



Project: WELD COUNTY (NAD 83)
Site: SW SW SEC. 3 T1N R68W 6TH P.M.
Well: HAMMER 3-1HZ
Wellbore: JOB # 2018-82-461
Design: FINAL SURVEYS

ANNOTATIONS

TVD	MD	Inc	Azi	+N/-S	+E/-W	VSec	Departure	Annotation
1819.7	1862.0	14.49	307.38	197.7	-253.4	197.7	324.1	9 5/8" CASING
6763.2	6844.0	1.89	10.72	-53.5	-274.5	-53.5	776.2	KOP
7691.1	7963.3	68.24	351.76	471.5	-304.7	471.5	1304.0	~ CROSS LANDING BOX = 7963.3' MD
7717.0	8090.0	89.10	356.70	594.0	-318.1	594.0	1426.4	HEEL= 8090' MD; (40.078248, -104.998664)
7700.7	8394.5	93.91	0.46	897.5	-331.6	897.5	1730.4	~ ENTER RADIUS HEEL = 8394.50' MD
7662.1	9302.4	92.30	1.10	1803.5	-297.2	1803.6	2637.1	~ EXIT RADIUS HEEL = 9302.4' MD
7525.9	16386.6	91.63	359.87	8883.5	-334.7	8883.5	9718.2	~ ENTER RADIUS TOE = 16386.6' MD
7513.2	16703.0	93.10	359.00	9199.6	-337.6	9199.6	10034.4	LAST SURVEY - APR 3, 2018
7508.2	16796.0	93.10	359.00	9292.4	-339.2	9292.5	10127.2	EXTRAPOLATION TO TD = 16796' MD (40.102125, -104.998739)

AS DRILLED LOCAL COORDINATES:

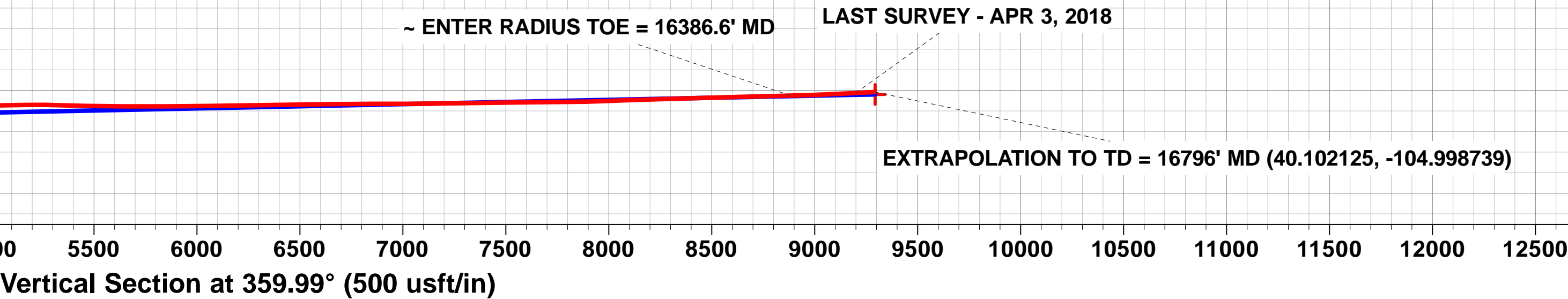
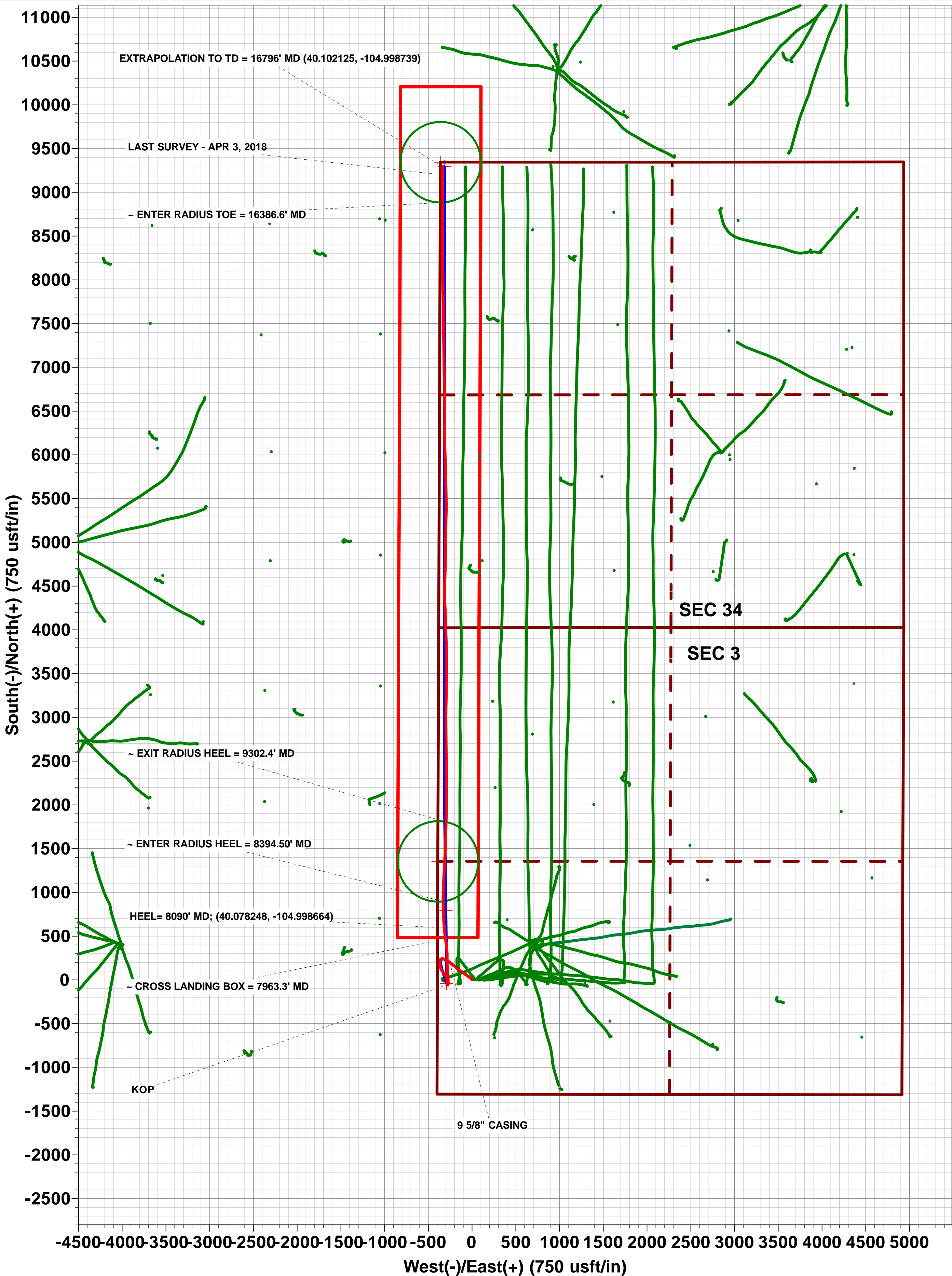
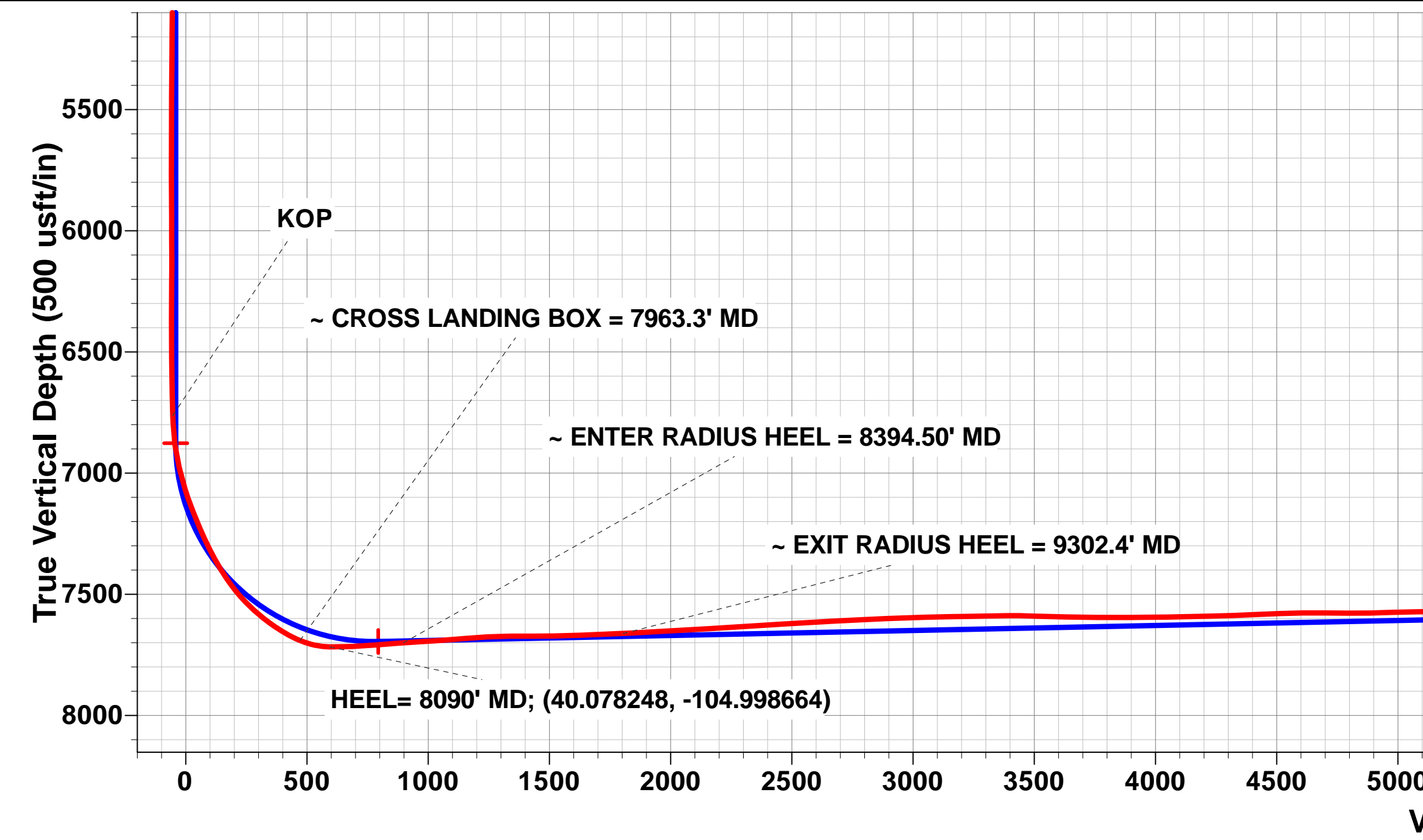
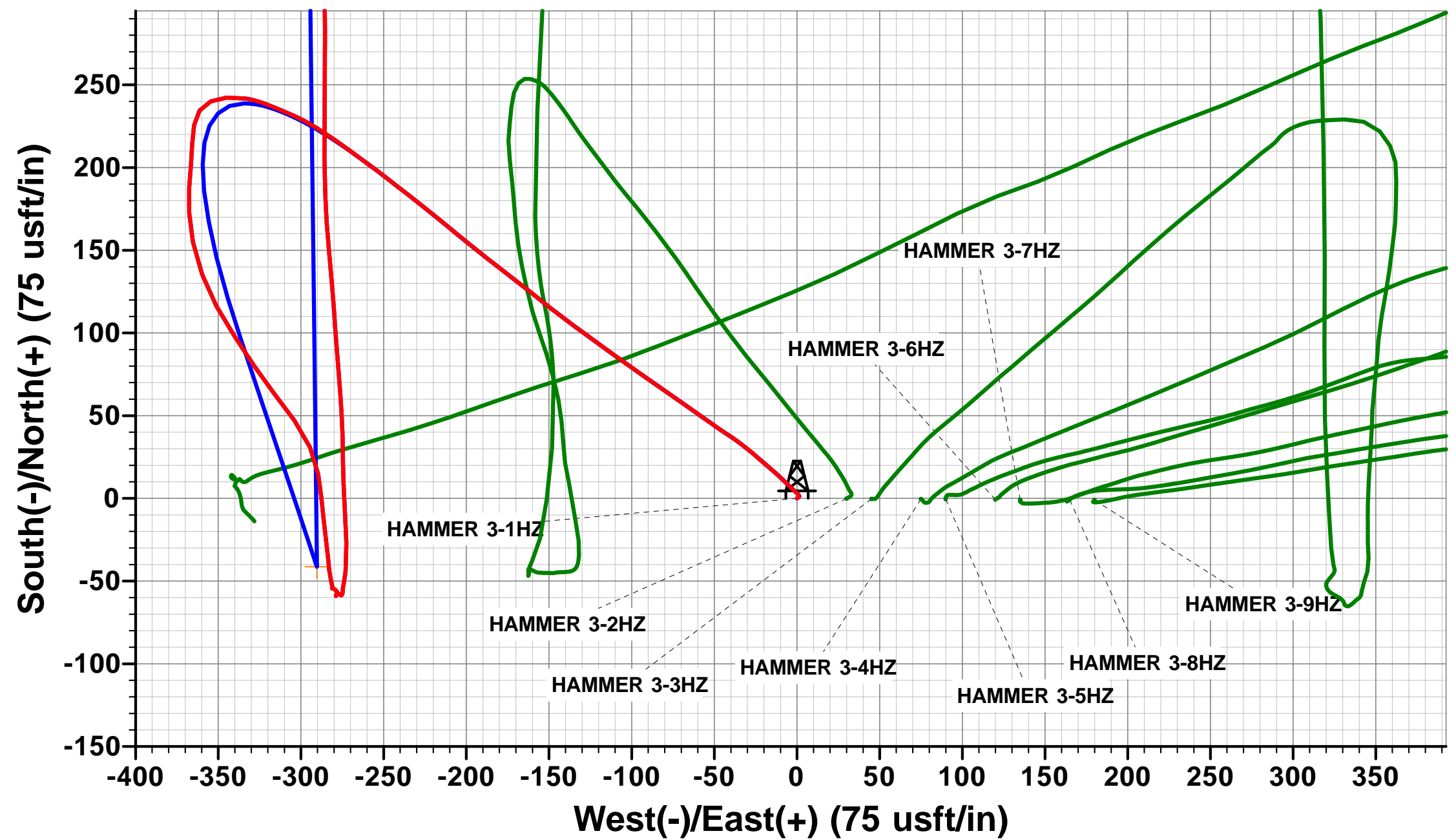
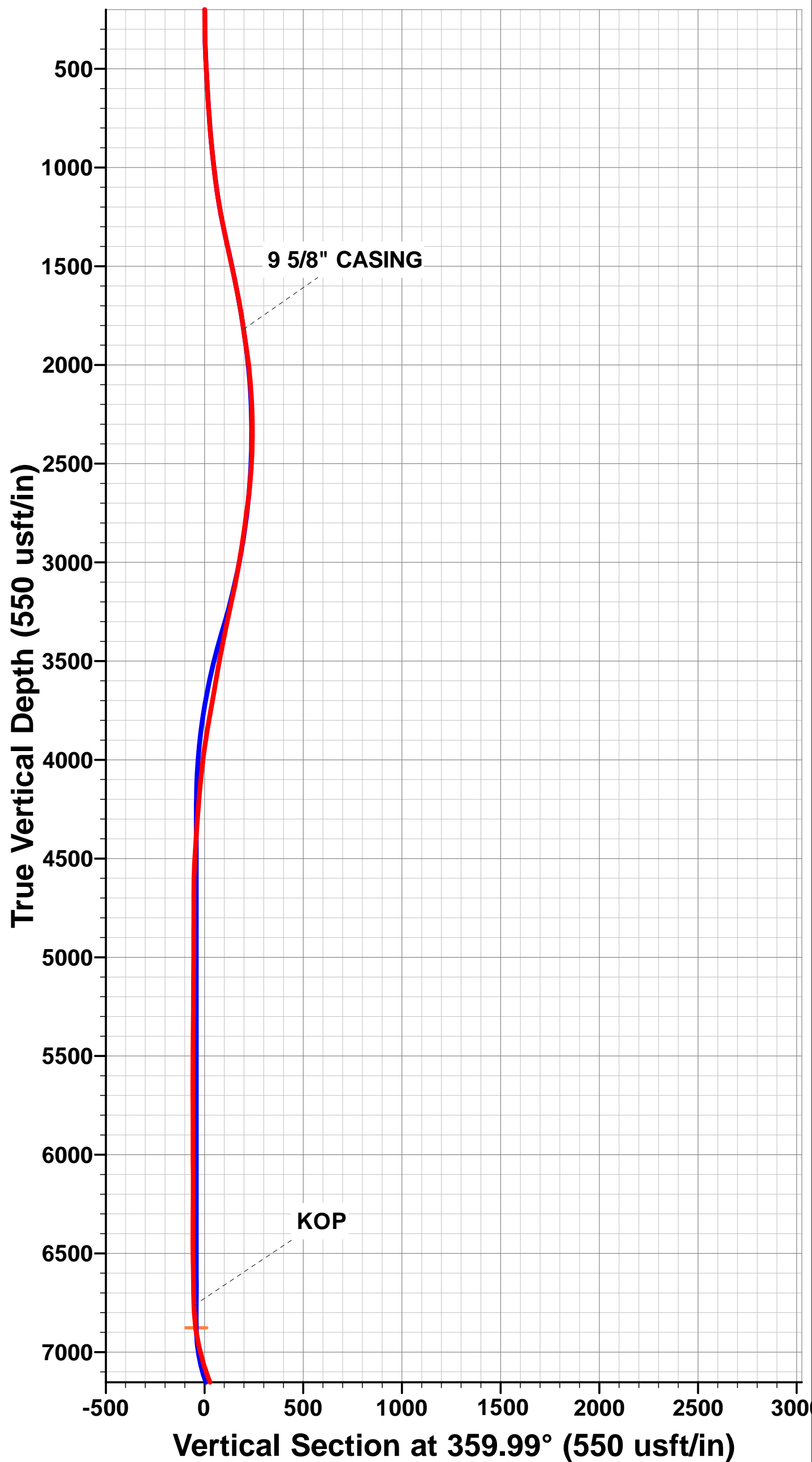
SHL: 1306ft FSL & 396ft FWL Sec 3

HEEL: 1900ft FSL & 111.3ft FWL Sec 3

BHL: 53.4ft FNL & 94.5ft FWL Sec 34

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
BHL - HAMMER 3-1HZ (P3)	7520.0	9293.8	-316.5	40° 6' 7.664 N	104° 59' 55.169 W
HEEL - HAMMER 3-1HZ (P3)	7695.0	794.0	-300.1	40° 4' 43.667 N	104° 59' 54.957 W
KOP - HAMMER 3-1HZ (P3)	6876.7	-41.4	-290.3	40° 4' 35.412 N	104° 59' 54.830 W



Survey Report



Company:	ANADARKO PETROLEUM CORP	Local Co-ordinate Reference:	Well HAMMER 3-1HZ
Project:	WELD COUNTY (NAD 83)	TVD Reference:	KB 20' @ 5065.0usft (PD461)
Site:	SW SW SEC. 3 T1N R68W 6TH P.M.	MD Reference:	KB 20' @ 5065.0usft (PD461)
Well:	HAMMER 3-1HZ	North Reference:	True
Wellbore:	JOB # 2018-82-461	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	Database:	EOG RESOURCES

Project	WELD COUNTY (NAD 83)		
Map System:	Universal Transverse Mercator (US Survey Fee	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Zone 13N (108 W to 102 W)		Using geodetic scale factor

Site	SW SW SEC. 3 T1N R68W 6TH P.M.		
Site Position:		Northing:	14,554,632.99 usft
From:	Lat/Long	Easting:	1,641,108.55 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"
		Latitude:	40° 4' 35.821 N
		Longitude:	104° 59' 51.096 W
		Grid Convergence:	0.00 °

Well	HAMMER 3-1HZ		
Well Position	+N-S	0.0 usft	Northing: 14,554,632.99 usft
	+E-W	0.0 usft	Easting: 1,641,108.55 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
		Latitude:	40° 4' 35.821 N
		Longitude:	104° 59' 51.096 W
		Ground Level:	5,045.0 usft

Wellbore	JOB # 2018-82-461				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	11/12/2017	8.25	66.55	52,142

Design	FINAL SURVEYS				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N-S (usft)	+E-W (usft)	Direction (°)	
	0.0	0.0	0.0	359.99	

Survey Program	Date	03/04/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
128.0	16,796.0	FINAL SURVEYS (JOB # 2018-82-461)	APC_ISCWSA REV 2 MV Fixed:v2:crustal field declination		

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N-S (usft)	+E-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	5,065.0	0.0	0.0	0.0	0.00	0.00	0.00
128.0	0.44	55.01	128.0	4,937.0	0.3	0.4	0.3	0.34	0.34	0.00
159.0	0.75	35.14	159.0	4,906.0	0.5	0.6	0.5	1.19	1.00	-64.10
191.0	1.10	53.34	191.0	4,874.0	0.9	1.0	0.9	1.42	1.09	56.87
223.0	0.75	29.70	223.0	4,842.0	1.2	1.3	1.2	1.60	-1.09	-73.87
254.0	0.66	319.29	254.0	4,811.0	1.5	1.3	1.5	2.63	-0.29	-227.13
286.0	0.57	324.92	286.0	4,779.0	1.8	1.1	1.8	0.34	-0.28	17.59
317.0	0.66	316.66	317.0	4,748.0	2.1	0.9	2.1	0.41	0.29	-26.65
349.0	1.45	324.39	349.0	4,716.0	2.5	0.5	2.5	2.50	2.47	24.16
380.0	2.59	316.13	380.0	4,685.0	3.4	-0.2	3.4	3.79	3.68	-26.65
412.0	3.16	307.96	411.9	4,653.1	4.4	-1.4	4.4	2.19	1.78	-25.53
444.0	4.00	312.70	443.9	4,621.1	5.7	-2.9	5.7	2.78	2.62	14.81
475.0	4.26	313.76	474.8	4,590.2	7.3	-4.5	7.3	0.87	0.84	3.42

Survey Report



Company:	ANADARKO PETROLEUM CORP	Local Co-ordinate Reference:	Well HAMMER 3-1HZ
Project:	WELD COUNTY (NAD 83)	TVD Reference:	KB 20' @ 5065.0usft (PD461)
Site:	SW SW SEC. 3 T1N R68W 6TH P.M.	MD Reference:	KB 20' @ 5065.0usft (PD461)
Well:	HAMMER 3-1HZ	North Reference:	True
Wellbore:	JOB # 2018-82-461	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	Database:	EOG RESOURCES

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
507.0	4.61	314.64	506.7	4,558.3	9.0	-6.3	9.0	1.11	1.09	2.75
538.0	5.01	316.22	537.6	4,527.4	10.8	-8.1	10.8	1.36	1.29	5.10
570.0	5.10	313.49	569.4	4,495.6	12.8	-10.1	12.8	0.80	0.28	-8.53
602.0	5.10	310.86	601.3	4,463.7	14.7	-12.2	14.7	0.73	0.00	-8.22
634.0	5.05	307.08	633.2	4,431.8	16.5	-14.4	16.5	1.06	-0.16	-11.81
666.0	5.10	313.58	665.1	4,399.9	18.3	-16.6	18.3	1.80	0.16	20.31
697.0	5.71	310.15	695.9	4,369.1	20.3	-18.8	20.3	2.23	1.97	-11.06
729.0	6.46	311.38	727.7	4,337.3	22.5	-21.3	22.5	2.38	2.34	3.84
761.0	6.59	310.51	759.5	4,305.5	24.9	-24.1	24.9	0.51	0.41	-2.72
793.0	6.94	310.15	791.3	4,273.7	27.3	-26.9	27.3	1.10	1.09	-1.12
824.0	7.60	308.57	822.1	4,242.9	29.8	-30.0	29.8	2.22	2.13	-5.10
856.0	8.57	307.08	853.8	4,211.2	32.6	-33.5	32.6	3.10	3.03	-4.66
888.0	9.49	306.29	885.4	4,179.6	35.6	-37.6	35.6	2.90	2.87	-2.47
920.0	10.68	302.16	916.9	4,148.1	38.7	-42.2	38.7	4.35	3.72	-12.91
951.0	11.12	305.85	947.3	4,117.7	42.0	-47.1	42.0	2.66	1.42	11.90
983.0	10.90	304.35	978.7	4,086.3	45.5	-52.1	45.5	1.13	-0.69	-4.69
1,015.0	10.94	305.32	1,010.1	4,054.9	49.0	-57.0	49.0	0.59	0.12	3.03
1,047.0	11.91	305.41	1,041.5	4,023.5	52.6	-62.2	52.6	3.03	3.03	0.28
1,078.0	13.18	304.88	1,071.8	3,993.2	56.5	-67.7	56.5	4.11	4.10	-1.71
1,110.0	14.24	305.14	1,102.8	3,962.2	60.9	-73.9	60.9	3.32	3.31	0.81
1,142.0	15.29	304.62	1,133.8	3,931.2	65.5	-80.6	65.5	3.31	3.28	-1.62
1,173.0	15.38	305.14	1,163.7	3,901.3	70.2	-87.3	70.2	0.53	0.29	1.68
1,205.0	16.35	304.79	1,194.5	3,870.5	75.2	-94.5	75.2	3.05	3.03	-1.09
1,269.0	18.46	305.67	1,255.5	3,809.5	86.3	-110.1	86.3	3.32	3.30	1.37
1,301.0	18.94	306.29	1,285.8	3,779.2	92.3	-118.4	92.3	1.62	1.50	1.94
1,332.0	19.34	305.94	1,315.1	3,749.9	98.3	-126.6	98.3	1.34	1.29	-1.13
1,364.0	20.08	306.73	1,345.3	3,719.7	104.7	-135.3	104.7	2.46	2.31	2.47
1,396.0	20.52	306.55	1,375.3	3,689.7	111.3	-144.2	111.3	1.39	1.37	-0.56
1,427.0	19.73	309.89	1,404.4	3,660.6	117.9	-152.6	117.9	4.50	-2.55	10.77
1,459.0	19.56	307.34	1,434.5	3,630.5	124.6	-161.0	124.6	2.73	-0.53	-7.97
1,491.0	19.82	308.13	1,464.6	3,600.4	131.2	-169.6	131.2	1.16	0.81	2.47
1,522.0	18.85	307.61	1,493.9	3,571.1	137.5	-177.7	137.5	3.18	-3.13	-1.68
1,554.0	18.72	308.04	1,524.2	3,540.8	143.8	-185.8	143.9	0.59	-0.41	1.34
1,586.0	18.76	308.84	1,554.5	3,510.5	150.2	-193.8	150.3	0.81	0.12	2.50
1,618.0	17.71	309.01	1,584.9	3,480.1	156.5	-201.6	156.5	3.29	-3.28	0.53
1,649.0	16.61	309.10	1,614.5	3,450.5	162.3	-208.7	162.3	3.55	-3.55	0.29
1,681.0	17.18	309.98	1,645.1	3,419.9	168.2	-215.9	168.2	1.95	1.78	2.75
1,713.0	16.44	308.31	1,675.8	3,389.2	174.0	-223.1	174.1	2.76	-2.31	-5.22
1,744.0	15.47	308.31	1,705.6	3,359.4	179.3	-229.8	179.4	3.13	-3.13	0.00
1,776.0	14.63	307.61	1,736.5	3,328.5	184.4	-236.3	184.5	2.69	-2.62	-2.19
1,808.0	14.50	307.61	1,767.4	3,297.6	189.3	-242.7	189.4	0.41	-0.41	0.00
1,822.0	14.63	308.13	1,781.0	3,284.0	191.5	-245.5	191.6	1.32	0.93	3.71
9 5/8" CASING										
1,862.0	14.49	307.38	1,819.7	3,245.3	197.7	-253.4	197.7	0.59	-0.35	-1.87
1,949.0	14.20	305.70	1,904.0	3,161.0	210.5	-270.7	210.5	0.58	-0.33	-1.93
2,043.0	12.40	302.90	1,995.5	3,069.5	222.7	-288.6	222.8	2.03	-1.91	-2.98
2,137.0	11.20	293.50	2,087.5	2,977.5	231.8	-305.4	231.9	2.41	-1.28	-10.00
2,231.0	9.00	291.40	2,180.0	2,885.0	238.2	-320.6	238.2	2.37	-2.34	-2.23
2,324.0	7.70	278.10	2,272.0	2,793.0	241.7	-333.6	241.7	2.49	-1.40	-14.30
2,417.0	6.40	266.70	2,364.3	2,700.7	242.3	-344.9	242.3	2.05	-1.40	-12.26
2,509.0	6.20	246.00	2,455.8	2,609.2	240.0	-354.6	240.0	2.47	-0.22	-22.50
2,604.0	4.90	210.70	2,550.4	2,514.6	234.4	-361.4	234.4	3.77	-1.37	-37.16
2,699.0	6.70	192.30	2,644.9	2,420.1	225.5	-364.6	225.5	2.70	1.89	-19.37

Survey Report



Company:	ANADARKO PETROLEUM CORP	Local Co-ordinate Reference:	Well HAMMER 3-1HZ
Project:	WELD COUNTY (NAD 83)	TVD Reference:	KB 20' @ 5065.0usft (PD461)
Site:	SW SW SEC. 3 T1N R68W 6TH P.M.	MD Reference:	KB 20' @ 5065.0usft (PD461)
Well:	HAMMER 3-1HZ	North Reference:	True
Wellbore:	JOB # 2018-82-461	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	Database:	EOG RESOURCES

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
2,794.0	7.30	179.80	2,739.2	2,325.8	214.0	-365.8	214.1	1.72	0.63	-13.16
2,888.0	8.10	186.60	2,832.3	2,232.7	201.5	-366.5	201.5	1.29	0.85	7.23
2,983.0	8.60	182.30	2,926.3	2,138.7	187.7	-367.6	187.8	0.84	0.53	-4.53
3,077.0	10.00	177.80	3,019.1	2,045.9	172.5	-367.5	172.6	1.68	1.49	-4.79
3,171.0	11.70	168.30	3,111.4	1,953.6	155.1	-365.3	155.1	2.62	1.81	-10.11
3,265.0	13.30	160.80	3,203.2	1,861.8	135.5	-359.8	135.6	2.42	1.70	-7.98
3,357.0	13.30	150.90	3,292.7	1,772.3	116.3	-351.2	116.3	2.47	0.00	-10.76
3,452.0	13.40	146.80	3,385.2	1,679.8	97.5	-339.8	97.6	1.00	0.11	-4.32
3,547.0	12.80	146.00	3,477.7	1,587.3	79.6	-327.9	79.6	0.66	-0.63	-0.84
3,641.0	12.30	142.30	3,569.5	1,495.5	63.0	-316.0	63.1	1.01	-0.53	-3.94
3,735.0	12.20	143.70	3,661.3	1,403.7	47.1	-304.0	47.1	0.33	-0.11	1.49
3,829.0	11.20	156.70	3,753.4	1,311.6	30.7	-294.5	30.7	2.99	-1.06	13.83
3,922.0	9.70	170.30	3,844.9	1,220.1	14.7	-289.6	14.7	3.09	-1.61	14.62
4,016.0	8.00	174.70	3,937.7	1,127.3	0.4	-287.6	0.4	1.95	-1.81	4.68
4,109.0	6.70	173.50	4,030.0	1,035.0	-11.5	-286.4	-11.4	1.41	-1.40	-1.29
4,203.0	5.70	173.30	4,123.4	941.6	-21.6	-285.3	-21.5	1.06	-1.06	-0.21
4,296.0	4.40	173.40	4,216.1	848.9	-29.7	-284.3	-29.6	1.40	-1.40	0.11
4,390.0	4.10	173.60	4,309.8	755.2	-36.6	-283.5	-36.6	0.32	-0.32	0.21
4,484.0	4.20	175.30	4,403.5	661.5	-43.4	-282.9	-43.3	0.17	0.11	1.81
4,579.0	3.40	164.00	4,498.3	566.7	-49.6	-281.8	-49.5	1.15	-0.84	-11.89
4,673.0	1.10	181.30	4,592.3	472.7	-53.1	-281.1	-53.1	2.52	-2.45	18.40
4,766.0	0.30	194.10	4,685.3	379.7	-54.3	-281.1	-54.2	0.87	-0.86	13.76
4,861.0	0.00	158.30	4,780.3	284.7	-54.5	-281.2	-54.5	0.32	-0.32	0.00
4,956.0	0.60	98.00	4,875.3	189.7	-54.6	-280.7	-54.5	0.63	0.63	0.00
5,074.0	0.40	118.30	4,993.2	71.8	-54.9	-279.7	-54.8	0.22	-0.17	17.20
5,168.0	0.80	137.40	5,087.2	-22.2	-55.5	-279.0	-55.5	0.47	0.43	20.32
5,263.0	0.30	139.50	5,182.2	-117.2	-56.2	-278.4	-56.1	0.53	-0.53	2.21
5,358.0	0.40	145.00	5,277.2	-212.2	-56.6	-278.0	-56.6	0.11	0.11	5.79
5,453.0	0.60	211.30	5,372.2	-307.2	-57.3	-278.1	-57.3	0.60	0.21	69.79
5,545.0	0.60	218.10	5,464.2	-399.2	-58.1	-278.6	-58.1	0.08	0.00	7.39
5,639.0	0.40	174.50	5,558.2	-493.2	-58.8	-278.9	-58.8	0.44	-0.21	-46.38
5,734.0	0.10	9.10	5,653.2	-588.2	-59.1	-278.9	-59.0	0.52	-0.32	-174.11
5,830.0	0.20	21.60	5,749.2	-684.2	-58.9	-278.8	-58.8	0.11	0.10	13.02
5,925.0	0.50	22.30	5,844.2	-779.2	-58.3	-278.6	-58.3	0.32	0.32	0.74
6,021.0	0.30	92.50	5,940.2	-875.2	-57.9	-278.2	-57.9	0.51	-0.21	73.12
6,116.0	0.20	56.40	6,035.2	-970.2	-57.9	-277.8	-57.8	0.19	-0.11	-38.00
6,211.0	0.40	43.80	6,130.2	-1,065.2	-57.5	-277.4	-57.5	0.22	0.21	-13.26
6,306.0	0.60	148.90	6,225.2	-1,160.2	-57.7	-276.9	-57.7	0.85	0.21	110.63
6,401.0	0.60	125.50	6,320.2	-1,255.2	-58.4	-276.3	-58.4	0.26	0.00	-24.63
6,496.0	0.40	73.50	6,415.2	-1,350.2	-58.6	-275.5	-58.6	0.50	-0.21	-54.74
6,591.0	0.80	19.90	6,510.2	-1,445.2	-57.9	-275.0	-57.9	0.68	0.42	-56.42
6,685.0	0.80	6.00	6,604.2	-1,539.2	-56.6	-274.7	-56.6	0.21	0.00	-14.79
6,779.0	1.00	356.80	6,698.2	-1,633.2	-55.2	-274.7	-55.1	0.26	0.21	-9.79
KOP										
6,844.0	1.89	10.72	6,763.2	-1,698.2	-53.5	-274.5	-53.5	1.46	1.37	21.42
6,873.0	2.30	13.40	6,792.1	-1,727.1	-52.5	-274.3	-52.5	1.45	1.41	9.24
6,966.0	8.10	7.80	6,884.7	-1,819.7	-44.2	-273.0	-44.1	6.25	6.24	-6.02
7,059.0	13.10	357.70	6,976.1	-1,911.1	-27.2	-272.5	-27.1	5.72	5.38	-10.86
7,152.0	17.20	356.80	7,065.9	-2,000.9	-2.9	-273.7	-2.8	4.42	4.41	-0.97
7,246.0	21.50	359.50	7,154.5	-2,089.5	28.2	-274.6	28.3	4.67	4.57	2.87
7,339.0	24.00	355.30	7,240.3	-2,175.3	64.1	-276.3	64.2	3.20	2.69	-4.52
7,433.0	26.70	356.10	7,325.2	-2,260.2	104.3	-279.3	104.3	2.90	2.87	0.85
7,528.0	32.30	354.70	7,407.9	-2,342.9	150.9	-283.1	150.9	5.94	5.89	-1.47

Survey Report



Company:	ANADARKO PETROLEUM CORP	Local Co-ordinate Reference:	Well HAMMER 3-1HZ
Project:	WELD COUNTY (NAD 83)	TVD Reference:	KB 20' @ 5065.0usft (PD461)
Site:	SW SW SEC. 3 T1N R68W 6TH P.M.	MD Reference:	KB 20' @ 5065.0usft (PD461)
Well:	HAMMER 3-1HZ	North Reference:	True
Wellbore:	JOB # 2018-82-461	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	Database:	EOG RESOURCES

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
7,622.0	38.40	359.50	7,484.5	-2,419.5	205.1	-285.7	205.2	7.13	6.49	5.11
7,715.0	46.50	0.80	7,553.1	-2,488.1	267.8	-285.5	267.9	8.76	8.71	1.40
7,809.0	53.40	355.80	7,613.6	-2,548.6	339.7	-287.8	339.7	8.39	7.34	-5.32
7,904.0	60.40	351.30	7,665.4	-2,600.4	418.7	-296.8	418.7	8.37	7.37	-4.74
7,997.0	72.70	352.00	7,702.4	-2,637.4	502.9	-309.2	503.0	13.24	13.23	0.75
HZ LANDING POINT										
8,090.0	89.10	356.70	7,717.0	-2,652.0	594.0	-318.1	594.0	18.32	17.63	5.05
8,182.0	92.60	355.30	7,715.7	-2,650.7	685.7	-324.5	685.8	4.10	3.80	-1.52
8,275.0	94.70	358.00	7,709.8	-2,644.8	778.4	-329.9	778.4	3.67	2.26	2.90
8,369.0	94.20	359.90	7,702.5	-2,637.5	872.0	-331.6	872.1	2.08	-0.53	2.02
8,464.0	93.10	2.00	7,696.4	-2,631.4	966.8	-330.1	966.9	2.49	-1.16	2.21
8,556.0	94.60	1.70	7,690.2	-2,625.2	1,058.6	-327.1	1,058.6	1.66	1.63	-0.33
8,650.0	94.80	2.70	7,682.5	-2,617.5	1,152.2	-323.5	1,152.2	1.08	0.21	1.06
8,743.0	93.10	2.50	7,676.1	-2,611.1	1,244.9	-319.3	1,244.9	1.84	-1.83	-0.22
8,837.0	90.30	3.30	7,673.3	-2,608.3	1,338.7	-314.6	1,338.8	3.10	-2.98	0.85
8,931.0	89.80	2.90	7,673.3	-2,608.3	1,432.6	-309.5	1,432.6	0.68	-0.53	-0.43
9,023.0	91.20	2.50	7,672.5	-2,607.5	1,524.5	-305.1	1,524.5	1.58	1.52	-0.43
9,116.0	92.30	1.60	7,669.6	-2,604.6	1,617.3	-301.8	1,617.4	1.53	1.18	-0.97
9,209.0	92.30	1.50	7,665.9	-2,600.9	1,710.2	-299.3	1,710.3	0.11	0.00	-0.11
9,303.0	92.30	1.10	7,662.1	-2,597.1	1,804.1	-297.2	1,804.2	0.43	0.00	-0.43
9,398.0	93.40	1.00	7,657.4	-2,592.4	1,899.0	-295.4	1,899.1	1.16	1.16	-0.11
9,491.0	93.30	0.30	7,652.0	-2,587.0	1,991.8	-294.4	1,991.9	0.76	-0.11	-0.75
9,586.0	93.40	0.20	7,646.4	-2,581.4	2,086.7	-294.0	2,086.7	0.15	0.11	-0.11
9,679.0	93.50	0.30	7,640.8	-2,575.8	2,179.5	-293.6	2,179.6	0.15	0.11	0.11
9,774.0	93.40	359.90	7,635.1	-2,570.1	2,274.3	-293.4	2,274.4	0.43	-0.11	-0.42
9,867.0	93.50	359.60	7,629.5	-2,564.5	2,367.2	-293.8	2,367.2	0.34	0.11	-0.32
9,959.0	93.60	359.50	7,623.8	-2,558.8	2,459.0	-294.5	2,459.0	0.15	0.11	-0.11
10,051.0	93.80	359.20	7,617.9	-2,552.9	2,550.8	-295.6	2,550.8	0.39	0.22	-0.33
10,142.0	92.90	359.50	7,612.5	-2,547.5	2,641.6	-296.6	2,641.7	1.04	-0.99	0.33
10,234.0	93.10	359.20	7,607.7	-2,542.7	2,733.5	-297.6	2,733.5	0.39	0.22	-0.33
10,326.0	92.00	359.80	7,603.6	-2,538.6	2,825.4	-298.4	2,825.4	1.36	-1.20	0.65
10,420.0	92.50	359.60	7,599.9	-2,534.9	2,919.3	-298.9	2,919.4	0.57	0.53	-0.21
10,515.0	91.90	0.00	7,596.3	-2,531.3	3,014.2	-299.3	3,014.3	0.76	-0.63	0.42
10,609.0	91.30	1.00	7,593.7	-2,528.7	3,108.2	-298.4	3,108.3	1.24	-0.64	1.06
10,705.0	90.80	1.10	7,591.9	-2,526.9	3,204.2	-296.7	3,204.2	0.53	-0.52	0.10
10,799.0	91.20	0.40	7,590.3	-2,525.3	3,298.2	-295.4	3,298.2	0.86	0.43	-0.74
10,892.0	90.50	0.90	7,588.9	-2,523.9	3,391.1	-294.4	3,391.2	0.92	-0.75	0.54
10,986.0	88.50	0.90	7,589.7	-2,524.7	3,485.1	-292.9	3,485.2	2.13	-2.13	0.00
11,080.0	88.00	0.40	7,592.6	-2,527.6	3,579.1	-291.9	3,579.1	0.75	-0.53	-0.53
11,175.0	89.40	359.50	7,594.7	-2,529.7	3,674.0	-291.9	3,674.1	1.75	1.47	-0.95
11,268.0	89.20	358.90	7,595.9	-2,530.9	3,767.0	-293.2	3,767.1	0.68	-0.22	-0.65
11,362.0	90.60	358.30	7,596.0	-2,531.0	3,861.0	-295.5	3,861.0	1.62	1.49	-0.64
11,454.0	90.40	357.50	7,595.2	-2,530.2	3,952.9	-298.9	3,953.0	0.90	-0.22	-0.87
11,548.0	91.00	358.90	7,594.1	-2,529.1	4,046.9	-301.9	4,046.9	1.62	0.64	1.49
11,643.0	91.20	358.60	7,592.3	-2,527.3	4,141.8	-303.9	4,141.9	0.38	0.21	-0.32
11,735.0	91.00	356.50	7,590.5	-2,525.5	4,233.7	-307.9	4,233.8	2.29	-0.22	-2.28
11,828.0	92.30	358.00	7,587.8	-2,522.8	4,326.6	-312.3	4,326.6	2.13	1.40	1.61
11,922.0	92.90	0.00	7,583.6	-2,518.6	4,420.5	-314.0	4,420.5	2.22	0.64	2.13
12,015.0	91.90	1.00	7,579.7	-2,514.7	4,513.4	-313.1	4,513.4	1.52	-1.08	1.08
12,109.0	90.80	1.90	7,577.4	-2,512.4	4,607.3	-310.8	4,607.4	1.51	-1.17	0.96
12,201.0	89.40	1.80	7,577.3	-2,512.3	4,699.3	-307.8	4,699.3	1.53	-1.52	-0.11
12,294.0	89.20	1.40	7,578.4	-2,513.4	4,792.2	-305.2	4,792.3	0.48	-0.22	-0.43
12,387.0	91.80	0.40	7,577.6	-2,512.6	4,885.2	-303.7	4,885.2	3.00	2.80	-1.08

Survey Report



Company:	ANADARKO PETROLEUM CORP	Local Co-ordinate Reference:	Well HAMMER 3-1HZ
Project:	WELD COUNTY (NAD 83)	TD Reference:	KB 20' @ 5065.0usft (PD461)
Site:	SW SW SEC. 3 T1N R68W 6TH P.M.	MD Reference:	KB 20' @ 5065.0usft (PD461)
Well:	HAMMER 3-1HZ	North Reference:	True
Wellbore:	JOB # 2018-82-461	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	Database:	EOG RESOURCES

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
12,481.0	91.70	0.30	7,574.7	-2,509.7	4,979.1	-303.2	4,979.2	0.15	-0.11	-0.11
12,574.0	90.60	1.30	7,572.9	-2,507.9	5,072.1	-301.9	5,072.2	1.60	-1.18	1.08
12,667.0	91.40	1.30	7,571.2	-2,506.2	5,165.1	-299.8	5,165.1	0.86	0.86	0.00
12,762.0	88.90	1.10	7,571.0	-2,506.0	5,260.0	-297.8	5,260.1	2.64	-2.63	-0.21
12,856.0	88.30	0.80	7,573.3	-2,508.3	5,354.0	-296.2	5,354.1	0.71	-0.64	-0.32
12,951.0	89.30	359.50	7,575.3	-2,510.3	5,449.0	-296.0	5,449.0	1.73	1.05	-1.37
13,045.0	88.80	359.20	7,576.8	-2,511.8	5,543.0	-297.0	5,543.0	0.62	-0.53	-0.32
13,140.0	89.80	358.60	7,578.0	-2,513.0	5,637.9	-298.9	5,638.0	1.23	1.05	-0.63
13,232.0	90.60	358.90	7,577.7	-2,512.7	5,729.9	-300.9	5,730.0	0.93	0.87	0.33
13,325.0	90.20	358.30	7,577.0	-2,512.0	5,822.9	-303.1	5,822.9	0.78	-0.43	-0.65
13,418.0	89.60	357.80	7,577.2	-2,512.2	5,915.8	-306.3	5,915.9	0.84	-0.65	-0.54
13,512.0	90.80	358.90	7,576.9	-2,511.9	6,009.8	-309.0	6,009.8	1.73	1.28	1.17
13,605.0	90.60	358.70	7,575.7	-2,510.7	6,102.8	-310.9	6,102.8	0.30	-0.22	-0.22
13,697.0	90.60	358.80	7,574.8	-2,509.8	6,194.7	-313.0	6,194.8	0.11	0.00	0.11
13,790.0	91.20	0.50	7,573.3	-2,508.3	6,287.7	-313.5	6,287.8	1.94	0.65	1.83
13,886.0	91.30	0.90	7,571.2	-2,506.2	6,383.7	-312.4	6,383.7	0.43	0.10	0.42
13,979.0	91.20	359.80	7,569.2	-2,504.2	6,476.7	-311.8	6,476.7	1.19	-0.11	-1.18
14,073.0	90.60	359.10	7,567.7	-2,502.7	6,570.6	-312.7	6,570.7	0.98	-0.64	-0.74
14,166.0	90.50	358.80	7,566.8	-2,501.8	6,663.6	-314.4	6,663.7	0.34	-0.11	-0.32
14,259.0	90.30	358.40	7,566.2	-2,501.2	6,756.6	-316.7	6,756.6	0.48	-0.22	-0.43
14,354.0	90.20	359.40	7,565.8	-2,500.8	6,851.6	-318.5	6,851.6	1.06	-0.11	1.05
14,448.0	89.60	359.20	7,565.9	-2,500.9	6,945.6	-319.6	6,945.6	0.67	-0.64	-0.21
14,543.0	90.70	359.30	7,565.7	-2,500.7	7,040.6	-320.9	7,040.6	1.16	1.16	0.11
14,636.0	90.80	359.20	7,564.4	-2,499.4	7,133.5	-322.1	7,133.6	0.15	0.11	-0.11
14,730.0	90.50	359.20	7,563.4	-2,498.4	7,227.5	-323.4	7,227.6	0.32	-0.32	0.00
14,825.0	90.90	359.40	7,562.2	-2,497.2	7,322.5	-324.6	7,322.6	0.47	0.42	0.21
14,918.0	91.20	359.80	7,560.5	-2,495.5	7,415.5	-325.2	7,415.5	0.54	0.32	0.43
15,013.0	90.50	359.30	7,559.1	-2,494.1	7,510.5	-326.0	7,510.5	0.91	-0.74	-0.53
15,107.0	90.50	359.10	7,558.3	-2,493.3	7,604.5	-327.3	7,604.5	0.21	0.00	-0.21
15,202.0	90.50	359.10	7,557.5	-2,492.5	7,699.4	-328.8	7,699.5	0.00	0.00	0.00
15,296.0	90.10	358.50	7,557.0	-2,492.0	7,793.4	-330.7	7,793.5	0.77	-0.43	-0.64
15,390.0	91.80	359.60	7,555.4	-2,490.4	7,887.4	-332.3	7,887.4	2.15	1.81	1.17
15,483.0	92.00	359.40	7,552.3	-2,487.3	7,980.3	-333.1	7,980.4	0.30	0.22	-0.22
15,576.0	92.10	359.50	7,549.0	-2,484.0	8,073.3	-334.0	8,073.3	0.15	0.11	0.11
15,670.0	91.70	359.20	7,545.9	-2,480.9	8,167.2	-335.1	8,167.3	0.53	-0.43	-0.32
15,763.0	92.10	358.80	7,542.8	-2,477.8	8,260.1	-336.7	8,260.2	0.61	0.43	-0.43
15,858.0	91.40	358.90	7,539.9	-2,474.9	8,355.1	-338.6	8,355.1	0.74	-0.74	0.11
15,952.0	92.10	1.10	7,537.0	-2,472.0	8,449.0	-338.6	8,449.1	2.45	0.74	2.34
16,045.0	91.40	1.00	7,534.2	-2,469.2	8,542.0	-336.9	8,542.0	0.76	-0.75	-0.11
16,139.0	91.50	0.50	7,531.8	-2,466.8	8,635.9	-335.7	8,636.0	0.54	0.11	-0.53
16,233.0	91.30	0.20	7,529.5	-2,464.5	8,729.9	-335.1	8,730.0	0.38	-0.21	-0.32
16,325.0	91.30	0.20	7,527.4	-2,462.4	8,821.9	-334.8	8,821.9	0.00	0.00	0.00
16,419.0	91.80	359.70	7,524.9	-2,459.9	8,915.8	-334.8	8,915.9	0.75	0.53	-0.53
16,514.0	92.20	359.50	7,521.6	-2,456.6	9,010.8	-335.5	9,010.8	0.47	0.42	-0.21
16,608.0	92.40	359.50	7,517.8	-2,452.8	9,104.7	-336.3	9,104.8	0.21	0.21	0.00
LAST SURVEY - APR 3, 2018										
16,703.0	93.10	359.00	7,513.2	-2,448.2	9,199.6	-337.6	9,199.6	0.91	0.74	-0.53
EXTRAPOLATION TO TD										
16,796.0	93.10	359.00	7,508.2	-2,443.2	9,292.4	-339.2	9,292.5	0.00	0.00	0.00

Survey Report



Company:	ANADARKO PETROLEUM CORP	Local Co-ordinate Reference:	Well HAMMER 3-1HZ
Project:	WELD COUNTY (NAD 83)	TVD Reference:	KB 20' @ 5065.0usft (PD461)
Site:	SW SW SEC. 3 T1N R68W 6TH P.M.	MD Reference:	KB 20' @ 5065.0usft (PD461)
Well:	HAMMER 3-1HZ	North Reference:	True
Wellbore:	JOB # 2018-82-461	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEYS	Database:	EOG RESOURCES

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
BHL - HAMMER 3-1H - survey misses target center by 24.8usft at 16796.0usft MD (7508.2 TVD, 9292.4 N, -339.2 E) - Point	0.00	0.00	7,518.0	9,293.8	-316.5	14,563,923.06	1,640,791.92	40° 6' 7.664 N	104° 59' 55.169 W
KOP - HAMMER 3-1H - survey misses target center by 275.5usft at 7121.4usft MD (7036.5 TVD, -11.6 N, -273.2 E) - Point	0.00	0.00	6,964.9	251.1	-315.3	14,554,883.97	1,640,793.34	40° 4' 38.302 N	104° 59' 55.152 W
CIRCLE 1 - HAMMER - survey misses target center by 1408.1usft at 13.8usft MD (13.8 TVD, 0.0 N, 0.0 E) - Point	0.00	0.00	12.0	1,353.3	-389.1	14,555,985.70	1,640,719.60	40° 4' 49.194 N	104° 59' 56.101 W
HEEL - HAMMER 3-1 - survey misses target center by 100.4usft at 8397.6usft MD (7700.4 TVD, 900.6 N, -331.5 E) - Point	0.00	0.00	7,601.5	894.0	-315.4	14,555,526.66	1,640,793.21	40° 4' 44.656 N	104° 59' 55.154 W
CIRCLE 2 - HAMMER - survey misses target center by 7496.4usft at 16796.0usft MD (7508.2 TVD, 9292.4 N, -339.2 E) - Point	0.00	0.00	12.0	9,343.6	-359.2	14,563,972.80	1,640,749.20	40° 6' 8.156 N	104° 59' 55.719 W

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,862.0	1,819.7	197.7	-253.4	9 5/8" CASING
6,844.0	6,763.2	-53.5	-274.5	KOP
8,090.0	7,717.0	594.0	-318.1	HZ LANDING POINT
16,703.0	7,513.2	9,199.6	-337.6	LAST SURVEY - APR 3, 2018
16,796.0	7,508.2	9,292.4	-339.2	EXTRAPOLATION TO TD

Checked By: _____ Approved By: _____ Date: _____