

# **ANADARKO PETROLEUM CORP**

**WELD COUNTY (NAD 83)**

**NE NE SEC. 7 T1N R67W 6th P.M.**

**RANGER 7-19HZ**

**JOB # 2019-198-461**

**07 June, 2019**

**Survey: FINAL SURVEYS**





Project: WELD COUNTY (NAD 83)  
Site: NE NE SEC. 7 T1N R67W 6th P.M.  
Well: RANGER 7-19HZ  
Wellbore: JOB # 2019-198-461  
Design: FINAL SURVEYS

#### ANNOTATIONS

TVD	MD	Inc	Azi	+N/-S	+E/-W	VSec	Departure	Annotation
1811.2	1843.0	14.59	93.88	1.7	283.6	1.8	286.6	TIE ON TO SURFACE SURVEYS
2604.8	2663.0	15.57	94.23	-11.3	488.7	-11.3	493.1	~ ENTER TGT BOX (2663' MD)
6915.5	7027.0	0.88	304.03	-39.6	930.7	-39.4	964.1	KOP
7554.2	7809.0	57.27	0.08	358.8	916.4	359.0	1364.1	~ ENTER RADIUS HEEL (7809' MD)
7716.1	8346.0	90.85	2.65	863.7	918.8	863.8	1868.7	HEEL:40.073159; -104.933427
7707.0	8760.0	90.20	1.27	1277.3	933.7	1277.4	2282.6	~ EXIT RADIUS HEEL (8760' MD)
7691.9	18472.0	90.06	0.79	10985.9	936.9	10986.1	11993.2	~ ENTER RADIUS TOE (18472' MD)
7694.2	18813.0	90.22	0.89	11326.9	942.9	11327.0	12334.2	LAST SURVEY JUNE 7, 2019
7693.9	18872.0	90.22	0.89	11385.8	943.8	11386.0	12393.2	PROJECTION TO TD: 40.102043; -104.933337

#### AS DRILLED LOCAL COORDINATES:

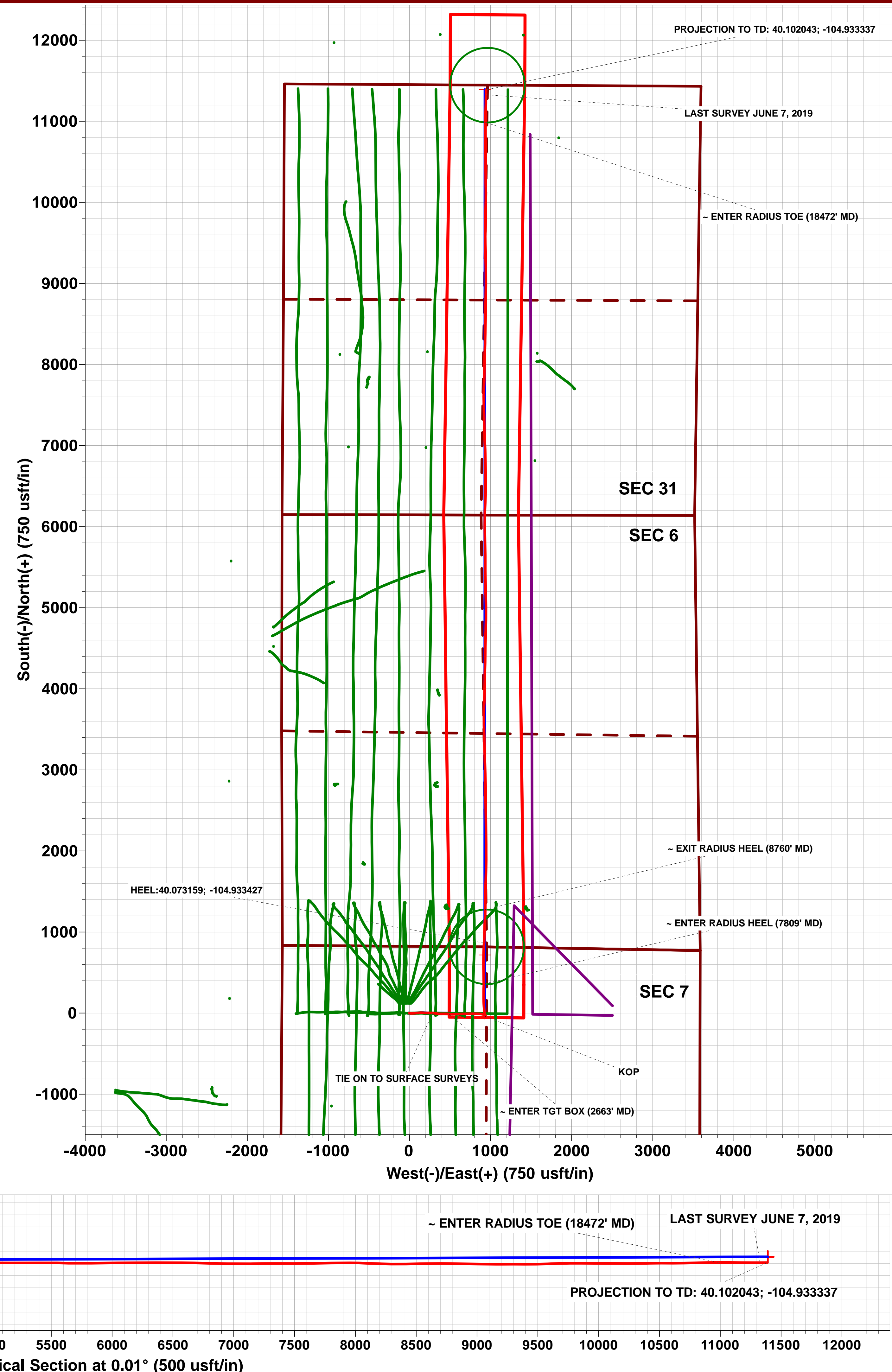
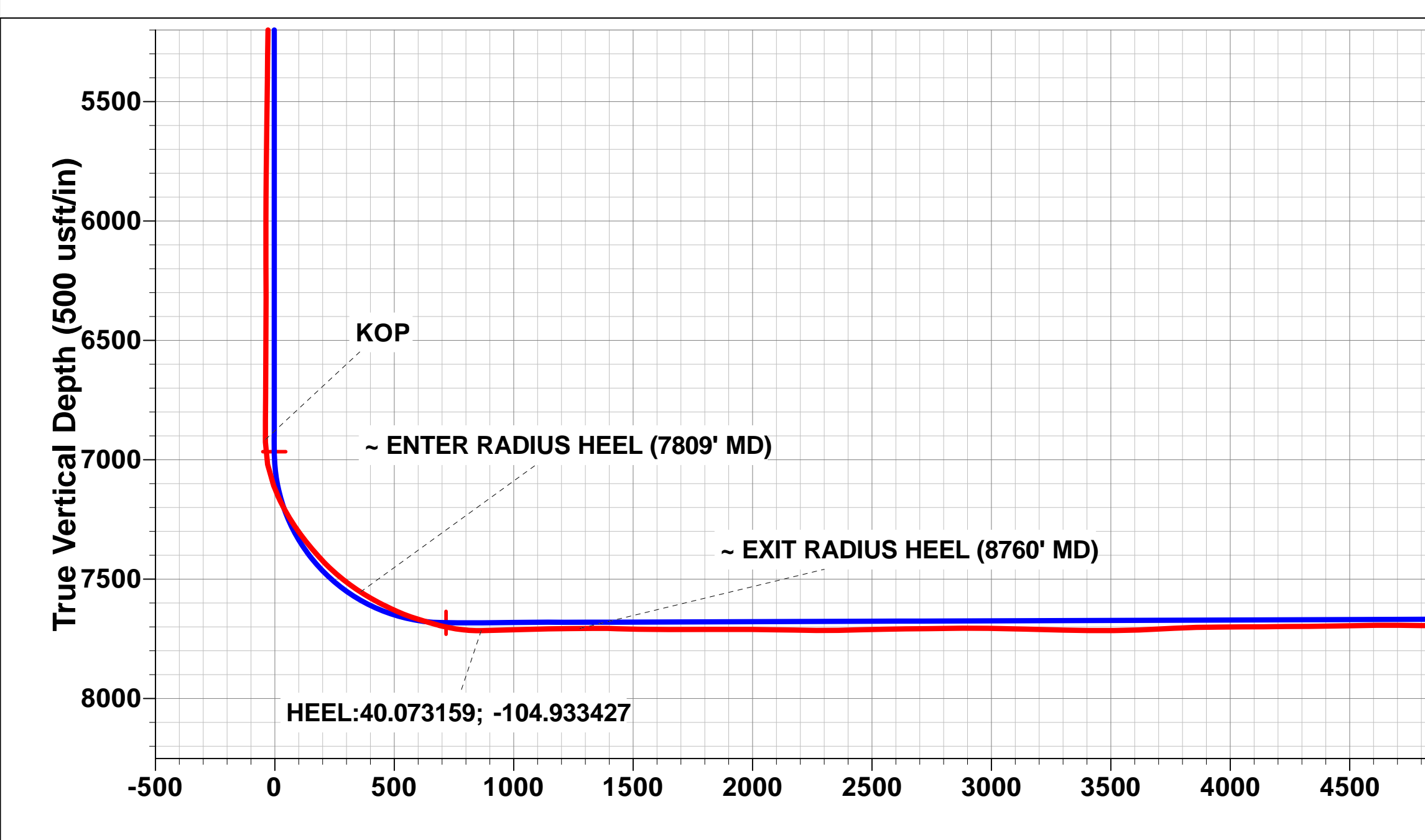
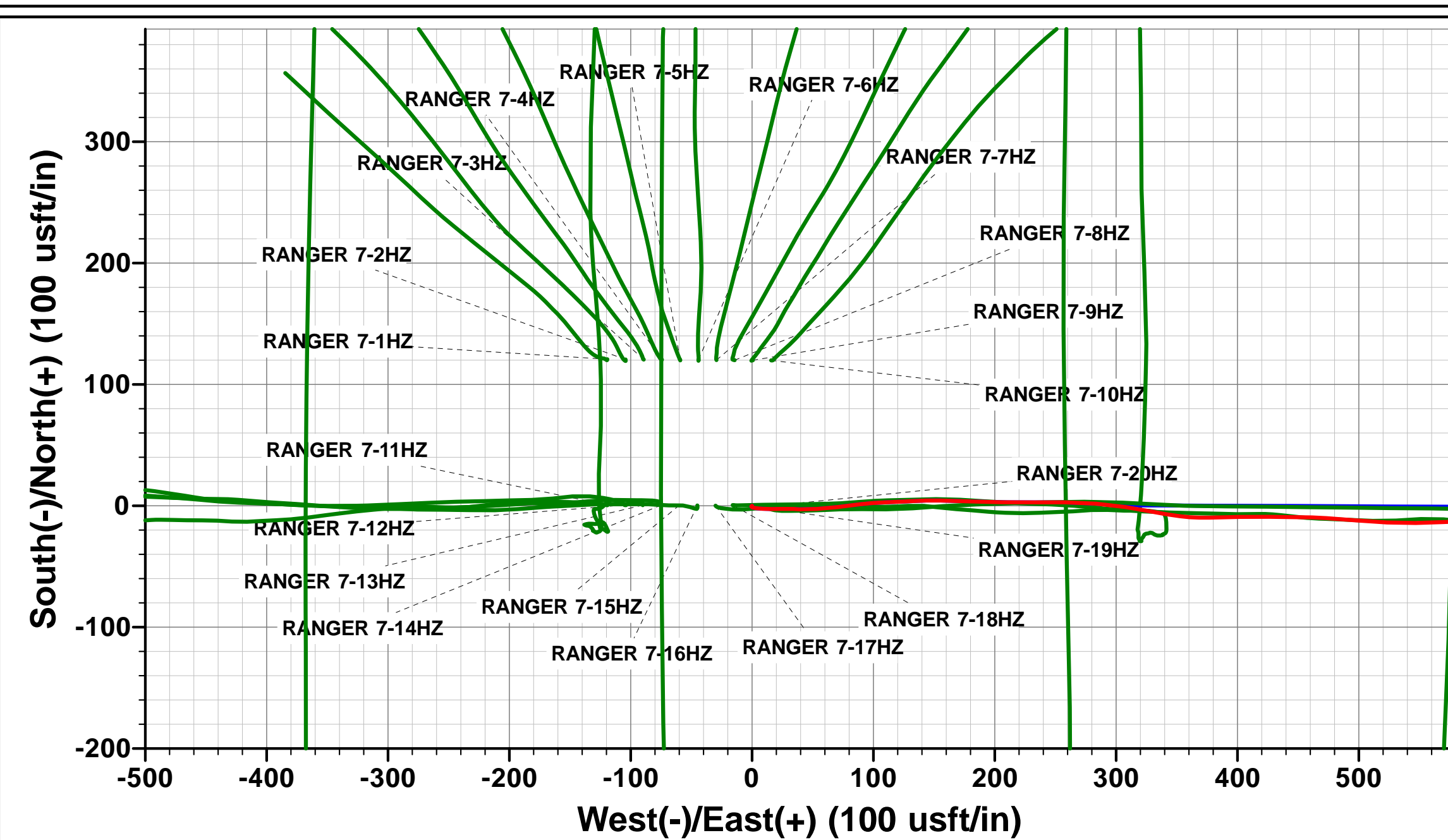
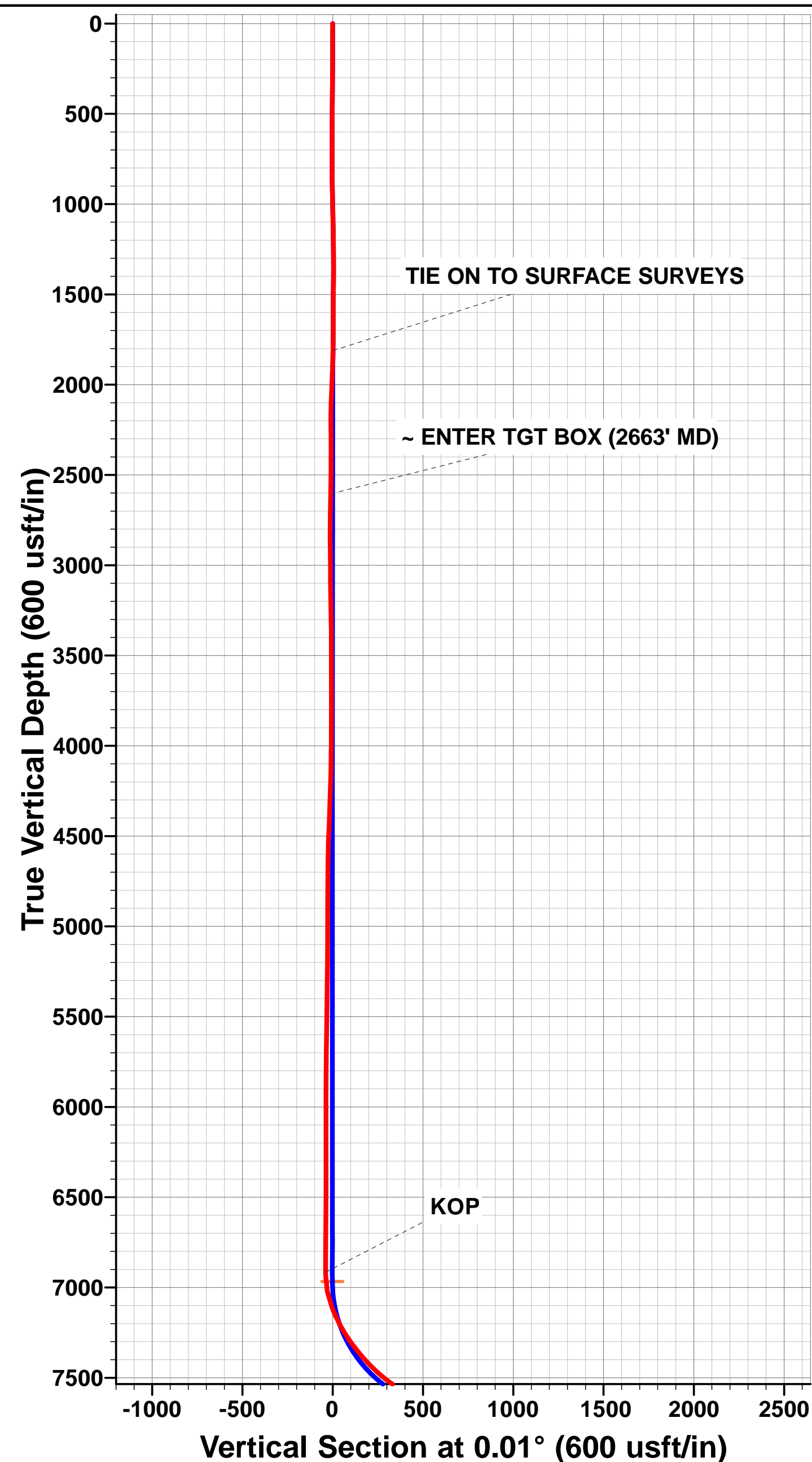
SHL: 825ft FNL & 1574ft FWL Sec 7

HEEL:47.17ft FSL & 2486.92ft FWL Sec 6

BHL: 55.75ft FNL & 2487.48ft FWL Sec 31

#### WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
BHL - RANGER 7-19HZ (P2)	7646.0	11390.6	930.3	40° 6' 7.402 N	104° 56' 0.184 W
HEEL - RANGER 7-19HZ (P2)	7683.0	716.5	927.9	40° 4' 21.918 N	104° 56' 0.220 W
KOP - RANGER 7-19HZ (P2)	6966.8	-2.3	927.8	40° 4' 14.816 N	104° 56' 0.222 W



## Survey Report



<b>Company:</b>	ANADARKO PETROLEUM CORP	<b>Local Co-ordinate Reference:</b>	Well RANGER 7-19HZ
<b>Project:</b>	WELD COUNTY (NAD 83)	<b>TVD Reference:</b>	KB 20' @ 5132.00usft (PD461)
<b>Site:</b>	NE NE SEC. 7 T1N R67W 6th P.M.	<b>MD Reference:</b>	KB 20' @ 5132.00usft (PD461)
<b>Well:</b>	RANGER 7-19HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	JOB # 2019-198-461	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL SURVEYS	<b>Database:</b>	Database 1

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

Site	NE NE SEC. 7 T1N R67W 6th P.M.				
Site Position:		Northing:	14,552,637.41 usft	Latitude:	40.071120
From:	Lat/Long	Easting:	1,658,003.48 usft	Longitude:	-104.937136
Position Uncertainty:	0.00 usft	Slot Radius:	1.10 ft	Grid Convergence:	0.04 °

Well	RANGER 7-19HZ					
Well Position	+N/-S	0.00 usft	Northing:	14,552,516.82 usft	Latitude:	40.070788
	+E/-W	0.00 usft	Easting:	1,658,122.78 usft	Longitude:	-104.936710
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	5,112.00 usft

<b>Wellbore</b>	JOB # 2019-198-461				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2015	08/03/2019	8.09	66.52	52,004

Design	FINAL SURVEYS				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)		+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00		0.00	0.00	0.01

<b>Survey Program</b>	<b>Date</b>	07/06/2019			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
129.00	18,872.00	FINAL SURVEYS (JOB # 2019-198-461)	APC_ISCWSA REV 2 MWD+	Fixed:v2:crustal field declination	

<b>Survey</b>										
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (usft)</b>	<b>Subsea Depth (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Vertical Section (usft)</b>	<b>Dogleg Rate (°/100usft)</b>	<b>Build Rate (°/100usft)</b>	<b>Turn Rate (°/100usft)</b>
0.00	0.00	0.00	0.00	5,132.00	0.00	0.00	0.00	0.00	0.00	0.00
129.00	0.26	249.27	129.00	5,003.00	-0.10	-0.27	-0.10	0.20	0.20	0.00
224.00	0.57	207.79	224.00	4,908.00	-0.60	-0.70	-0.60	0.43	0.33	-43.66
319.00	1.58	106.53	318.98	4,813.02	-1.39	0.34	-1.39	1.88	1.06	-106.59
414.00	2.68	98.10	413.92	4,718.08	-2.07	3.79	-2.07	1.20	1.16	-8.87
509.00	3.60	91.68	508.77	4,623.23	-2.47	8.97	-2.47	1.04	0.97	-6.76
604.00	5.67	89.84	603.46	4,528.54	-2.55	16.65	-2.55	2.18	2.18	-1.94
699.00	6.81	89.66	697.89	4,434.11	-2.50	26.98	-2.50	1.20	1.20	-0.19
793.00	7.78	93.09	791.13	4,340.87	-2.81	38.90	-2.81	1.13	1.03	3.65
889.00	9.84	85.97	886.00	4,246.00	-2.59	53.57	-2.58	2.42	2.15	-7.42
984.00	10.50	83.42	979.50	4,152.50	-1.02	70.27	-1.01	0.84	0.69	-2.68
1,079.00	12.17	82.72	1,072.65	4,059.35	1.24	88.81	1.25	1.76	1.76	-0.74
1,174.00	13.45	88.43	1,165.29	3,966.71	2.81	109.78	2.83	1.89	1.35	6.01

## Survey Report



<b>Company:</b>	ANADARKO PETROLEUM CORP	<b>Local Co-ordinate Reference:</b>	Well RANGER 7-19HZ
<b>Project:</b>	WELD COUNTY (NAD 83)	<b>TVD Reference:</b>	KB 20' @ 5132.00usft (PD461)
<b>Site:</b>	NE NE SEC. 7 T1N R67W 6th P.M.	<b>MD Reference:</b>	KB 20' @ 5132.00usft (PD461)
<b>Well:</b>	RANGER 7-19HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	JOB # 2019-198-461	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL SURVEYS	<b>Database:</b>	Database 1

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)
1,269.00	13.75	86.41	1,257.62	3,874.38	3.82	132.10	3.84	0.59	0.32	-2.13
1,365.00	14.46	90.98	1,350.73	3,781.27	4.33	155.47	4.36	1.38	0.74	4.76
1,460.00	15.42	92.12	1,442.52	3,689.48	3.66	179.95	3.69	1.06	1.01	1.20
1,554.00	16.57	91.24	1,532.88	3,599.12	2.91	205.84	2.94	1.25	1.22	-0.94
1,650.00	16.13	88.78	1,625.00	3,507.00	2.89	232.86	2.93	0.85	-0.46	-2.56
1,744.00	15.16	91.42	1,715.51	3,416.49	2.87	258.20	2.91	1.28	-1.03	2.81
<b>TIE ON TO SURFACE SURVEYS</b>										
<b>1,843.00</b>	<b>14.59</b>	<b>93.88</b>	<b>1,811.20</b>	<b>3,320.80</b>	<b>1.70</b>	<b>283.58</b>	<b>1.75</b>	<b>0.86</b>	<b>-0.58</b>	<b>2.48</b>
1,942.00	13.96	98.99	1,907.14	3,224.86	-1.01	307.82	-0.95	1.42	-0.64	5.16
2,036.00	13.69	100.76	1,998.42	3,133.58	-4.86	329.95	-4.80	0.53	-0.29	1.88
2,130.00	14.49	97.68	2,089.59	3,042.41	-8.50	352.53	-8.44	1.17	0.85	-3.28
2,224.00	15.86	88.67	2,180.33	2,951.67	-9.78	377.03	-9.71	2.90	1.46	-9.59
2,318.00	14.82	88.31	2,270.98	2,861.02	-9.13	401.89	-9.06	1.11	-1.11	-0.38
2,413.00	14.97	91.31	2,362.79	2,769.21	-9.05	426.30	-8.97	0.83	0.16	3.16
2,508.00	13.94	90.01	2,454.78	2,677.22	-9.33	450.01	-9.25	1.14	-1.08	-1.37
2,603.00	14.43	94.19	2,546.88	2,585.12	-10.20	473.26	-10.11	1.19	0.52	4.40
<b>~ ENTER TGT BOX (2663' MD)</b>										
<b>2,663.00</b>	<b>15.57</b>	<b>94.23</b>	<b>2,604.84</b>	<b>2,527.16</b>	<b>-11.34</b>	<b>488.75</b>	<b>-11.25</b>	<b>1.91</b>	<b>1.91</b>	<b>0.07</b>
2,698.00	16.24	94.25	2,638.50	2,493.50	-12.05	498.31	-11.96	1.91	1.91	0.06
2,792.00	14.56	93.47	2,729.12	2,402.88	-13.74	523.22	-13.64	1.80	-1.79	-0.83
2,886.00	14.89	88.43	2,820.03	2,311.97	-14.12	547.08	-14.02	1.41	0.35	-5.36
2,980.00	13.02	87.48	2,911.26	2,220.74	-13.32	569.74	-13.22	2.00	-1.99	-1.01
3,075.00	13.97	88.75	3,003.63	2,128.37	-12.60	591.89	-12.50	1.05	1.00	1.34
3,169.00	14.50	89.38	3,094.75	2,037.25	-12.23	615.00	-12.12	0.59	0.56	0.67
3,262.00	15.20	85.63	3,184.64	1,947.36	-11.17	638.80	-11.06	1.28	0.75	-4.03
3,356.00	12.94	85.74	3,275.82	1,856.18	-9.45	661.59	-9.34	2.40	-2.40	0.12
3,451.00	14.78	89.08	3,368.05	1,763.95	-8.47	684.32	-8.35	2.11	1.94	3.52
3,544.00	15.96	90.68	3,457.72	1,674.28	-8.43	708.96	-8.30	1.35	1.27	1.72
3,638.00	14.03	87.64	3,548.52	1,583.48	-8.11	733.27	-7.98	2.22	-2.05	-3.23
3,732.00	14.95	89.61	3,639.53	1,492.47	-7.56	756.78	-7.43	1.11	0.98	2.10
3,825.00	16.43	90.47	3,729.06	1,402.94	-7.59	781.93	-7.45	1.61	1.59	0.92
3,919.00	14.67	90.54	3,819.61	1,312.39	-7.81	807.13	-7.67	1.87	-1.87	0.07
4,013.00	12.54	89.08	3,910.97	1,221.03	-7.76	829.24	-7.61	2.30	-2.27	-1.55
4,107.00	12.97	93.32	4,002.65	1,129.35	-8.20	849.97	-8.06	1.10	0.46	4.51
4,202.00	10.68	92.57	4,095.63	1,036.37	-9.22	869.41	-9.06	2.42	-2.41	-0.79
4,297.00	10.41	101.90	4,189.03	942.97	-11.38	886.60	-11.23	1.82	-0.28	9.82
4,391.00	8.82	102.37	4,281.71	850.29	-14.68	901.95	-14.52	1.69	-1.69	0.50
4,484.00	7.73	101.36	4,373.74	758.26	-17.44	915.05	-17.28	1.18	-1.17	-1.09
4,579.00	6.13	117.20	4,468.05	663.95	-21.01	925.83	-20.85	2.61	-1.68	16.67
4,672.00	3.48	117.00	4,560.72	571.28	-24.56	932.76	-24.40	2.85	-2.85	-0.22
4,766.00	1.02	138.37	4,654.64	477.36	-26.49	935.86	-26.32	2.72	-2.62	22.73
4,954.00	0.12	223.28	4,842.63	289.37	-27.88	936.84	-27.72	0.54	-0.48	45.16
5,047.00	0.10	280.47	4,935.63	196.37	-27.94	936.69	-27.77	0.11	-0.02	61.49
5,233.00	0.44	192.64	5,121.63	10.37	-28.60	936.37	-28.44	0.24	0.18	-47.22
5,421.00	0.68	198.41	5,309.62	-177.62	-30.37	935.86	-30.20	0.13	0.13	3.07
5,516.00	0.74	191.84	5,404.61	-272.61	-31.50	935.56	-31.34	0.11	0.06	-6.92
5,703.00	0.91	194.09	5,591.59	-459.59	-34.12	934.95	-33.96	0.09	0.09	1.20
5,917.00	0.57	224.24	5,805.57	-673.57	-36.53	933.79	-36.37	0.24	-0.16	14.09
6,010.00	0.47	239.02	5,898.57	-766.57	-37.06	933.14	-36.90	0.18	-0.11	15.89
6,103.00	0.44	242.00	5,991.57	-859.57	-37.43	932.50	-37.26	0.04	-0.03	3.20
6,197.00	0.36	264.20	6,085.56	-953.56	-37.63	931.89	-37.46	0.18	-0.09	23.62
6,291.00	0.76	293.53	6,179.56	-1,047.56	-37.41	931.02	-37.24	0.51	0.43	31.20
6,385.00	0.74	291.64	6,273.55	-1,141.55	-36.93	929.89	-36.77	0.03	-0.02	-2.01



## Survey Report



<b>Company:</b>	ANADARKO PETROLEUM CORP	<b>Local Co-ordinate Reference:</b>	Well RANGER 7-19HZ
<b>Project:</b>	WELD COUNTY (NAD 83)	<b>TVD Reference:</b>	KB 20' @ 5132.00usft (PD461)
<b>Site:</b>	NE NE SEC. 7 T1N R67W 6th P.M.	<b>MD Reference:</b>	KB 20' @ 5132.00usft (PD461)
<b>Well:</b>	RANGER 7-19HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	JOB # 2019-198-461	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL SURVEYS	<b>Database:</b>	Database 1

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)
6,479.00	0.03	45.78	6,367.55	-1,235.55	-36.69	929.34	-36.53	0.80	-0.76	121.43
6,571.00	0.55	149.00	6,459.55	-1,327.55	-37.05	929.59	-36.89	0.61	0.57	112.20
6,665.00	0.47	151.25	6,553.54	-1,421.54	-37.78	930.00	-37.62	0.09	-0.09	2.39
6,852.00	0.43	143.94	6,740.54	-1,608.54	-39.02	930.79	-38.86	0.04	-0.02	-3.91
6,946.00	0.43	156.95	6,834.53	-1,702.53	-39.63	931.13	-39.47	0.10	0.00	13.84
<b>KOP</b>										
7,027.00	0.88	304.03	6,915.53	-1,783.53	-39.56	930.73	-39.40	1.56	0.56	181.58
7,038.00	1.05	305.76	6,926.53	-1,794.53	-39.45	930.58	-39.29	1.56	1.54	15.75
7,132.00	10.92	347.23	7,019.92	-1,887.92	-30.24	927.91	-30.08	10.81	10.50	44.12
7,225.00	21.25	355.61	7,109.17	-1,977.17	-4.78	924.66	-4.61	11.36	11.11	9.01
7,319.00	27.19	354.04	7,194.85	-2,062.85	33.60	921.13	33.76	6.36	6.32	-1.67
7,412.00	33.99	357.55	7,274.87	-2,142.87	80.77	917.80	80.93	7.56	7.31	3.77
7,505.00	38.73	358.25	7,349.74	-2,217.74	135.85	915.80	136.01	5.12	5.10	0.75
7,600.00	43.20	359.16	7,421.46	-2,289.46	198.10	914.42	198.26	4.75	4.71	0.96
7,693.00	49.84	1.73	7,485.42	-2,353.42	265.53	915.02	265.69	7.41	7.14	2.76
7,787.00	55.93	0.31	7,542.12	-2,410.12	340.44	916.32	340.60	6.59	6.48	-1.51
<b>~ ENTER RADIUS HEEL (7809' MD)</b>										
7,809.00	57.27	0.08	7,554.23	-2,422.23	358.80	916.38	358.96	6.15	6.08	-1.06
7,879.00	61.53	359.38	7,589.86	-2,457.86	419.04	916.09	419.20	6.15	6.09	-1.00
7,972.00	65.48	357.78	7,631.34	-2,499.34	502.23	914.01	502.39	4.52	4.25	-1.72
8,066.00	72.25	359.96	7,665.22	-2,533.22	589.83	912.32	589.99	7.52	7.20	2.32
8,159.00	74.78	1.25	7,691.61	-2,559.61	678.99	913.27	679.15	3.03	2.72	1.39
8,252.00	82.01	1.48	7,710.30	-2,578.30	770.01	915.44	770.17	7.78	7.77	0.25
<b>HEEL:40.073159; -104.933427</b>										
8,346.00	90.85	2.65	7,716.15	-2,584.15	863.67	918.82	863.83	9.49	9.40	1.24
8,439.00	92.01	2.42	7,713.83	-2,581.83	956.55	922.93	956.71	1.27	1.25	-0.25
8,532.00	91.20	1.84	7,711.22	-2,579.22	1,049.44	926.39	1,049.61	1.07	-0.87	-0.62
8,626.00	91.94	2.40	7,708.65	-2,576.65	1,143.34	929.86	1,143.51	0.99	0.79	0.60
8,721.00	89.99	1.23	7,707.05	-2,575.05	1,238.28	932.87	1,238.44	2.39	-2.05	-1.23
<b>~ EXIT RADIUS HEEL (8760' MD)</b>										
8,760.00	90.20	1.27	7,706.98	-2,574.98	1,277.27	933.72	1,277.43	0.55	0.54	0.10
8,813.00	90.49	1.32	7,706.66	-2,574.66	1,330.25	934.92	1,330.42	0.55	0.54	0.10
8,905.00	88.47	1.37	7,707.50	-2,575.50	1,422.22	937.08	1,422.38	2.20	-2.20	0.05
8,998.00	88.79	0.65	7,709.72	-2,577.72	1,515.18	938.71	1,515.34	0.85	0.34	-0.77
9,093.00	89.35	0.94	7,711.26	-2,579.26	1,610.15	940.03	1,610.32	0.66	0.59	0.31
9,187.00	89.84	1.25	7,711.93	-2,579.93	1,704.13	941.83	1,704.30	0.62	0.52	0.33
9,281.00	90.37	1.79	7,711.76	-2,579.76	1,798.10	944.32	1,798.27	0.80	0.56	0.57
9,376.00	90.90	359.96	7,710.70	-2,578.70	1,893.08	945.77	1,893.24	2.01	0.56	-1.93
9,469.00	88.97	359.50	7,710.81	-2,578.81	1,986.07	945.33	1,986.24	2.13	-2.08	-0.49
9,562.00	89.25	359.97	7,712.25	-2,580.25	2,079.06	944.90	2,079.23	0.59	0.30	0.51
9,657.00	88.99	359.46	7,713.71	-2,581.71	2,174.05	944.43	2,174.21	0.60	-0.27	-0.54
9,750.00	88.81	359.40	7,715.50	-2,583.50	2,267.03	943.51	2,267.19	0.20	-0.19	-0.06
9,843.00	91.98	359.12	7,714.86	-2,582.86	2,360.00	942.31	2,360.17	3.42	3.41	-0.30
9,937.00	91.18	358.94	7,712.26	-2,580.26	2,453.95	940.72	2,454.12	0.87	-0.85	-0.19
10,031.00	91.43	359.93	7,710.12	-2,578.12	2,547.92	939.79	2,548.09	1.09	0.27	1.05
10,124.00	90.41	359.52	7,708.63	-2,576.63	2,640.91	939.34	2,641.07	1.18	-1.10	-0.44
10,217.00	90.54	359.33	7,707.86	-2,575.86	2,733.90	938.41	2,734.07	0.25	0.14	-0.20
10,310.00	91.01	358.88	7,706.60	-2,574.60	2,826.88	936.96	2,827.04	0.70	0.51	-0.48
10,405.00	89.48	358.31	7,706.20	-2,574.20	2,921.85	934.63	2,922.01	1.72	-1.61	-0.60
10,593.00	88.92	358.71	7,708.82	-2,576.82	3,109.77	929.74	3,109.93	0.37	-0.30	0.21
10,687.00	87.93	358.57	7,711.40	-2,579.40	3,203.70	927.51	3,203.86	1.06	-1.05	-0.15
10,780.00	88.80	358.27	7,714.06	-2,582.06	3,296.63	924.95	3,296.79	0.99	0.94	-0.32
10,967.00	90.03	357.93	7,715.97	-2,583.97	3,483.51	918.75	3,483.67	0.68	0.66	-0.18

## Survey Report



<b>Company:</b>	ANADARKO PETROLEUM CORP	<b>Local Co-ordinate Reference:</b>	Well RANGER 7-19HZ
<b>Project:</b>	WELD COUNTY (NAD 83)	<b>TVD Reference:</b>	KB 20' @ 5132.00usft (PD461)
<b>Site:</b>	NE NE SEC. 7 T1N R67W 6th P.M.	<b>MD Reference:</b>	KB 20' @ 5132.00usft (PD461)
<b>Well:</b>	RANGER 7-19HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	JOB # 2019-198-461	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL SURVEYS	<b>Database:</b>	Database 1

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)
11,062.00	91.95	0.71	7,714.32	-2,582.32	3,578.48	917.62	3,578.64	3.56	2.02	2.93
11,155.00	92.23	359.81	7,710.93	-2,578.93	3,671.41	918.04	3,671.57	1.01	0.30	-0.97
11,248.00	93.31	1.22	7,706.44	-2,574.44	3,764.30	918.87	3,764.46	1.91	1.16	1.52
11,342.00	91.66	2.89	7,702.36	-2,570.36	3,858.14	922.24	3,858.30	2.50	-1.76	1.78
11,436.00	89.81	1.17	7,701.16	-2,569.16	3,952.07	925.57	3,952.23	2.69	-1.97	-1.83
11,531.00	91.00	1.45	7,700.49	-2,568.49	4,047.04	927.74	4,047.20	1.29	1.25	0.29
11,624.00	90.17	359.95	7,699.54	-2,567.54	4,140.02	928.88	4,140.19	1.84	-0.89	-1.61
11,719.00	90.53	1.58	7,698.96	-2,566.96	4,235.01	930.15	4,235.17	1.76	0.38	1.72
11,813.00	90.26	1.03	7,698.31	-2,566.31	4,328.98	932.29	4,329.15	0.65	-0.29	-0.59
12,001.00	91.66	0.56	7,695.16	-2,563.16	4,516.93	934.90	4,517.10	0.79	0.74	-0.25
12,096.00	90.21	1.71	7,693.61	-2,561.61	4,611.90	936.78	4,612.06	1.95	-1.53	1.21
12,190.00	89.52	1.63	7,693.83	-2,561.83	4,705.86	939.52	4,706.02	0.74	-0.73	-0.09
12,284.00	89.60	0.40	7,694.55	-2,562.55	4,799.84	941.18	4,800.00	1.31	0.09	-1.31
12,378.00	90.28	1.75	7,694.65	-2,562.65	4,893.82	942.95	4,893.98	1.61	0.72	1.44
12,471.00	89.08	358.64	7,695.17	-2,563.17	4,986.80	943.26	4,986.97	3.58	-1.29	-3.34
12,564.00	89.49	358.63	7,696.33	-2,564.33	5,079.77	941.05	5,079.93	0.44	0.44	-0.01
12,658.00	89.94	358.79	7,696.80	-2,564.80	5,173.74	938.93	5,173.91	0.51	0.48	0.17
12,752.00	90.72	359.53	7,696.26	-2,564.26	5,267.73	937.55	5,267.89	1.14	0.83	0.79
12,846.00	89.08	357.80	7,696.42	-2,564.42	5,361.70	935.36	5,361.86	2.54	-1.74	-1.84
12,940.00	91.02	0.18	7,696.34	-2,564.34	5,455.67	933.71	5,455.84	3.27	2.06	2.53
13,034.00	88.94	0.01	7,696.37	-2,564.37	5,549.67	933.86	5,549.83	2.22	-2.21	-0.18
13,127.00	89.04	359.58	7,698.01	-2,566.01	5,642.65	933.53	5,642.81	0.47	0.11	-0.46
13,315.00	90.82	359.00	7,698.24	-2,566.24	5,830.63	931.20	5,830.79	1.00	0.95	-0.31
13,409.00	90.32	359.01	7,697.30	-2,565.30	5,924.61	929.57	5,924.77	0.53	-0.53	0.01
13,503.00	90.19	0.24	7,696.89	-2,564.89	6,018.61	928.95	6,018.77	1.32	-0.14	1.31
13,598.00	91.26	359.86	7,695.68	-2,563.68	6,113.60	929.04	6,113.76	1.20	1.13	-0.40
13,691.00	90.46	1.76	7,694.29	-2,562.29	6,206.57	930.35	6,206.73	2.22	-0.86	2.04
13,784.00	89.73	2.40	7,694.13	-2,562.13	6,299.51	933.73	6,299.67	1.04	-0.78	0.69
13,971.00	89.99	0.64	7,694.59	-2,562.59	6,486.43	938.69	6,486.60	0.95	0.14	-0.94
14,064.00	89.48	359.74	7,695.02	-2,563.02	6,579.43	938.99	6,579.60	1.11	-0.55	-0.97
14,158.00	88.98	358.70	7,696.28	-2,564.28	6,673.41	937.72	6,673.58	1.23	-0.53	-1.11
14,343.00	88.51	359.28	7,700.34	-2,568.34	6,858.34	934.45	6,858.50	0.40	-0.25	0.31
14,436.00	88.56	358.28	7,702.71	-2,570.71	6,951.29	932.48	6,951.45	1.08	0.05	-1.08
14,625.00	91.22	357.03	7,703.08	-2,571.08	7,140.11	924.74	7,140.27	1.56	1.41	-0.66
14,717.00	90.96	359.40	7,701.33	-2,569.33	7,232.04	921.88	7,232.20	2.59	-0.28	2.58
14,811.00	90.04	359.14	7,700.51	-2,568.51	7,326.03	920.68	7,326.19	1.02	-0.98	-0.28
14,906.00	89.72	358.90	7,700.70	-2,568.70	7,421.01	919.06	7,421.17	0.42	-0.34	-0.25
14,999.00	89.76	358.05	7,701.13	-2,569.13	7,513.98	916.58	7,514.14	0.91	0.04	-0.91
15,092.00	91.82	0.91	7,699.84	-2,567.84	7,606.95	915.74	7,607.11	3.79	2.22	3.08
15,186.00	90.49	1.52	7,697.95	-2,565.95	7,700.91	917.73	7,701.07	1.56	-1.41	0.65
15,280.00	90.33	1.54	7,697.28	-2,565.28	7,794.87	920.24	7,795.03	0.17	-0.17	0.02
15,374.00	90.89	1.04	7,696.28	-2,564.28	7,888.84	922.35	7,889.00	0.80	0.60	-0.53
15,562.00	87.79	1.68	7,698.44	-2,566.44	8,076.75	926.82	8,076.91	1.68	-1.65	0.34
15,656.00	88.46	1.78	7,701.52	-2,569.52	8,170.66	929.65	8,170.82	0.72	0.71	0.11
15,749.00	87.91	0.46	7,704.46	-2,572.46	8,263.59	931.47	8,263.75	1.54	-0.59	-1.42
15,842.00	90.44	1.83	7,705.80	-2,573.80	8,356.55	933.33	8,356.72	3.09	2.72	1.47
15,938.00	90.96	0.50	7,704.63	-2,572.63	8,452.52	935.28	8,452.69	1.49	0.54	-1.39
16,032.00	91.97	0.15	7,702.23	-2,570.23	8,546.49	935.81	8,546.65	1.14	1.07	-0.37
16,126.00	89.97	2.35	7,700.63	-2,568.63	8,640.44	937.86	8,640.61	3.16	-2.13	2.34
16,219.00	89.31	0.54	7,701.22	-2,569.22	8,733.41	940.21	8,733.57	2.07	-0.71	-1.95
16,313.00	89.02	0.66	7,702.59	-2,570.59	8,827.39	941.19	8,827.56	0.33	-0.31	0.13
16,407.00	89.09	0.62	7,704.14	-2,572.14	8,921.37	942.24	8,921.54	0.09	0.07	-0.04
16,501.00	89.82	359.65	7,705.03	-2,573.03	9,015.37	942.46	9,015.53	1.29	0.78	-1.03

## Survey Report



<b>Company:</b>	ANADARKO PETROLEUM CORP	<b>Local Co-ordinate Reference:</b>	Well RANGER 7-19HZ
<b>Project:</b>	WELD COUNTY (NAD 83)	<b>TVD Reference:</b>	KB 20' @ 5132.00usft (PD461)
<b>Site:</b>	NE NE SEC. 7 T1N R67W 6th P.M.	<b>MD Reference:</b>	KB 20' @ 5132.00usft (PD461)
<b>Well:</b>	RANGER 7-19HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	JOB # 2019-198-461	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL SURVEYS	<b>Database:</b>	Database 1

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)
16,595.00	88.91	359.39	7,706.07	-2,574.07	9,109.36	941.68	9,109.52	1.01	-0.97	-0.28
16,689.00	90.33	359.31	7,706.70	-2,574.70	9,203.35	940.61	9,203.51	1.51	1.51	-0.09
16,784.00	89.95	359.36	7,706.47	-2,574.47	9,298.34	939.51	9,298.50	0.40	-0.40	0.05
16,877.00	89.96	358.37	7,706.54	-2,574.54	9,391.32	937.67	9,391.48	1.06	0.01	-1.06
16,972.00	90.54	357.61	7,706.12	-2,574.12	9,486.26	934.33	9,486.42	1.01	0.61	-0.80
17,065.00	92.03	1.08	7,704.04	-2,572.04	9,579.21	933.27	9,579.38	4.06	1.60	3.73
17,158.00	92.44	1.09	7,700.41	-2,568.41	9,672.13	935.03	9,672.29	0.44	0.44	0.01
17,251.00	89.50	0.76	7,698.84	-2,566.84	9,765.09	936.53	9,765.25	3.18	-3.16	-0.35
17,344.00	90.34	1.71	7,698.97	-2,566.97	9,858.07	938.53	9,858.23	1.36	0.90	1.02
17,438.00	89.49	0.47	7,699.11	-2,567.11	9,952.05	940.32	9,952.21	1.60	-0.90	-1.32
17,531.00	89.79	359.88	7,699.69	-2,567.69	10,045.05	940.61	10,045.21	0.71	0.32	-0.63
17,719.00	89.66	359.80	7,700.59	-2,568.59	10,233.04	940.08	10,233.21	0.08	-0.07	-0.04
17,813.00	90.66	359.64	7,700.33	-2,568.33	10,327.04	939.62	10,327.20	1.08	1.06	-0.17
17,907.00	91.28	359.53	7,698.74	-2,566.74	10,421.02	938.94	10,421.19	0.67	0.66	-0.12
18,002.00	89.82	0.53	7,697.83	-2,565.83	10,516.01	938.99	10,516.18	1.86	-1.54	1.05
18,097.00	89.72	359.18	7,698.21	-2,566.21	10,611.01	938.75	10,611.18	1.42	-0.11	-1.42
18,190.00	91.19	359.05	7,697.47	-2,565.47	10,703.99	937.31	10,704.16	1.59	1.58	-0.14
18,284.00	91.06	359.78	7,695.62	-2,563.62	10,797.97	936.36	10,798.13	0.79	-0.14	0.78
18,379.00	91.68	0.04	7,693.35	-2,561.35	10,892.94	936.21	10,893.11	0.71	0.65	0.27
~ ENTER RADIUS TOE (18472' MD)										
18,472.00	90.06	0.79	7,691.94	-2,559.94	10,985.93	936.88	10,986.09	1.92	-1.74	0.81
18,564.00	89.32	1.51	7,692.44	-2,560.44	11,077.91	938.73	11,078.07	1.12	-0.80	0.78
18,657.00	89.31	1.28	7,693.55	-2,561.55	11,170.87	940.99	11,171.04	0.25	-0.01	-0.25
18,751.00	89.87	0.25	7,694.22	-2,562.22	11,264.86	942.24	11,265.02	1.25	0.60	-1.10
LAST SURVEY JUNE 7, 2019										
18,813.00	90.22	0.89	7,694.17	-2,562.17	11,326.86	942.86	11,327.02	1.18	0.56	1.03
PROJECTION TO TD: 40.102043; -104.933337										
18,872.00	90.22	0.89	7,693.95	-2,561.95	11,385.85	943.78	11,386.01	0.00	0.00	0.00

# Survey Report



<b>Company:</b>	ANADARKO PETROLEUM CORP	<b>Local Co-ordinate Reference:</b>	Well RANGER 7-19HZ
<b>Project:</b>	WELD COUNTY (NAD 83)	<b>TVD Reference:</b>	KB 20' @ 5132.00usft (PD461)
<b>Site:</b>	NE NE SEC. 7 T1N R67W 6th P.M.	<b>MD Reference:</b>	KB 20' @ 5132.00usft (PD461)
<b>Well:</b>	RANGER 7-19HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	JOB # 2019-198-461	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	FINAL SURVEYS	<b>Database:</b>	Database 1

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 - RANGER 7-19HZ - survey misses target center by 50.03usft at 18872.00usft MD (7693.95 TVD, 11385.85 N, 943.78 E) - Point	0.00	0.00	7,646.00	11,390.64	930.32	14,563,903.57	1,659,044.63	40.102056	-104.933384
KOP - RANGER 7-19HZ - survey misses target center by 35.17usft at 7081.86usft MD (6970.31 TVD, -37.19 N, 929.65 E) - Point	0.00	0.00	6,966.81	-2.25	927.81	14,552,515.23	1,659,050.22	40.070782	-104.933395
HEEL - RANGER 7-19H - survey misses target center by 22.23usft at 8194.32usft MD (7700.06 TVD, 713.27 N, 914.04 E) - Point	0.00	0.00	7,683.00	716.45	927.94	14,553,233.64	1,659,049.84	40.072755	-104.933394
BHL - RANGER 7-19HZ - survey misses target center by 49.07usft at 18872.00usft MD (7693.95 TVD, 11385.85 N, 943.78 E) - Point	0.00	0.00	7,647.00	11,390.64	930.32	14,563,903.57	1,659,044.63	40.102056	-104.933384
HEEL - RANGER 7-19H - survey misses target center by 13.94usft at 8197.54usft MD (7700.75 TVD, 716.42 N, 914.11 E) - Point	0.00	0.00	7,699.00	716.45	927.94	14,553,233.64	1,659,049.84	40.072755	-104.933394
KOP - RANGER 7-19HZ - survey misses target center by 32.45usft at 7097.69usft MD (6986.04 TVD, -35.50 N, 929.18 E) - Point	0.00	0.00	6,982.80	-3.24	927.78	14,552,514.24	1,659,050.19	40.070779	-104.933395

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,843.00	1,811.20	1.70	283.58	TIE ON TO SURFACE SURVEYS
2,663.00	2,604.84	-11.34	488.75	~ ENTER TGT BOX (2663' MD)
7,027.00	6,915.53	-39.56	930.73	KOP
7,809.00	7,554.23	358.80	916.38	~ ENTER RADIUS HEEL (7809' MD)
8,346.00	7,716.15	863.67	918.82	HEEL:40.073159; -104.933427
8,760.00	7,706.98	1,277.27	933.72	~ EXIT RADIUS HEEL (8760' MD)
18,472.00	7,691.94	10,985.93	936.88	~ ENTER RADIUS TOE (18472' MD)
18,813.00	7,694.17	11,326.86	942.86	LAST SURVEY JUNE 7, 2019
18,872.00	7,693.95	11,385.85	943.78	PROJECTION TO TD: 40.102043; -104.933337

Checked By: _____	Approved By: _____	Date: _____
-------------------	--------------------	-------------