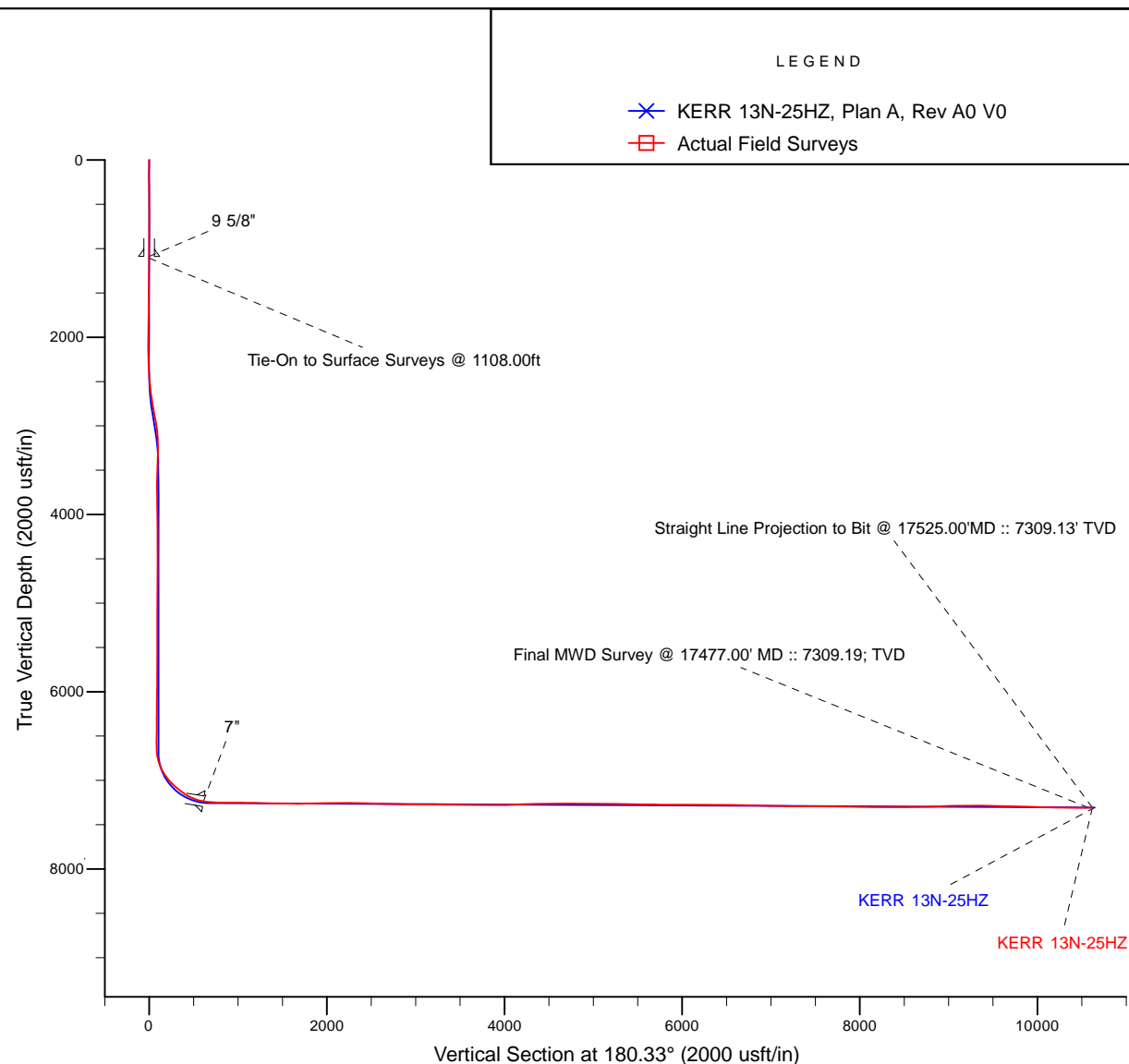
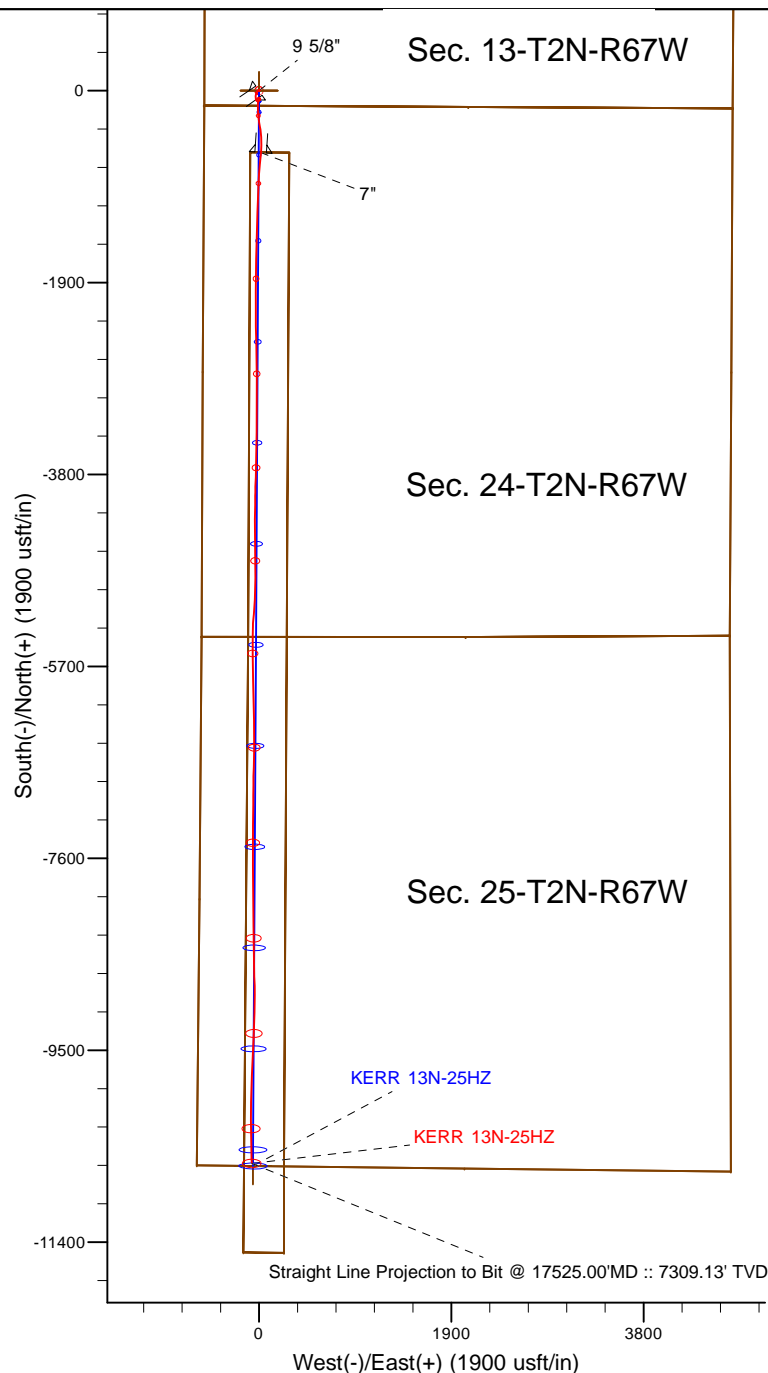
Print Name : Brian Saunders Print Name : James Ramsay Print Name :

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.

Project: Weld County, CO (NAD 83)
 Site: Sec. 13-T2N-R67W
 Well: KERR 13N-25HZ
 Wellbore: Plan A
 Design: Actual Field Surveys



7" Casing: ~461.78' FNL, ~562.28' FWL
 Lat/Long: 40.129502 N, -104.846589 E
 State Planes - CO Northern: 1,290,694.54' N, 3,182,706.32' E
 Location: Sec. 24-T2N-R67W

BHL: ~25.56' FSL, ~543.24' FWL
 Lat/Long: 40.102027 N, -104.846912 E
 State Planes - CO Northern: 1,044,846.912' N, 3,182,689.71' E
 Location: Sec. 25-T2N-R67W

WELL DETAILS: KERR 13N-25HZ	
Ground Level:	4891.00
RKB = 25' @ 4916.00usft (H&P 308)	
Design: Actual Field Surveys (KERR 13N-25HZ/Plan A)	
Created By: Katie Benner	Date: 12/16/2014
Reviewed: _____	Date: _____

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 13-T2N-R67W

KERR 13N-25HZ

Job Number: 901640431 :: API: 05-123-39357

Plan A

Design: Actual Field Surveys

Sperry Drilling Services

Standard Report

16 December, 2014

Surface UWI : Job Number: 901640431 :: API: 05-123-39357

Well Coordinates: 1,291,306.32 N, 3,182,683.77 E (40° 07' 52.25" N, 104° 50' 47.95" W)

Ground Level: 4,891.00 usft

Local Coordinate Origin:

Centered on Well KERR 13N-25HZ

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 13N-25HZ - 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
KERR 13N-25HZ_LD - KERR 13N-25HZ_SEC - KERR 13N-25HZ_SHL							
20.00	0.00	0.00	20.00	0.00	0.00	0.00	0.00
70.00	0.00	0.00	70.00	0.00	0.00	0.00	0.00
141.00	0.20	316.10	141.00	0.09	-0.09	-0.09	0.28
209.00	0.10	202.80	209.00	0.12	-0.19	-0.12	0.38
303.00	0.30	245.10	303.00	-0.06	-0.45	0.06	0.25
383.00	0.30	210.30	383.00	-0.33	-0.74	0.33	0.22
463.00	0.70	217.80	462.99	-0.90	-1.15	0.90	0.51
543.00	0.70	223.50	542.99	-1.64	-1.78	1.65	0.09
623.00	0.00	0.00	622.99	-1.99	-2.12	2.00	0.87
703.00	0.30	116.90	702.99	-2.08	-1.93	2.10	0.37
783.00	0.20	98.50	782.99	-2.20	-1.61	2.21	0.16
863.00	0.00	0.00	862.99	-2.22	-1.47	2.23	0.25
943.00	0.50	28.50	942.98	-1.91	-1.30	1.92	0.62
1,023.00	0.70	27.40	1,022.98	-1.17	-0.91	1.18	0.25
1,055.00	0.90	55.50	1,054.98	-0.86	-0.61	0.86	1.36
1,088.80	0.90	55.50	1,088.77	-0.56	-0.18	0.56	0.00
9 5/8"							
1,108.00	0.90	55.50	1,107.97	-0.39	0.07	0.39	0.00
Tie-On to Surface Surveys @ 1108.00ft							
1,209.00	0.76	55.59	1,208.96	0.44	1.28	-0.45	0.14
1,304.00	0.90	46.55	1,303.95	1.31	2.34	-1.32	0.20
1,399.00	0.87	64.18	1,398.94	2.14	3.53	-2.16	0.29
1,493.00	0.86	53.13	1,492.93	2.87	4.74	-2.90	0.18
1,587.00	0.56	28.37	1,586.92	3.70	5.52	-3.73	0.45
1,679.00	0.52	33.65	1,678.92	4.44	5.96	-4.48	0.07
1,770.00	0.57	14.53	1,769.91	5.22	6.31	-5.26	0.21
1,862.00	0.72	1.85	1,861.91	6.25	6.44	-6.28	0.22
1,953.00	0.66	347.17	1,952.90	7.33	6.34	-7.36	0.20
2,045.00	0.90	325.98	2,044.89	8.44	5.82	-8.48	0.40
2,228.00	2.40	272.96	2,227.82	9.83	1.19	-9.84	1.09
2,319.00	4.16	230.07	2,318.68	7.81	-3.25	-7.79	3.19
2,411.00	6.15	225.21	2,410.30	2.20	-9.30	-2.14	2.21
2,502.00	7.50	218.08	2,500.66	-5.91	-16.42	6.01	1.75
2,593.00	7.93	207.66	2,590.84	-16.15	-23.00	16.28	1.61
2,686.00	8.79	199.66	2,682.85	-28.52	-28.37	28.68	1.55
2,778.00	8.95	195.41	2,773.75	-42.04	-32.64	42.23	0.73
2,870.00	10.35	179.65	2,864.46	-57.21	-34.49	57.40	3.24
2,963.00	10.64	173.47	2,955.91	-74.09	-33.46	74.28	1.25
3,056.00	7.63	157.22	3,047.74	-88.32	-30.09	88.49	4.23
3,148.00	4.38	146.19	3,139.22	-96.87	-25.77	97.02	3.73
3,239.00	2.06	110.49	3,230.08	-100.33	-22.31	100.46	3.25
3,332.00	2.94	0.83	3,323.03	-98.53	-20.71	98.65	4.43
3,424.00	2.61	345.08	3,414.92	-94.15	-21.21	94.27	0.90
3,517.00	0.88	6.03	3,507.88	-91.39	-21.68	91.52	1.95
3,608.00	0.81	108.44	3,598.87	-90.90	-21.00	91.02	1.45
3,700.00	0.33	115.87	3,690.87	-91.22	-20.14	91.34	0.53
3,792.00	0.35	301.53	3,782.86	-91.19	-20.14	91.31	0.74
3,884.00	0.68	188.30	3,874.86	-91.58	-20.46	91.70	0.96

Design Report for KERR 13N-25HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
3,977.00	0.86	133.66	3,967.86	-92.61	-20.04	92.73	0.78
4,069.00	1.23	120.77	4,059.84	-93.59	-18.69	93.70	0.47
4,162.00	1.19	116.20	4,152.82	-94.53	-16.96	94.63	0.11
4,254.00	1.05	115.01	4,244.80	-95.31	-15.34	95.40	0.15
4,348.00	0.40	56.22	4,338.79	-95.49	-14.29	95.57	0.97
4,442.00	0.26	13.75	4,432.79	-95.10	-13.97	95.18	0.29
4,536.00	0.25	40.97	4,526.79	-94.74	-13.78	94.82	0.13
4,630.00	0.45	42.20	4,620.79	-94.31	-13.40	94.39	0.21
4,724.00	0.19	64.42	4,714.79	-93.97	-13.01	94.04	0.30
4,912.00	0.61	58.88	4,902.78	-93.32	-11.87	93.39	0.22
5,100.00	0.68	112.22	5,090.77	-93.22	-9.98	93.28	0.31
5,194.00	0.20	115.47	5,184.77	-93.50	-9.32	93.56	0.51
5,288.00	0.57	90.41	5,278.77	-93.58	-8.70	93.63	0.42
5,382.00	0.45	63.86	5,372.76	-93.42	-7.90	93.46	0.28
5,476.00	0.22	23.55	5,466.76	-93.09	-7.50	93.13	0.34
5,570.00	0.25	69.77	5,560.76	-92.85	-7.24	92.90	0.20
5,853.00	0.62	15.61	5,843.75	-91.17	-6.24	91.20	0.18
5,947.00	0.88	15.27	5,937.75	-89.98	-5.92	90.01	0.28
6,042.00	0.70	14.00	6,032.74	-88.71	-5.58	88.74	0.19
6,136.00	0.78	10.15	6,126.73	-87.53	-5.33	87.56	0.10
6,230.00	0.87	18.38	6,220.72	-86.22	-5.00	86.25	0.16
6,325.00	0.51	43.40	6,315.71	-85.23	-4.48	85.25	0.49
6,420.00	0.50	54.79	6,410.71	-84.68	-3.85	84.70	0.11
6,514.00	0.53	60.85	6,504.71	-84.23	-3.13	84.25	0.07
6,609.00	0.70	73.11	6,599.70	-83.85	-2.19	83.86	0.23
6,656.00	2.29	181.68	6,646.69	-84.71	-1.95	84.72	5.53
6,704.00	6.70	195.78	6,694.53	-88.36	-2.74	88.38	9.40
6,751.00	11.56	196.23	6,740.92	-95.53	-4.80	95.55	10.34
6,798.00	15.82	191.16	6,786.58	-106.34	-7.36	106.38	9.41
6,845.00	20.71	189.32	6,831.19	-120.83	-9.95	120.89	10.48
6,892.00	26.64	182.41	6,874.23	-139.58	-11.74	139.65	13.91
6,939.00	30.45	179.74	6,915.51	-162.03	-12.13	162.10	8.55
6,986.00	34.71	178.77	6,955.10	-187.33	-11.78	187.39	9.13
7,033.00	41.15	174.83	6,992.16	-216.14	-10.10	216.20	14.63
7,081.00	42.66	174.46	7,027.89	-248.06	-7.11	248.10	3.19
7,128.00	49.39	171.60	7,060.50	-281.60	-2.96	281.61	14.97
7,175.00	50.16	171.05	7,090.86	-317.07	2.45	317.06	1.87
7,222.00	52.30	170.22	7,120.29	-353.23	8.42	353.17	4.76
7,270.00	57.22	171.81	7,147.97	-391.94	14.52	391.85	10.60
7,317.00	59.89	174.46	7,172.49	-431.74	19.30	431.62	7.44
7,434.00	72.44	182.25	7,219.74	-538.41	22.01	538.27	12.32
7,509.80	80.69	183.90	7,237.34	-611.96	18.04	611.84	11.09
7"							
7,534.00	83.33	184.41	7,240.70	-635.86	16.31	635.75	11.09
7,629.00	86.11	185.07	7,249.44	-730.12	8.49	730.06	3.01
7,723.00	89.94	185.08	7,252.68	-823.68	0.18	823.67	4.07
7,818.00	89.66	182.76	7,253.01	-918.45	-6.31	918.47	2.46
7,912.00	89.26	181.54	7,253.90	-1,012.38	-9.84	1,012.42	1.37
8,007.00	89.97	181.28	7,254.54	-1,107.35	-12.18	1,107.40	0.80
8,102.00	88.03	181.87	7,256.19	-1,202.29	-14.79	1,202.36	2.13
8,196.00	88.55	181.75	7,259.00	-1,296.20	-17.76	1,296.28	0.57

Design Report for KERR 13N-25HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
8,291.00	88.86	182.00	7,261.15	-1,391.13	-20.86	1,391.22	0.42
8,385.00	89.48	182.00	7,262.51	-1,485.06	-24.14	1,485.17	0.66
8,479.00	88.92	182.23	7,263.82	-1,578.99	-27.61	1,579.12	0.64
8,574.00	90.55	180.10	7,264.26	-1,673.96	-29.54	1,674.10	2.82
8,668.00	91.26	180.03	7,262.77	-1,767.94	-29.65	1,768.09	0.76
Current MWD Survey @ 8668.00' MD :: 7262.77' TVD							
8,762.00	91.05	180.14	7,260.88	-1,861.92	-29.79	1,862.07	0.25
8,857.00	90.74	180.54	7,259.40	-1,956.91	-30.35	1,957.05	0.53
8,952.00	91.26	180.08	7,257.74	-2,051.89	-30.87	2,052.04	0.73
9,046.00	90.25	180.66	7,256.50	-2,145.88	-31.47	2,146.03	1.24
9,138.00	90.40	180.28	7,255.98	-2,237.88	-32.23	2,238.03	0.44
9,233.00	88.52	179.20	7,256.87	-2,332.87	-31.80	2,333.01	2.28
9,327.00	88.12	178.72	7,259.63	-2,426.81	-30.09	2,426.94	0.66
9,421.00	88.00	177.97	7,262.81	-2,520.72	-27.38	2,520.83	0.81
9,515.00	88.64	178.62	7,265.57	-2,614.63	-24.58	2,614.73	0.97
9,610.00	88.89	179.99	7,267.61	-2,709.60	-23.43	2,709.69	1.47
9,704.00	88.83	179.42	7,269.48	-2,803.58	-22.95	2,803.67	0.61
9,798.00	88.95	180.95	7,271.31	-2,897.56	-23.25	2,897.65	1.63
9,893.00	89.63	180.42	7,272.48	-2,992.55	-24.39	2,992.64	0.91
9,988.00	89.66	179.78	7,273.07	-3,087.54	-24.55	3,087.63	0.67
10,082.00	89.48	179.81	7,273.78	-3,181.54	-24.22	3,181.63	0.19
10,173.00	89.04	179.38	7,274.95	-3,272.53	-23.57	3,272.61	0.68
10,264.00	89.94	181.16	7,275.76	-3,363.52	-24.00	3,363.60	2.19
10,357.00	89.35	180.16	7,276.34	-3,456.51	-25.07	3,456.60	1.25
10,449.00	90.03	181.12	7,276.84	-3,548.50	-26.10	3,548.59	1.28
10,542.00	89.29	180.68	7,277.39	-3,641.49	-27.56	3,641.59	0.93
10,634.00	90.03	181.88	7,277.93	-3,733.46	-29.62	3,733.57	1.53
10,728.00	88.71	181.66	7,278.97	-3,827.41	-32.52	3,827.53	1.42
10,819.00	90.03	181.75	7,279.97	-3,918.36	-35.23	3,918.50	1.45
10,910.00	92.31	180.64	7,278.11	-4,009.32	-37.13	4,009.46	2.79
11,003.00	92.31	180.79	7,274.36	-4,102.23	-38.29	4,102.39	0.16
11,096.00	92.59	180.48	7,270.39	-4,195.14	-39.31	4,195.30	0.45
11,188.00	91.63	180.17	7,267.00	-4,287.08	-39.84	4,287.24	1.10
11,280.00	90.62	180.06	7,265.19	-4,379.06	-40.02	4,379.22	1.10
11,371.00	90.37	179.79	7,264.41	-4,470.05	-39.90	4,470.21	0.40
11,463.00	90.28	179.35	7,263.88	-4,562.05	-39.21	4,562.20	0.49
11,556.00	90.22	179.43	7,263.48	-4,655.04	-38.22	4,655.19	0.11
11,648.00	89.72	179.39	7,263.53	-4,747.04	-37.27	4,747.17	0.55
11,740.00	89.78	179.48	7,263.93	-4,839.03	-36.37	4,839.16	0.12
11,833.00	89.75	181.39	7,264.31	-4,932.03	-37.07	4,932.16	2.05
11,925.00	89.85	183.21	7,264.63	-5,023.95	-40.76	5,024.10	1.98
12,019.00	89.91	184.76	7,264.83	-5,117.72	-47.30	5,117.90	1.65
12,114.00	89.72	185.17	7,265.13	-5,212.36	-55.52	5,212.59	0.48
12,200.00	88.92	182.01	7,266.16	-5,298.17	-60.90	5,298.44	3.79
12,292.00	88.80	180.30	7,267.99	-5,390.13	-62.76	5,390.40	1.86
12,383.00	88.27	180.17	7,270.31	-5,481.10	-63.13	5,481.37	0.60
12,474.00	89.23	179.57	7,272.30	-5,572.08	-62.92	5,572.35	1.24
12,566.00	89.01	179.46	7,273.71	-5,664.06	-62.15	5,664.33	0.27
12,657.00	88.58	178.89	7,275.62	-5,755.03	-60.84	5,755.29	0.78
12,749.00	90.03	179.11	7,276.74	-5,847.01	-59.23	5,847.25	1.59
12,841.00	90.12	178.76	7,276.62	-5,938.99	-57.52	5,939.23	0.39

Design Report for KERR 13N-25HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
12,935.00	90.71	178.38	7,275.94	-6,032.96	-55.17	6,033.18	0.75
13,029.00	90.03	179.23	7,275.33	-6,126.94	-53.21	6,127.14	1.16
13,123.00	90.18	178.70	7,275.16	-6,220.92	-51.52	6,221.12	0.59
13,218.00	89.51	179.08	7,275.42	-6,315.90	-49.68	6,316.09	0.81
13,312.00	89.08	178.85	7,276.57	-6,409.88	-47.98	6,410.05	0.52
13,406.00	88.80	180.63	7,278.31	-6,503.86	-47.55	6,504.03	1.92
13,500.00	89.35	181.98	7,279.83	-6,597.82	-49.69	6,598.00	1.55
13,595.00	89.01	181.48	7,281.19	-6,692.77	-52.56	6,692.96	0.64
13,689.00	88.49	180.81	7,283.24	-6,786.73	-54.44	6,786.93	0.90
13,783.00	88.58	180.63	7,285.64	-6,880.69	-55.62	6,880.89	0.21
13,877.00	88.28	180.24	7,288.22	-6,974.65	-56.33	6,974.86	0.52
13,972.00	89.82	181.45	7,289.79	-7,069.62	-57.73	7,069.84	2.06
14,066.00	89.11	180.91	7,290.67	-7,163.60	-59.67	7,163.82	0.95
14,160.00	88.89	180.62	7,292.31	-7,257.57	-60.92	7,257.80	0.39
14,255.00	89.20	180.26	7,293.90	-7,352.56	-61.65	7,352.79	0.50
14,349.00	89.32	179.86	7,295.11	-7,446.55	-61.75	7,446.78	0.44
14,443.00	90.55	179.82	7,295.22	-7,540.55	-61.49	7,540.78	1.31
14,538.00	89.69	178.55	7,295.02	-7,635.53	-60.14	7,635.75	1.61
14,633.00	89.48	180.49	7,295.71	-7,730.52	-59.34	7,730.74	2.05
14,727.00	89.08	179.86	7,296.89	-7,824.51	-59.63	7,824.73	0.79
14,821.00	88.61	178.66	7,298.78	-7,918.49	-58.41	7,918.69	1.37
14,916.00	89.72	180.08	7,300.17	-8,013.47	-57.37	8,013.66	1.90
15,011.00	90.03	179.72	7,300.37	-8,108.47	-57.20	8,108.66	0.50
15,105.00	89.45	179.13	7,300.80	-8,202.46	-56.26	8,202.65	0.88
15,199.00	89.01	179.22	7,302.06	-8,296.44	-54.91	8,296.62	0.48
15,294.00	88.55	178.75	7,304.09	-8,391.40	-53.23	8,391.57	0.69
15,388.00	90.83	179.85	7,304.59	-8,485.39	-52.08	8,485.55	2.69
15,482.00	91.02	179.09	7,303.08	-8,579.37	-51.21	8,579.52	0.83
15,576.00	91.73	178.67	7,300.82	-8,673.32	-49.37	8,673.47	0.88
15,671.00	91.60	178.04	7,298.06	-8,768.24	-46.65	8,768.37	0.68
15,765.00	92.06	179.32	7,295.06	-8,862.17	-44.48	8,862.28	1.45
15,859.00	91.20	180.72	7,292.39	-8,956.13	-44.51	8,956.24	1.75
15,954.00	91.32	181.34	7,290.30	-9,051.09	-46.22	9,051.21	0.66
16,048.00	91.39	180.77	7,288.07	-9,145.05	-47.95	9,145.17	0.61
16,143.00	91.66	180.49	7,285.55	-9,240.01	-49.00	9,240.14	0.41
16,237.00	89.88	181.91	7,284.28	-9,333.97	-50.96	9,334.11	2.42
16,332.00	88.83	183.46	7,285.35	-9,428.86	-55.41	9,429.02	1.97
16,426.00	88.43	183.12	7,287.60	-9,522.68	-60.81	9,522.87	0.56
16,521.00	88.06	182.78	7,290.51	-9,617.51	-65.69	9,617.72	0.53
16,615.00	87.69	182.47	7,293.99	-9,711.34	-70.00	9,711.58	0.51
16,709.00	87.44	181.98	7,297.99	-9,805.19	-73.64	9,805.45	0.58
16,804.00	88.61	181.39	7,301.26	-9,900.09	-76.43	9,900.36	1.38
16,898.00	88.70	180.82	7,303.47	-9,994.04	-78.25	9,994.33	0.61
16,992.00	89.01	180.46	7,305.35	-10,088.02	-79.30	10,088.31	0.51
17,087.00	89.45	179.90	7,306.62	-10,183.01	-79.59	10,183.30	0.75
17,181.00	89.26	179.68	7,307.68	-10,277.00	-79.25	10,277.29	0.31
17,276.00	89.66	178.91	7,308.58	-10,371.99	-78.08	10,372.27	0.91
17,370.00	89.78	178.87	7,309.04	-10,465.97	-76.26	10,466.24	0.13
17,477.00	90.06	178.37	7,309.19	-10,572.94	-73.68	10,573.19	0.54
Final MWD Survey @ 17477.00' MD :: 7309.19; TVD							
17,525.00	90.06	178.37	7,309.13	-10,620.92	-72.32	10,621.16	0.00

Design Report for KERR 13N-25HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
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Straight Line Projection to Bit @ 17525.00'MD :: 7309.13' TVD - KERR 13N-25HZ_TOE

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,108.00	1,107.97	-0.39	0.07	Tie-On to Surface Surveys @ 1108.00ft
8,668.00	7,262.77	-1,767.94	-29.65	Current MWD Survey @ 8668.00' MD :: 7262.77' TVD
17,477.00	7,309.19	-10,572.94	-73.68	Final MWD Survey @ 17477.00' MD :: 7309.19' TVD
17,525.00	7,309.13	-10,620.92	-72.32	Straight Line Projection to Bit @ 17525.00'MD :: 7309.13' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	180.33	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
20.00	1,108.00	Cathedral MWD Surface Surveys	MWD
1,209.00	8,668.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
8,762.00	17,525.00	MWD Lateral Surveys	MWD+IFR1+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,088.80	1,088.77	9 5/8"	9-5/8	13-1/2
7,509.80	7,237.34	7"	7	8-3/4

Design Report for KERR 13N-25HZ - 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 13N-25HZ_LD - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,291,306.33	3,182,683.77	40.131182	-104.846653
Point 1				0.00	-609.57	-87.44	1,290,696.16	3,182,600.83	
Point 2				0.00	-611.79	298.72	1,290,696.78	3,182,986.98	
Point 3				0.00	-5,409.02	276.01	1,285,899.71	3,182,999.61	
Point 4				0.00	-10,650.32	246.86	1,280,658.55	3,183,009.08	
Point 5				0.00	-11,506.99	246.31	1,279,801.94	3,183,014.84	
Point 6				0.00	-11,501.26	-155.17	1,279,804.71	3,182,613.35	
Point 7				0.00	-5,408.96	-108.69	1,285,896.94	3,182,614.94	
KERR 13N-25HZ_SEC - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,291,306.33	3,182,683.77	40.131182	-104.846653
Point 1				0.00	10,398.89	-502.89	1,301,700.80	3,182,104.30	
Point 2				0.00	10,330.73	2,118.75	1,301,651.96	3,184,726.26	
Point 3				0.00	10,296.71	3,429.51	1,301,627.60	3,186,037.18	
Point 4				0.00	10,262.50	4,740.32	1,301,603.05	3,187,348.16	
Point 5				0.00	7,653.40	4,724.10	1,298,994.01	3,187,351.16	
Point 6				0.00	5,044.87	4,708.25	1,296,385.54	3,187,354.53	
Point 7				0.00	5,084.15	2,090.89	1,296,405.54	3,184,737.06	
Point 8				0.00	5,124.95	-523.76	1,296,427.07	3,182,122.29	
Point 9				0.00	5,084.15	2,090.89	1,296,405.54	3,184,737.06	
Point 10				0.00	5,044.87	4,708.25	1,296,385.54	3,187,354.53	
Point 11				0.00	2,434.19	4,694.87	1,293,774.94	3,187,360.39	
Point 12				0.00	-175.85	4,680.64	1,291,164.97	3,187,365.39	
Point 13				0.00	-161.92	2,067.32	1,291,159.65	3,184,752.14	
Point 14				0.00	-146.91	-545.48	1,291,155.41	3,182,139.41	
Point 15				0.00	-161.92	2,067.32	1,291,159.65	3,184,752.14	
Point 16				0.00	-175.85	4,680.64	1,291,164.97	3,187,365.39	
Point 17				0.00	-2,786.50	4,666.08	1,288,554.40	3,187,370.06	
Point 18				0.00	-5,397.27	4,651.39	1,285,943.69	3,187,374.61	
Point 19				0.00	-5,409.36	2,040.79	1,285,912.37	3,184,764.27	
Point 20				0.00	-5,408.87	-568.72	1,285,893.64	3,182,154.94	
Point 21				0.00	-5,409.36	2,040.79	1,285,912.37	3,184,764.27	
Point 22				0.00	-5,397.27	4,651.39	1,285,943.69	3,187,374.61	
Point 23				0.00	-10,700.98	4,663.12	1,280,640.43	3,187,425.41	
Point 24				0.00	-10,671.18	2,029.55	1,280,650.83	3,184,791.80	
Point 25				0.00	-10,640.10	-615.79	1,280,662.42	3,182,146.41	
Point 26				0.00	-8,001.81	-589.43	1,283,300.72	3,182,153.33	
Point 27				0.00	-5,408.87	-568.72	1,285,893.64	3,182,154.94	
Point 28				0.00	-2,781.42	-556.73	1,288,521.00	3,182,147.57	
Point 29				0.00	-146.94	-541.60	1,291,155.41	3,182,143.29	
Point 30				0.00	2,489.64	-534.54	1,293,791.86	3,182,130.92	
Point 31				0.00	5,124.95	-523.76	1,296,427.07	3,182,122.29	
Point 32				0.00	7,762.69	-515.13	1,299,064.69	3,182,111.48	
KERR 13N-25HZ_SHL - actual wellpath hits target center - Point	0.00	0.00	0.00	0.00	0.00	1,291,306.33	3,182,683.77	40.131182	-104.846653
KERR 13N-25HZ_TOE - actual wellpath misses target center by 27.47usft at 17525.00usft MD (7309.13 TVD, -10620.92 N, -72.32 E) - Point	0.00	0.00	7,307.00	-10,645.73	-60.70	1,280,660.88	3,182,701.50	40.101959	-104.846870

Directional Difficulty Index

Average Dogleg over Survey:	1.41 °/100usft	Maximum Dogleg over Survey:	14.97 °/100usft at 7,128.00 usft
Net Tortousity applicable to Plans:	0.50 °/100usft	Directional Difficulty Index:	6.803

Design Report for KERR 13N-25HZ - Actual Field Surveys

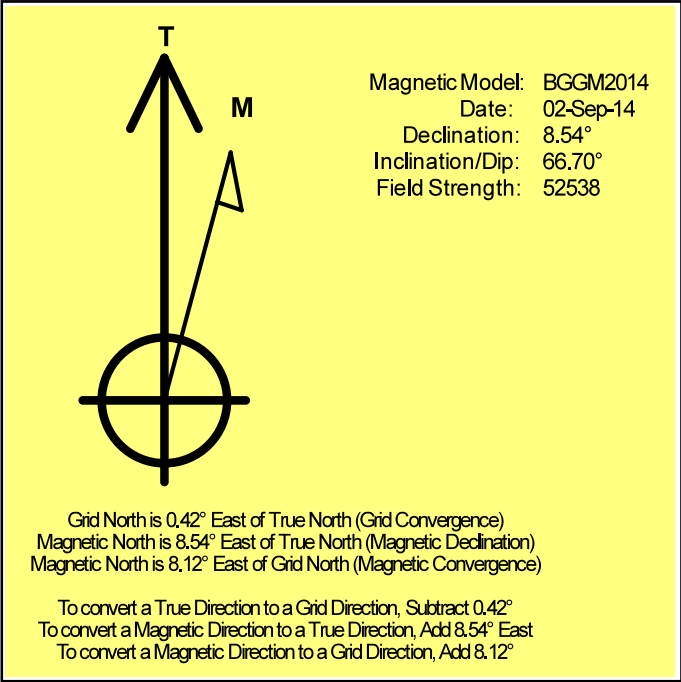
Audit Info

North Reference Sheet for Sec. 13-T2N-R67W - KERR 13N-25HZ - 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 13N-25HZ
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: 1,291,306.32 usft N, 3,182,683.77 usft E
Geographical Coordinates of Well: 40° 07' 52.25" N, 104° 50' 47.95" W
Grid Convergence at Surface is: 0.42°

Based upon Minimum Curvature type calculations, at a Measured Depth of 17,525.00usft
the Bottom Hole Displacement is 10,621.17usft in the Direction of 180.39° (True).
Magnetic Convergence at surface is: -8.12° (2 September 2014, , BGGM2014)



Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 13-T2N-R67W

KERR 13N-25HZ

Job Number: 901640431 :: API: 05-123-39357

Plan A

Design: Actual Field Surveys

Sperry Drilling Services

Geodetic Report

16 December, 2014

Well Coordinates: 1,291,306.32 N, 3,182,683.77 E (40° 07' 52.25" N, 104° 50' 47.95" W)

Ground Level: 4,891.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

Centered on Well KERR 13N-25HZ

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

N

True

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Design Report for KERR 13N-25HZ - 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	40.131182	-104.846653	1,291,306.32	3,182,683.77
20.00	0.00	0.00	20.00	0.00	0.00	40.131182	-104.846653	1,291,306.32	3,182,683.77
70.00	0.00	0.00	70.00	0.00	0.00	40.131182	-104.846653	1,291,306.32	3,182,683.77
141.00	0.20	316.10	141.00	0.09	-0.09	40.131182	-104.846654	1,291,306.41	3,182,683.68
209.00	0.10	202.80	209.00	0.12	-0.19	40.131182	-104.846654	1,291,306.44	3,182,683.58
303.00	0.30	245.10	303.00	-0.06	-0.45	40.131182	-104.846655	1,291,306.26	3,182,683.32
383.00	0.30	210.30	383.00	-0.33	-0.74	40.131181	-104.846656	1,291,305.99	3,182,683.03
463.00	0.70	217.80	462.99	-0.90	-1.15	40.131180	-104.846657	1,291,305.42	3,182,682.63
543.00	0.70	223.50	542.99	-1.64	-1.78	40.131178	-104.846660	1,291,304.67	3,182,682.00
623.00	0.00	0.00	622.99	-1.99	-2.12	40.131177	-104.846661	1,291,304.32	3,182,681.67
703.00	0.30	116.90	702.99	-2.08	-1.93	40.131176	-104.846660	1,291,304.22	3,182,681.85
783.00	0.20	98.50	782.99	-2.20	-1.61	40.131176	-104.846659	1,291,304.11	3,182,682.18
863.00	0.00	0.00	862.99	-2.22	-1.47	40.131176	-104.846659	1,291,304.09	3,182,682.32
943.00	0.50	28.50	942.98	-1.91	-1.30	40.131177	-104.846658	1,291,304.40	3,182,682.48
1,023.00	0.70	27.40	1,022.98	-1.17	-0.91	40.131179	-104.846657	1,291,305.14	3,182,682.87
1,055.00	0.90	55.50	1,054.98	-0.86	-0.61	40.131180	-104.846655	1,291,305.46	3,182,683.16
1,088.80	0.90	55.50	1,088.77	-0.56	-0.18	40.131180	-104.846654	1,291,305.77	3,182,683.60
1,108.00	0.90	55.50	1,107.97	-0.39	0.07	40.131181	-104.846653	1,291,305.94	3,182,683.84
1,209.00	0.76	55.59	1,208.96	0.44	1.28	40.131183	-104.846649	1,291,306.77	3,182,685.04
1,304.00	0.90	46.55	1,303.95	1.31	2.34	40.131186	-104.846645	1,291,307.65	3,182,686.10
1,399.00	0.87	64.18	1,398.94	2.14	3.53	40.131188	-104.846641	1,291,308.49	3,182,687.28
1,493.00	0.86	53.13	1,492.93	2.87	4.74	40.131190	-104.846636	1,291,309.23	3,182,688.49
1,587.00	0.56	28.37	1,586.92	3.70	5.52	40.131192	-104.846634	1,291,310.06	3,182,689.26
1,679.00	0.52	33.65	1,678.92	4.44	5.96	40.131194	-104.846632	1,291,310.81	3,182,689.70
1,770.00	0.57	14.53	1,769.91	5.22	6.31	40.131196	-104.846631	1,291,311.59	3,182,690.04
1,862.00	0.72	1.85	1,861.91	6.25	6.44	40.131199	-104.846630	1,291,312.62	3,182,690.16
1,953.00	0.66	347.17	1,952.90	7.33	6.34	40.131202	-104.846631	1,291,313.70	3,182,690.06
2,045.00	0.90	325.98	2,044.89	8.44	5.82	40.131205	-104.846632	1,291,314.81	3,182,689.53
2,228.00	2.40	272.96	2,227.82	9.83	1.19	40.131209	-104.846649	1,291,316.16	3,182,684.89
2,319.00	4.16	230.07	2,318.68	7.81	-3.25	40.131203	-104.846665	1,291,314.11	3,182,680.47
2,411.00	6.15	225.21	2,410.30	2.20	-9.30	40.131188	-104.846687	1,291,308.45	3,182,674.45
2,502.00	7.50	218.08	2,500.66	-5.91	-16.42	40.131166	-104.846712	1,291,300.29	3,182,667.39
2,593.00	7.93	207.66	2,590.84	-16.15	-23.00	40.131138	-104.846736	1,291,290.01	3,182,660.89
2,686.00	8.79	199.66	2,682.85	-28.52	-28.37	40.131104	-104.846755	1,291,277.59	3,182,655.61
2,778.00	8.95	195.41	2,773.75	-42.04	-32.64	40.131067	-104.846770	1,291,264.05	3,182,651.44
2,870.00	10.35	179.65	2,864.46	-57.21	-34.49	40.131025	-104.846777	1,291,248.87	3,182,649.70
2,963.00	10.64	173.47	2,955.91	-74.09	-33.46	40.130979	-104.846773	1,291,231.99	3,182,650.86
3,056.00	7.63	157.22	3,047.74	-88.32	-30.09	40.130940	-104.846761	1,291,217.79	3,182,654.33
3,148.00	4.38	146.19	3,139.22	-96.87	-25.77	40.130916	-104.846745	1,291,209.27	3,182,658.71
3,239.00	2.06	110.49	3,230.08	-100.33	-22.31	40.130907	-104.846733	1,291,205.83	3,182,662.20
3,332.00	2.94	0.83	3,323.03	-98.53	-20.71	40.130912	-104.846727	1,291,207.65	3,182,663.79
3,424.00	2.61	345.08	3,414.92	-94.15	-21.21	40.130924	-104.846729	1,291,212.02	3,182,663.25



Design Report for KERR 13N-25HZ - 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)
3,517.00	0.88	6.03	3,507.88	-91.39	-21.68	40.130931	-104.846731	1,291,214.78	3,182,662.76
3,608.00	0.81	108.44	3,598.87	-90.90	-21.00	40.130932	-104.846728	1,291,215.27	3,182,663.44
3,700.00	0.33	115.87	3,690.87	-91.22	-20.14	40.130932	-104.846725	1,291,214.96	3,182,664.30
3,792.00	0.35	301.53	3,782.86	-91.19	-20.14	40.130932	-104.846725	1,291,214.99	3,182,664.30
3,884.00	0.68	188.30	3,874.86	-91.58	-20.46	40.130931	-104.846726	1,291,214.59	3,182,663.98
3,977.00	0.86	133.66	3,967.86	-92.61	-20.04	40.130928	-104.846725	1,291,213.57	3,182,664.42
4,069.00	1.23	120.77	4,059.84	-93.59	-18.69	40.130925	-104.846720	1,291,212.60	3,182,665.77
4,162.00	1.19	116.20	4,152.82	-94.53	-16.96	40.130923	-104.846714	1,291,211.67	3,182,667.50
4,254.00	1.05	115.01	4,244.80	-95.31	-15.34	40.130920	-104.846708	1,291,210.91	3,182,669.13
4,348.00	0.40	56.22	4,338.79	-95.49	-14.29	40.130920	-104.846704	1,291,210.73	3,182,670.18
4,442.00	0.26	13.75	4,432.79	-95.10	-13.97	40.130921	-104.846703	1,291,211.13	3,182,670.51
4,536.00	0.25	40.97	4,526.79	-94.74	-13.78	40.130922	-104.846703	1,291,211.49	3,182,670.69
4,630.00	0.45	42.20	4,620.79	-94.31	-13.40	40.130923	-104.846701	1,291,211.92	3,182,671.07
4,724.00	0.19	64.42	4,714.79	-93.97	-13.01	40.130924	-104.846700	1,291,212.26	3,182,671.45
4,912.00	0.61	58.88	4,902.78	-93.32	-11.87	40.130926	-104.846696	1,291,212.92	3,182,672.59
5,100.00	0.68	112.22	5,090.77	-93.22	-9.98	40.130926	-104.846689	1,291,213.03	3,182,674.47
5,194.00	0.20	115.47	5,184.77	-93.50	-9.32	40.130925	-104.846687	1,291,212.76	3,182,675.14
5,288.00	0.57	90.41	5,278.77	-93.58	-8.70	40.130925	-104.846684	1,291,212.69	3,182,675.76
5,382.00	0.45	63.86	5,372.76	-93.42	-7.90	40.130926	-104.846682	1,291,212.85	3,182,676.55
5,476.00	0.22	23.55	5,466.76	-93.09	-7.50	40.130926	-104.846680	1,291,213.18	3,182,676.96
5,570.00	0.25	69.77	5,560.76	-92.85	-7.24	40.130927	-104.846679	1,291,213.42	3,182,677.22
5,853.00	0.62	15.61	5,843.75	-91.17	-6.24	40.130932	-104.846676	1,291,215.12	3,182,678.20
5,947.00	0.88	15.27	5,937.75	-89.98	-5.92	40.130935	-104.846674	1,291,216.31	3,182,678.52
6,042.00	0.70	14.00	6,032.74	-88.71	-5.58	40.130938	-104.846673	1,291,217.57	3,182,678.84
6,136.00	0.78	10.15	6,126.73	-87.53	-5.33	40.130942	-104.846672	1,291,218.76	3,182,679.08
6,230.00	0.87	18.38	6,220.72	-86.22	-5.00	40.130945	-104.846671	1,291,220.07	3,182,679.41
6,325.00	0.51	43.40	6,315.71	-85.23	-4.48	40.130948	-104.846669	1,291,221.07	3,182,679.92
6,420.00	0.50	54.79	6,410.71	-84.68	-3.85	40.130950	-104.846667	1,291,221.62	3,182,680.55
6,514.00	0.53	60.85	6,504.71	-84.23	-3.13	40.130951	-104.846664	1,291,222.07	3,182,681.26
6,609.00	0.70	73.11	6,599.70	-83.85	-2.19	40.130952	-104.846661	1,291,222.46	3,182,682.19
6,656.00	2.29	181.68	6,646.69	-84.71	-1.95	40.130949	-104.846660	1,291,221.61	3,182,682.45
6,704.00	6.70	195.78	6,694.53	-88.36	-2.74	40.130939	-104.846663	1,291,217.95	3,182,681.68
6,751.00	11.56	196.23	6,740.92	-95.53	-4.80	40.130920	-104.846670	1,291,210.77	3,182,679.67
6,798.00	15.82	191.16	6,786.58	-106.34	-7.36	40.130890	-104.846680	1,291,199.94	3,182,677.20
6,845.00	20.71	189.32	6,831.19	-120.83	-9.95	40.130850	-104.846689	1,291,185.43	3,182,674.72
6,892.00	26.64	182.41	6,874.23	-139.58	-11.74	40.130799	-104.846695	1,291,166.66	3,182,673.06
6,939.00	30.45	179.74	6,915.51	-162.03	-12.13	40.130737	-104.846697	1,291,144.22	3,182,672.84
6,986.00	34.71	178.77	6,955.10	-187.33	-11.78	40.130668	-104.846695	1,291,118.92	3,182,673.37
7,033.00	41.15	174.83	6,992.16	-216.14	-10.10	40.130589	-104.846689	1,291,090.12	3,182,675.26
7,081.00	42.66	174.46	7,027.89	-248.06	-7.11	40.130501	-104.846679	1,291,058.23	3,182,678.49
7,128.00	49.39	171.60	7,060.50	-281.60	-2.96	40.130409	-104.846664	1,291,024.72	3,182,682.89
7,175.00	50.16	171.05	7,090.86	-317.07	2.45	40.130312	-104.846644	1,290,989.29	3,182,688.56

Design Report for KERR 13N-25HZ - 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)
7,222.00	52.30	170.22	7,120.29	-353.23	8.42	40.130212	-104.846623	1,290,953.18	3,182,694.79
7,270.00	57.22	171.81	7,147.97	-391.94	14.52	40.130106	-104.846601	1,290,914.52	3,182,701.18
7,317.00	59.89	174.46	7,172.49	-431.74	19.30	40.129997	-104.846584	1,290,874.75	3,182,706.25
7,434.00	72.44	182.25	7,219.74	-538.41	22.01	40.129704	-104.846575	1,290,768.12	3,182,709.75
7,509.80	80.69	183.90	7,237.34	-611.96	18.04	40.129502	-104.846589	1,290,694.54	3,182,706.32
7,534.00	83.33	184.41	7,240.70	-635.86	16.31	40.129437	-104.846595	1,290,670.63	3,182,704.76
7,629.00	86.11	185.07	7,249.44	-730.12	8.49	40.129178	-104.846623	1,290,576.31	3,182,697.64
7,723.00	89.94	185.08	7,252.68	-823.68	0.18	40.128921	-104.846653	1,290,482.70	3,182,690.02
7,818.00	89.66	182.76	7,253.01	-918.45	-6.31	40.128661	-104.846676	1,290,387.89	3,182,684.22
7,912.00	89.26	181.54	7,253.90	-1,012.38	-9.84	40.128403	-104.846688	1,290,293.94	3,182,681.39
8,007.00	89.97	181.28	7,254.54	-1,107.35	-12.18	40.128142	-104.846697	1,290,198.96	3,182,679.75
8,102.00	88.03	181.87	7,256.19	-1,202.29	-14.79	40.127882	-104.846706	1,290,104.01	3,182,677.84
8,196.00	88.55	181.75	7,259.00	-1,296.20	-17.76	40.127624	-104.846717	1,290,010.08	3,182,675.56
8,291.00	88.86	182.00	7,261.15	-1,391.13	-20.86	40.127363	-104.846728	1,289,915.14	3,182,673.16
8,385.00	89.48	182.00	7,262.51	-1,485.06	-24.14	40.127105	-104.846740	1,289,821.19	3,182,670.57
8,479.00	88.92	182.23	7,263.82	-1,578.99	-27.61	40.126848	-104.846752	1,289,727.24	3,182,667.79
8,574.00	90.55	180.10	7,264.26	-1,673.96	-29.54	40.126587	-104.846759	1,289,632.26	3,182,666.56
8,668.00	91.26	180.03	7,262.77	-1,767.94	-29.65	40.126329	-104.846759	1,289,538.28	3,182,667.15
8,762.00	91.05	180.14	7,260.88	-1,861.92	-29.79	40.126071	-104.846760	1,289,444.31	3,182,667.70
8,857.00	90.74	180.54	7,259.40	-1,956.91	-30.35	40.125810	-104.846762	1,289,349.32	3,182,667.84
8,952.00	91.26	180.08	7,257.74	-2,051.89	-30.87	40.125549	-104.846764	1,289,254.34	3,182,668.02
9,046.00	90.25	180.66	7,256.50	-2,145.88	-31.47	40.125291	-104.846766	1,289,160.35	3,182,668.11
9,138.00	90.40	180.28	7,255.98	-2,237.88	-32.23	40.125039	-104.846769	1,289,068.36	3,182,668.03
9,233.00	88.52	179.20	7,256.87	-2,332.87	-31.80	40.124778	-104.846767	1,288,973.38	3,182,669.16
9,327.00	88.12	178.72	7,259.63	-2,426.81	-30.09	40.124520	-104.846761	1,288,879.46	3,182,671.56
9,421.00	88.00	177.97	7,262.81	-2,520.72	-27.38	40.124263	-104.846751	1,288,785.58	3,182,674.96
9,515.00	88.64	178.62	7,265.57	-2,614.63	-24.58	40.124005	-104.846741	1,288,691.69	3,182,678.45
9,610.00	88.89	179.99	7,267.61	-2,709.60	-23.43	40.123744	-104.846737	1,288,596.73	3,182,680.30
9,704.00	88.83	179.42	7,269.48	-2,803.58	-22.95	40.123486	-104.846735	1,288,502.76	3,182,681.48
9,798.00	88.95	180.95	7,271.31	-2,897.56	-23.25	40.123228	-104.846736	1,288,408.79	3,182,681.87
9,893.00	89.63	180.42	7,272.48	-2,992.55	-24.39	40.122967	-104.846740	1,288,313.80	3,182,681.43
9,988.00	89.66	179.78	7,273.07	-3,087.54	-24.55	40.122707	-104.846741	1,288,218.81	3,182,681.97
10,082.00	89.48	179.81	7,273.78	-3,181.54	-24.22	40.122449	-104.846740	1,288,124.82	3,182,682.99
10,173.00	89.04	179.38	7,274.95	-3,272.53	-23.57	40.122199	-104.846738	1,288,033.84	3,182,684.31
10,264.00	89.94	181.16	7,275.76	-3,363.52	-24.00	40.121949	-104.846739	1,287,942.85	3,182,684.55
10,357.00	89.35	180.16	7,276.34	-3,456.51	-25.07	40.121694	-104.846743	1,287,849.86	3,182,684.16
10,449.00	90.03	181.12	7,276.84	-3,548.50	-26.10	40.121441	-104.846747	1,287,757.87	3,182,683.81
10,542.00	89.29	180.68	7,277.39	-3,641.49	-27.56	40.121186	-104.846752	1,287,664.88	3,182,683.04
10,634.00	90.03	181.88	7,277.93	-3,733.46	-29.62	40.120934	-104.846759	1,287,572.90	3,182,681.66
10,728.00	88.71	181.66	7,278.97	-3,827.41	-32.52	40.120676	-104.846770	1,287,478.93	3,182,679.45
10,819.00	90.03	181.75	7,279.97	-3,918.36	-35.23	40.120426	-104.846779	1,287,387.97	3,182,677.41
10,910.00	92.31	180.64	7,278.11	-4,009.32	-37.13	40.120176	-104.846786	1,287,297.01	3,182,676.19

Design Report for KERR 13N-25HZ - 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)
11,003.00	92.31	180.79	7,274.36	-4,102.23	-38.29	40.119921	-104.846790	1,287,204.09	3,182,675.71
11,096.00	92.59	180.48	7,270.39	-4,195.14	-39.31	40.119666	-104.846794	1,287,111.18	3,182,675.37
11,188.00	91.63	180.17	7,267.00	-4,287.08	-39.84	40.119414	-104.846796	1,287,019.25	3,182,675.52
11,280.00	90.62	180.06	7,265.19	-4,379.06	-40.02	40.119161	-104.846796	1,286,927.27	3,182,676.01
11,371.00	90.37	179.79	7,264.41	-4,470.05	-39.90	40.118912	-104.846796	1,286,836.28	3,182,676.80
11,463.00	90.28	179.35	7,263.88	-4,562.05	-39.21	40.118659	-104.846793	1,286,744.30	3,182,678.17
11,556.00	90.22	179.43	7,263.48	-4,655.04	-38.22	40.118404	-104.846790	1,286,651.32	3,182,679.85
11,648.00	89.72	179.39	7,263.53	-4,747.04	-37.27	40.118151	-104.846787	1,286,559.33	3,182,681.47
11,740.00	89.78	179.48	7,263.93	-4,839.03	-36.37	40.117899	-104.846783	1,286,467.35	3,182,683.06
11,833.00	89.75	181.39	7,264.31	-4,932.03	-37.07	40.117643	-104.846786	1,286,374.36	3,182,683.04
11,925.00	89.85	183.21	7,264.63	-5,023.95	-40.76	40.117391	-104.846799	1,286,282.42	3,182,680.02
12,019.00	89.91	184.76	7,264.83	-5,117.72	-47.30	40.117134	-104.846822	1,286,188.61	3,182,674.18
12,114.00	89.72	185.17	7,265.13	-5,212.36	-55.52	40.116874	-104.846852	1,286,093.91	3,182,666.66
12,200.00	88.92	182.01	7,266.16	-5,298.17	-60.90	40.116638	-104.846871	1,286,008.06	3,182,661.91
12,292.00	88.80	180.30	7,267.99	-5,390.13	-62.76	40.116386	-104.846878	1,285,916.10	3,182,660.73
12,383.00	88.27	180.17	7,270.31	-5,481.10	-63.13	40.116136	-104.846879	1,285,825.13	3,182,661.03
12,474.00	89.23	179.57	7,272.30	-5,572.08	-62.92	40.115886	-104.846878	1,285,734.16	3,182,661.90
12,566.00	89.01	179.46	7,273.71	-5,664.06	-62.15	40.115634	-104.846875	1,285,642.19	3,182,663.36
12,657.00	88.58	178.89	7,275.62	-5,755.03	-60.84	40.115384	-104.846871	1,285,551.23	3,182,665.34
12,749.00	90.03	179.11	7,276.74	-5,847.01	-59.23	40.115132	-104.846865	1,285,459.27	3,182,667.62
12,841.00	90.12	178.76	7,276.62	-5,938.99	-57.52	40.114879	-104.846859	1,285,367.31	3,182,670.01
12,935.00	90.71	178.38	7,275.94	-6,032.96	-55.17	40.114621	-104.846851	1,285,273.37	3,182,673.05
13,029.00	90.03	179.23	7,275.33	-6,126.94	-53.21	40.114363	-104.846844	1,285,179.41	3,182,675.70
13,123.00	90.18	178.70	7,275.16	-6,220.92	-51.52	40.114105	-104.846837	1,285,085.45	3,182,678.09
13,218.00	89.51	179.08	7,275.42	-6,315.90	-49.68	40.113845	-104.846831	1,284,990.48	3,182,680.63
13,312.00	89.08	178.85	7,276.57	-6,409.88	-47.98	40.113587	-104.846825	1,284,896.53	3,182,683.02
13,406.00	88.80	180.63	7,278.31	-6,503.86	-47.55	40.113329	-104.846823	1,284,802.56	3,182,684.14
13,500.00	89.35	181.98	7,279.83	-6,597.82	-49.69	40.113071	-104.846831	1,284,708.59	3,182,682.69
13,595.00	89.01	181.48	7,281.19	-6,692.77	-52.56	40.112810	-104.846841	1,284,613.62	3,182,680.52
13,689.00	88.49	180.81	7,283.24	-6,786.73	-54.44	40.112552	-104.846848	1,284,519.66	3,182,679.34
13,783.00	88.58	180.63	7,285.64	-6,880.69	-55.62	40.112294	-104.846852	1,284,425.70	3,182,678.85
13,877.00	88.28	180.24	7,288.22	-6,974.65	-56.33	40.112036	-104.846855	1,284,331.73	3,182,678.83
13,972.00	89.82	181.45	7,289.79	-7,069.62	-57.73	40.111776	-104.846860	1,284,236.76	3,182,678.13
14,066.00	89.11	180.91	7,290.67	-7,163.60	-59.67	40.111518	-104.846867	1,284,142.78	3,182,676.88
14,160.00	88.89	180.62	7,292.31	-7,257.57	-60.92	40.111260	-104.846871	1,284,048.80	3,182,676.32
14,255.00	89.20	180.26	7,293.90	-7,352.56	-61.65	40.110999	-104.846874	1,283,953.81	3,182,676.29
14,349.00	89.32	179.86	7,295.11	-7,446.55	-61.75	40.110741	-104.846874	1,283,859.83	3,182,676.89
14,443.00	90.55	179.82	7,295.22	-7,540.55	-61.49	40.110483	-104.846873	1,283,765.84	3,182,677.84
14,538.00	89.69	178.55	7,295.02	-7,635.53	-60.14	40.110222	-104.846868	1,283,670.87	3,182,679.89
14,633.00	89.48	180.49	7,295.71	-7,730.52	-59.34	40.109961	-104.846865	1,283,575.89	3,182,681.39
14,727.00	89.08	179.86	7,296.89	-7,824.51	-59.63	40.109703	-104.846866	1,283,481.90	3,182,681.79
14,821.00	88.61	178.66	7,298.78	-7,918.49	-58.41	40.109445	-104.846862	1,283,387.95	3,182,683.70

Design Report for KERR 13N-25HZ - 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)
14,916.00	89.72	180.08	7,300.17	-8,013.47	-57.37	40.109185	-104.846858	1,283,292.98	3,182,685.44
15,011.00	90.03	179.72	7,300.37	-8,108.47	-57.20	40.108924	-104.846858	1,283,197.99	3,182,686.31
15,105.00	89.45	179.13	7,300.80	-8,202.46	-56.26	40.108666	-104.846854	1,283,104.01	3,182,687.94
15,199.00	89.01	179.22	7,302.06	-8,296.44	-54.91	40.108408	-104.846850	1,283,010.04	3,182,689.99
15,294.00	88.55	178.75	7,304.09	-8,391.40	-53.23	40.108147	-104.846844	1,282,915.10	3,182,692.37
15,388.00	90.83	179.85	7,304.59	-8,485.39	-52.08	40.107889	-104.846839	1,282,821.13	3,182,694.21
15,482.00	91.02	179.09	7,303.08	-8,579.37	-51.21	40.107631	-104.846836	1,282,727.16	3,182,695.77
15,576.00	91.73	178.67	7,300.82	-8,673.32	-49.37	40.107373	-104.846830	1,282,633.23	3,182,698.30
15,671.00	91.60	178.04	7,298.06	-8,768.24	-46.65	40.107113	-104.846820	1,282,538.33	3,182,701.73
15,765.00	92.06	179.32	7,295.06	-8,862.17	-44.48	40.106855	-104.846812	1,282,444.43	3,182,704.58
15,859.00	91.20	180.72	7,292.39	-8,956.13	-44.51	40.106597	-104.846812	1,282,350.48	3,182,705.24
15,954.00	91.32	181.34	7,290.30	-9,051.09	-46.22	40.106336	-104.846819	1,282,255.51	3,182,704.24
16,048.00	91.39	180.77	7,288.07	-9,145.05	-47.95	40.106079	-104.846825	1,282,161.55	3,182,703.20
16,143.00	91.66	180.49	7,285.55	-9,240.01	-49.00	40.105818	-104.846828	1,282,066.58	3,182,702.85
16,237.00	89.88	181.91	7,284.28	-9,333.97	-50.96	40.105560	-104.846835	1,281,972.61	3,182,701.58
16,332.00	88.83	183.46	7,285.35	-9,428.86	-55.41	40.105299	-104.846851	1,281,877.70	3,182,697.83
16,426.00	88.43	183.12	7,287.60	-9,522.68	-60.81	40.105042	-104.846871	1,281,783.85	3,182,693.13
16,521.00	88.06	182.78	7,290.51	-9,617.51	-65.69	40.104782	-104.846888	1,281,688.99	3,182,688.94
16,615.00	87.69	182.47	7,293.99	-9,711.34	-70.00	40.104524	-104.846903	1,281,595.13	3,182,685.33
16,709.00	87.44	181.98	7,297.99	-9,805.19	-73.64	40.104266	-104.846917	1,281,501.26	3,182,682.37
16,804.00	88.61	181.39	7,301.26	-9,900.09	-76.43	40.104006	-104.846926	1,281,406.35	3,182,680.28
16,898.00	88.70	180.82	7,303.47	-9,994.04	-78.25	40.103748	-104.846933	1,281,312.39	3,182,679.16
16,992.00	89.01	180.46	7,305.35	-10,088.02	-79.30	40.103490	-104.846937	1,281,218.41	3,182,678.80
17,087.00	89.45	179.90	7,306.62	-10,183.01	-79.59	40.103229	-104.846938	1,281,123.42	3,182,679.20
17,181.00	89.26	179.68	7,307.68	-10,277.00	-79.25	40.102971	-104.846937	1,281,029.44	3,182,680.24
17,276.00	89.66	178.91	7,308.58	-10,371.99	-78.08	40.102711	-104.846932	1,280,934.47	3,182,682.11
17,370.00	89.78	178.87	7,309.04	-10,465.97	-76.26	40.102453	-104.846926	1,280,840.50	3,182,684.62
17,477.00	90.06	178.37	7,309.19	-10,572.94	-73.68	40.102159	-104.846917	1,280,733.56	3,182,687.99
17,525.00	90.06	178.37	7,309.13	-10,620.92	-72.32	40.102027	-104.846912	1,280,685.60	3,182,689.71

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,108.00	1,107.97	-0.39	0.07	Tie-On to Surface Surveys @ 1108.00ft
8,668.00	7,262.77	-1,767.94	-29.65	Current MWD Survey @ 8668.00' MD :: 7262.77' TVD
17,477.00	7,309.19	-10,572.94	-73.68	Final MWD Survey @ 17477.00' MD :: 7309.19' TVD
17,525.00	7,309.13	-10,620.92	-72.32	Straight Line Projection to Bit @ 17525.00'MD :: 7309.13' TVD

Design Report for KERR 13N-25HZ - 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)	180.33	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
20.00	1,108.00	Cathedral MWD Surface Surveys	MWD
1,209.00	8,668.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
8,762.00	17,525.00	MWD Lateral Surveys	MWD+IFR1+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,088.80	1,088.77	9 5/8"	9-5/8	13-1/2
7,509.80	7,237.34	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:	1.41 °/100usft	Maximum Dogleg over Survey:	14.97 °/100usft at 7,128.00 usft
Net Tortosity applicable to Plans:	0.50 °/100usft	Directional Difficulty Index:	6.803

Design Report for KERR 13N-25HZ - Actual Field Surveys

Audit Info

North Reference Sheet for Sec. 13-T2N-R67W - KERR 13N-25HZ - 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 13N-25HZ

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: 1,291,306.32 usft N, 3,182,683.77 usft E

Geographical Coordinates of Well: 40° 07' 52.25" N, 104° 50' 47.95" W

Grid Convergence at Surface is: 0.42°

Based upon Minimum Curvature type calculations, at a Measured Depth of 17,525.00usft

the Bottom Hole Displacement is 10,621.17usft in the Direction of 180.39° (True).

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

