



Realtime Log

Natural Formation Evaluation
Gamma Ray

Scale:

1:240

True Vertical Depth

Company: Kerr-McGee Oil & Gas Onshore LP

Well: Howard 26N-28HZ

Field: Weld County (Kerr-McGee)

Region: RMD Country: United States

Status:

Final Print

Surface Location:

Latitude: 40° 1' 43.100" N
Longitude: 104° 53' 24.112" W

Other Services:

Directional
VSS

API Number:

051233693400

Section:

28

TWN: 1N

Range: 67W

Permanent Datum (P.D.):

Ground Level

Elevation:

4999.00 ft.

Elevations:

N/A

Log Measured From:

Drill Floor

13.00 ft.

Above P.D.

KB:

DF:

GL:

4999.00 ft.
4986.00 ft.

Depth Reference:

Driller's Depth

Interval Logged

Dates

Magnetic Field Reference

Top: 6882 ft. Date From: 01/Oct/13 Date To: 01/Oct/13 Dip Angle: 66.36 ° Az Reference North: True

Bottom: 7952 ft. Date To: 01/Oct/13 Total Mag to Reference

Spud Date: 27/Sep/13 Field Strength: 52797.0 nT North Correction: 8.45 °

Borehole Record

Casing Record

Hole Size From To Size Weight From To

13.500 in. Surface 1003 ft. 9.625 in. 36.00 lb/ft Surface 1023 ft.

8.750 in. 1003 ft. 7.000 in. 26.00 lb/ft Surface 7909 ft.

Mud Record

Deviation Record

Type From To Hole Size Interval Inc / Az (Start) Inc / Az (End)

Water Based - Fresh 2500 ft. 8006 ft. 13.500 in. 1023 ft. 0.9 ° / 245.4 ° 0.4 ° / 282.4 °

8.750 in. 8,750 in. 6983 ft. 0.5 ° / 298.2 ° 84.7 ° / 179.8 °

Acquisition System Software Version

Other

Advantage 2.20U4 Rig / Contractor: Xtreme 20 / Ensign Drilling

PATS 6.4.1.34 Job No: 5769725 / District: / Unit: RMD / D&E

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Log Run Summary

LWD Run No.	BHA Run No.	Bit Run No.	Bit Size (in.)	Bit Type	Bit Gauge Length (in.)	Assembly Type	Logged Interval		Bit Depth Interval		Date / Time		Circ. Time (hrs.)
							Top (ft.)	Bottom (ft.)	From (ft.)	To (ft.)	Start	End	
1	2	2	8.750	PDC	2.500	Steerable	6882	7952	1003	8006	01/Oct/2013 02:31	01/Oct/2013 16:33	49.6

Crew

Name	Arrive	Depart	Name	Arrive	Depart	Name	Arrive	Depart
	Wellsite	Wellsite		Wellsite	Wellsite		Wellsite	Wellsite
David Campbell	Sept 26 2013	Oct 6 2013	Greg Dore	Sept 26 2013	Oct 6 2013	Travis Wilcox	Sept 26 2013	Oct 6 2013
Adam Merha	Sept 26 2013	Oct 1 2013	Barry Combs	Oct 1 2013	Oct 6 2013			

Mud Properties Record

Date / Time		LWD Run No.	Measured Depth (ft.)	Mud Type	Density (sg)	Viscosity (cp)	pH	Fluid Loss (cc)	Oil / Water	Source	Total Chlorides (ppm)	K+ (%)
30/Sep/2013	16:26	1	2500	Water Based - Fresh	8.7	27	7.5	0.0	0 / 98	Active Mud Pit	1000	0.0
30/Sep/2013	16:26	1	5400	Water Based - Fresh	8.4	29	7.1	0.0	0 / 99	Active Mud Pit	900	0.0
01/Oct/2013	06:41	1	7260	Water Based - Fresh	8.7	27	7.5	0.0	0 / 98	Active Mud Pit	1000	0.0

Mnemonics

Curve	Description	Units
GRAX	Gamma Ray Apparent, 3.0 ft. Avg.	API
ROPA	Rate of Penetration, 3.0 ft. Avg.	ft/hr
TCDX	Downhole Temperature	degF
WOBA	Surface Weight on Bit, 1.0 ft. Avg.	klbf

Equipment and Service Data

LWD Run No.	Tool	Serial Number	Measurement	Bit Offset (m.)	Max O.D. (in.)	Min I.D. (in.)
1	DIR	12546334	Directional	56.42	6.750	0.000
1	SRIG	10658452	Gamma	53.04	6.750	0.000

Service and Tool Mnemonics

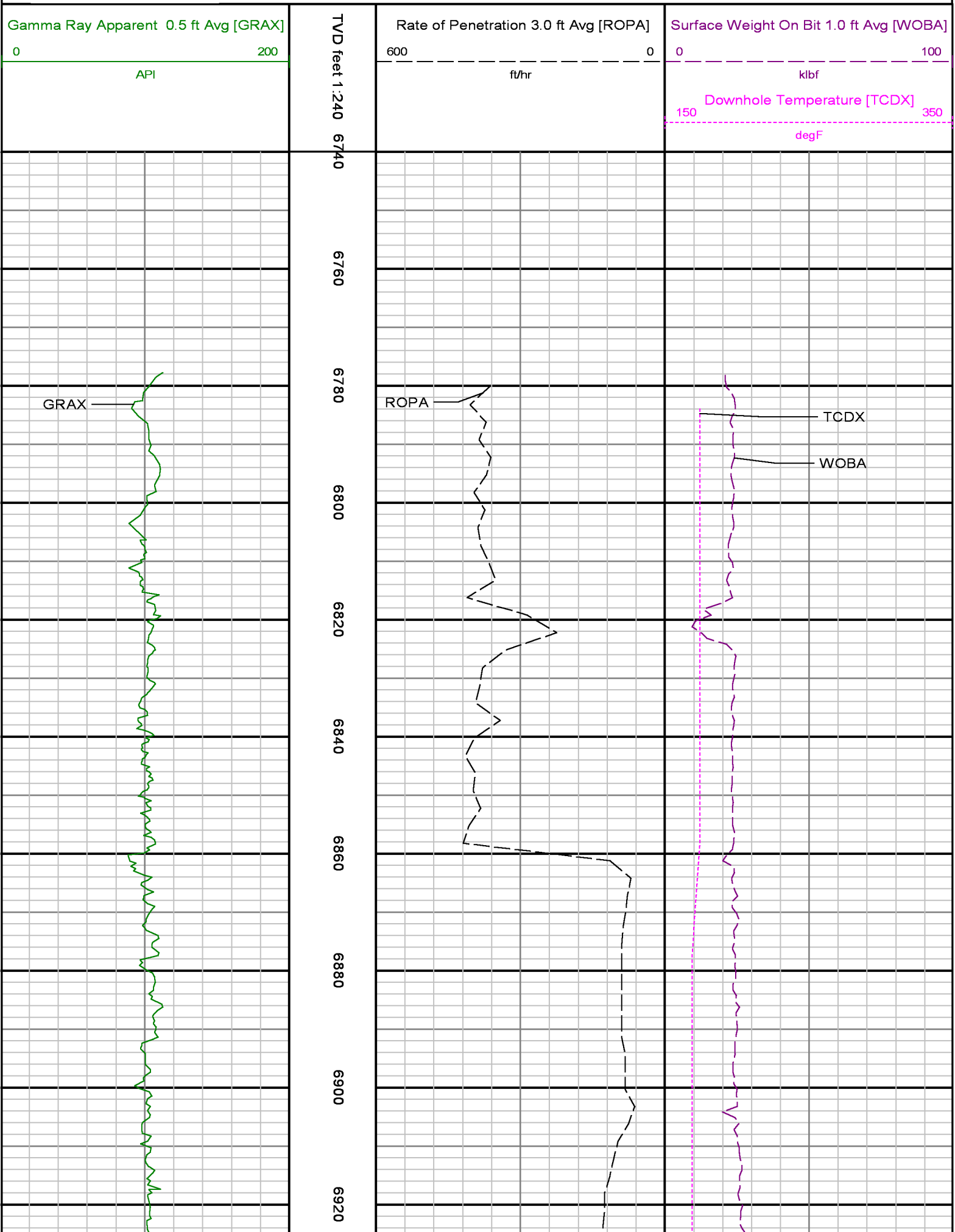
Mnemonic	Name	Description
DIR	Directional	Wellbore directional survey
SRIG	Inclination and Gamma	Probe based gamma ray and inclination module

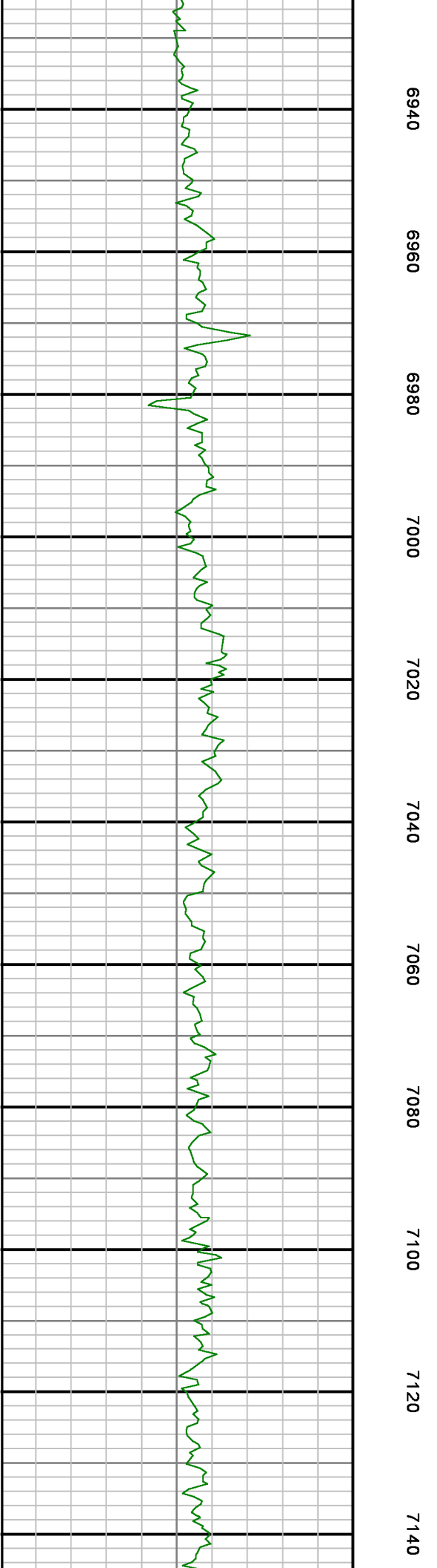
Comments

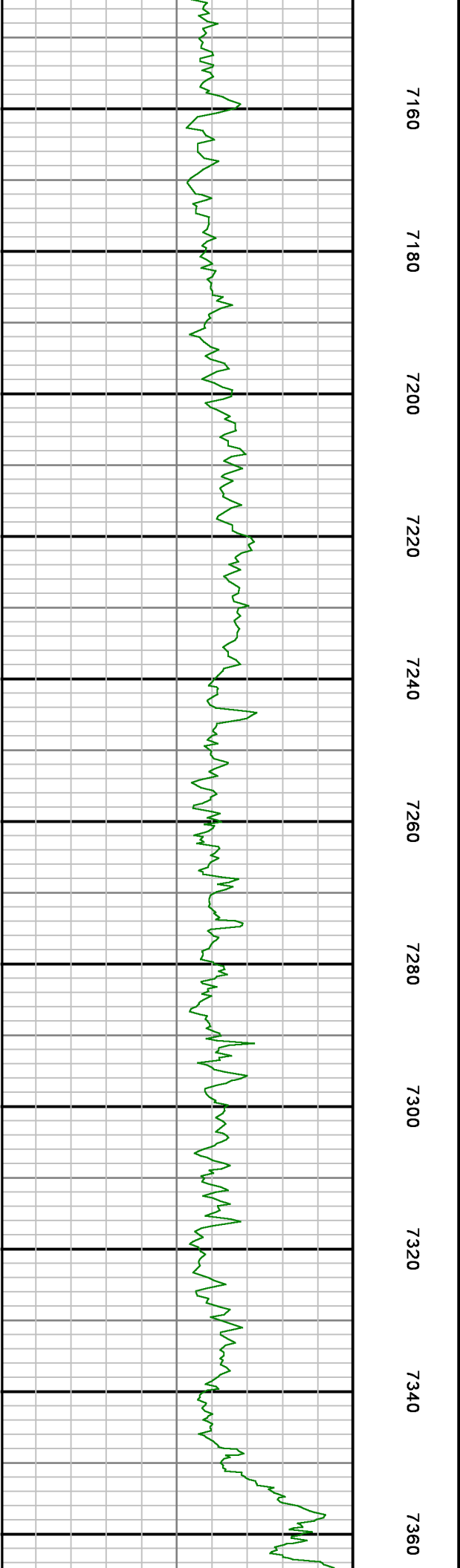
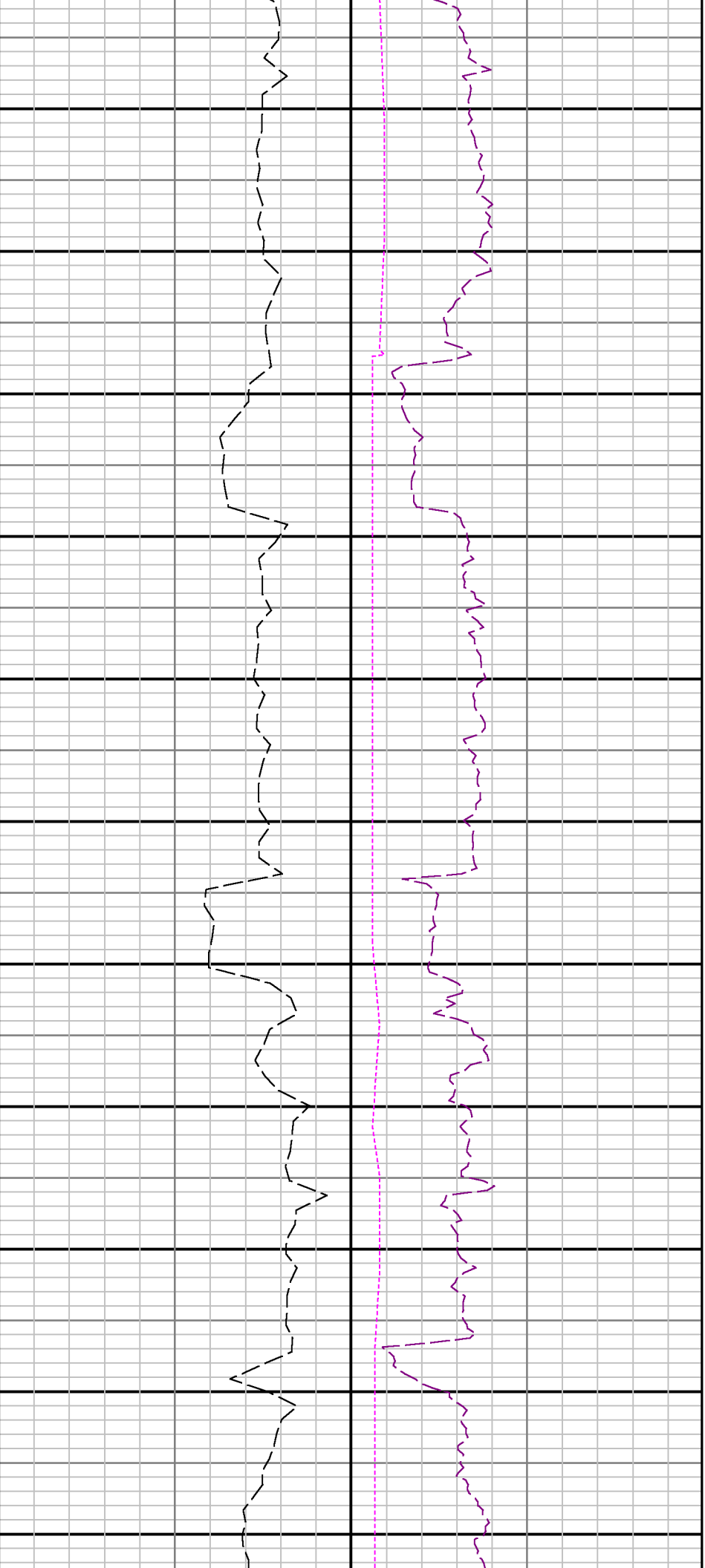
<p>1.) Depth measurements obtained from a depth control system not supplied or operated by Baker Hughes. Due to the lack of control by Baker Hughes logging engineers, depth calibrations and measurements could not be independently verified.</p> <p>2.) Baker Hughes run 1 utilized 6 3/4 inch NaviGamma services (Gamma Ray and Directional) behind an 8 3/4 inch bit and steerable assembly from 1003 to 8006 feet MD (1003 to 7476 feet TVD).</p> <p>3.) The interval from 1003 to 6938 feet MD (1003 to 6938 feet TVD) was not logged due to directional only services being provided through the straight-hole and nudge section for Baker Hughes run 1.</p>
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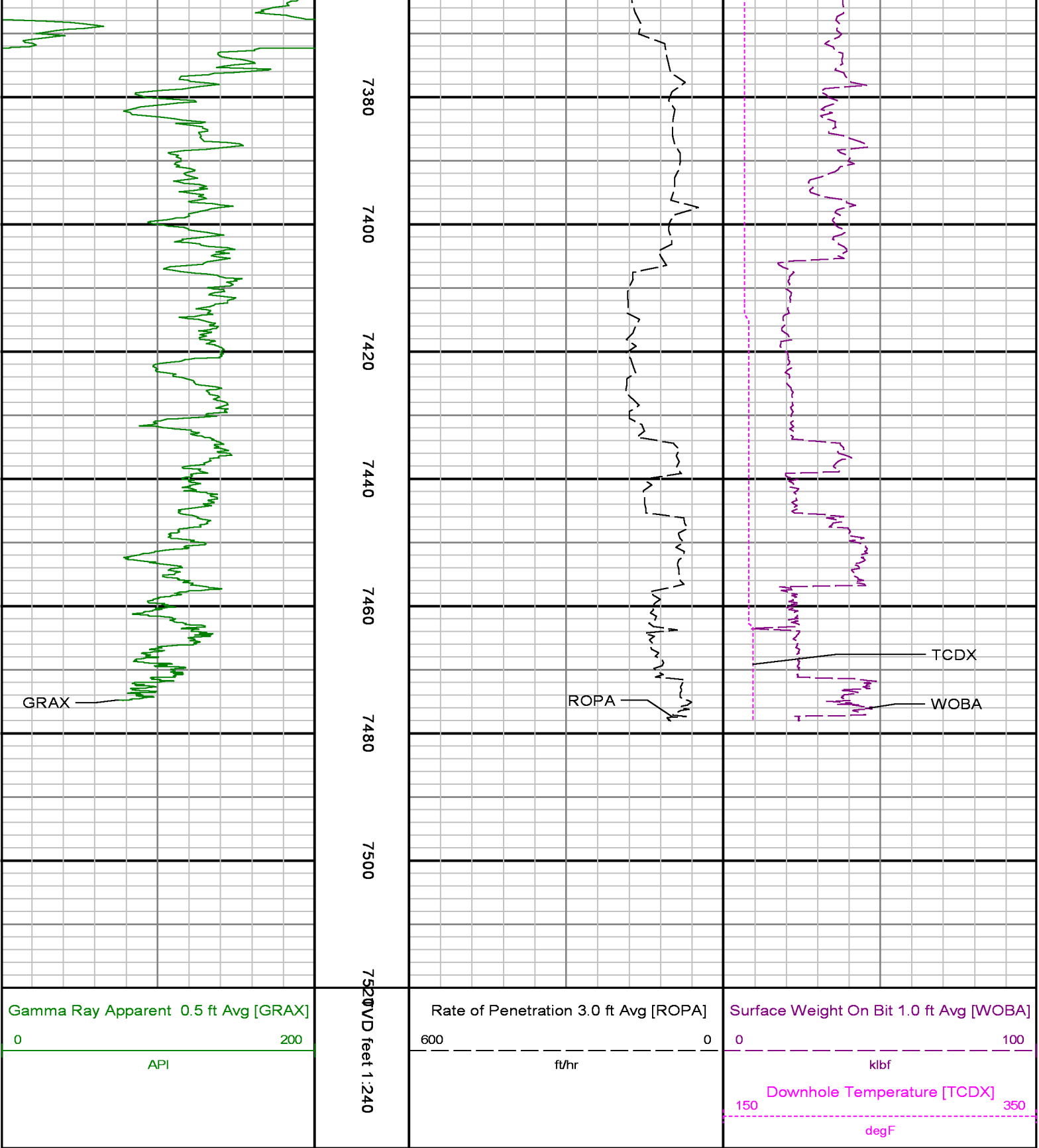
Remarks

Number	Measured Depth (m.)	Hole Section (in.)	LWD Run No.	Remark
1	6938	8.750	1	Begin logging due to directional only service provided thru vertical section.









ADVANTAGE Field Survey Listing

Operator : Kerr-McGee Oil & Gas Onshore LP	Field : Weld County (Kerr-McGee_	API No : 051233693400
Well : Howard 26N-28HZ	Rig : Xtreme 20	Job : 5769725
Wellbore : Howard 26N-28HZ Orig Hole		

Well Origin

Latitude : 40.03 deg	Longitude : -104.89 deg
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North Reference	True					Drill Depth Zero				NULL		
Vertical Datum is	Ground Level					Vertical Datum to DDZ				13.00 ft		
Vertical Section North	0.00 ft					Vertical Section East				0.00 ft		
Vertical Section Azimuth	179.73 deg					Vertical Section Depth				0.00ft		
Grid Convergence	0.00 deg					Magnetic Declination				8.45 deg		
Total Correction	8.45 deg					TVD Calculation Method				Minimal Curvature		
D-Raw Calculation	Magcorr1					Local Magnetic Field				52797 nT		
Local Magnetic Dip Angle	66.36 deg					Local Gravity Field				9.798 m/s^2		

Tie	MD ft	Incl deg	Azim deg	North ft	East ft	TVD ft	VS ft	Incr VS ft	Crs Len ft	DLS deg/100ft	Build deg/100ft	Turn deg/100ft
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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
	16.00	0.00	245.37	0.00	0.00	16.00	0.00	0.00	16.00	0.00	0.00	-716.44
	116.00	0.09	245.37	-0.03	-0.07	116.00	0.03	0.08	100.00	0.09	0.09	0.00
	216.00	0.15	104.04	-0.10	-0.02	216.00	0.10	0.16	100.00	0.23	0.06	-141.33
	316.00	0.22	243.99	-0.21	-0.06	316.00	0.21	0.29	100.00	0.35	0.07	139.95
	416.00	0.16	339.07	-0.17	-0.28	416.00	0.17	0.52	100.00	0.28	-0.06	95.08
	516.00	0.19	291.15	0.02	-0.49	516.00	-0.03	0.79	100.00	0.14	0.03	-47.92
	616.00	0.07	220.10	0.04	-0.68	616.00	-0.04	0.99	100.00	0.18	-0.12	-71.05
	716.00	0.11	287.05	0.02	-0.81	716.00	-0.02	1.12	100.00	0.10	0.04	66.95
	816.00	0.13	200.06	-0.06	-0.94	816.00	0.06	1.27	100.00	0.17	0.02	-86.99
	916.00	0.29	260.30	-0.21	-1.23	916.00	0.20	1.60	100.00	0.25	0.16	60.24
	932.00	0.40	282.43	-0.20	-1.33	932.00	0.20	1.69	16.00	1.07	0.69	138.31
	1090.00	0.46	298.21	0.21	-2.42	1089.99	-0.23	2.87	158.00	0.08	0.04	9.99
	1183.00	0.47	295.09	0.55	-3.10	1182.99	-0.57	3.62	93.00	0.03	0.01	-3.35
	1277.00	0.51	304.28	0.95	-3.79	1276.99	-0.97	4.42	94.00	0.09	0.04	9.78
	1371.00	1.32	30.16	2.12	-3.60	1370.98	-2.14	5.61	94.00	1.47	0.86	91.36
	1465.00	2.83	59.23	4.25	-1.06	1464.91	-4.25	8.92	94.00	1.91	1.61	30.93
	1561.00	3.80	65.29	6.79	3.87	1560.75	-6.77	14.46	96.00	1.07	1.01	6.31
	1653.00	5.19	66.70	9.71	10.46	1652.47	-9.66	21.67	92.00	1.52	1.51	1.53
	1745.00	6.29	70.13	13.07	19.02	1744.01	-12.98	30.87	92.00	1.25	1.20	3.73
	1836.00	7.72	72.52	16.60	29.54	1834.32	-16.46	41.97	91.00	1.60	1.57	2.63
	1928.00	9.39	74.39	20.47	42.66	1925.30	-20.27	55.65	92.00	1.84	1.82	2.03
	2021.00	11.12	81.54	23.84	58.84	2016.81	-23.56	72.18	93.00	2.31	1.86	7.69
	2113.00	12.93	80.96	26.76	77.79	2106.79	-26.39	91.34	92.00	1.97	1.97	-0.63
	2204.00	14.95	80.92	30.21	99.43	2195.10	-29.74	113.26	91.00	2.22	2.22	-0.04
	2296.00	15.88	78.49	34.60	123.49	2283.80	-34.01	137.71	92.00	1.23	1.01	-2.64
	2388.00	16.37	79.14	39.55	148.55	2372.18	-38.85	163.26	92.00	0.57	0.53	0.71
	2480.00	16.73	79.23	44.47	174.29	2460.36	-43.64	189.47	92.00	0.39	0.39	0.10
	2571.00	17.31	76.12	50.16	200.30	2547.38	-49.22	216.10	91.00	1.19	0.64	-3.42
	2663.00	16.32	74.72	56.85	226.06	2635.45	-55.79	242.71	92.00	1.16	-1.08	-1.52
	2755.00	16.89	75.92	63.51	251.49	2723.61	-62.32	269.00	92.00	0.72	0.62	1.30
	2847.00	16.89	77.35	69.69	277.50	2811.64	-68.38	295.72	92.00	0.45	0.00	1.55
	2939.00	16.63	80.11	74.88	303.51	2899.73	-73.45	322.25	92.00	0.91	-0.28	3.00
	3030.00	16.49	80.00	79.36	329.05	2986.96	-77.80	348.18	91.00	0.16	-0.15	-0.12
	3122.00	17.09	76.62	84.75	355.06	3075.04	-83.08	374.75	92.00	1.25	0.65	-3.67
	3212.00	16.47	78.57	90.34	380.43	3161.21	-88.55	400.73	90.00	0.93	-0.69	2.17
	3304.00	15.94	81.05	94.89	405.70	3249.55	-92.98	426.40	92.00	0.95	-0.58	2.70
	3389.00	16.04	81.43	98.46	428.84	3331.26	-96.43	449.81	85.00	0.17	0.12	0.45
	3474.00	17.95	81.63	102.11	453.41	3412.55	-99.97	474.65	85.00	2.25	2.25	0.24
	3560.00	16.12	81.61	105.78	478.34	3494.77	-103.53	499.85	86.00	2.13	-2.13	-0.02
	3645.00	15.93	79.67	109.60	501.49	3576.47	-107.23	523.31	85.00	0.67	-0.22	-2.28
	3730.00	15.72	78.67	113.95	524.25	3658.25	-111.48	546.49	85.00	0.40	-0.25	-1.18
	3815.00	16.33	78.41	118.61	547.25	3739.94	-116.03	569.95	85.00	0.72	0.72	-0.31
	3900.00	16.53	76.86	123.76	570.73	3821.47	-121.07	593.99	85.00	0.57	0.24	-1.82
	3985.00	14.56	76.72	128.97	592.91	3903.36	-126.17	616.77	85.00	2.32	-2.32	-0.16
	4071.00	14.89	76.81	133.97	614.18	3986.54	-131.08	638.63	86.00	0.38	0.38	0.10
	4156.00	15.47	77.96	138.83	635.90	4068.57	-135.83	660.89	85.00	0.77	0.68	1.35
	4241.00	15.74	80.53	143.09	658.36	4150.44	-139.99	683.75	85.00	0.87	0.32	3.02
	4326.00	15.84	79.69	147.06	681.15	4232.23	-143.85	706.87	85.00	0.29	0.12	-0.99
	4412.00	16.33	80.32	151.20	704.61	4314.86	-147.87	730.70	86.00	0.60	0.57	0.73

Tie	MD ft	Incl deg	Azim deg	North ft	East ft	TVD ft	VS ft	Incr VS ft	Crs Len ft	DLS deg/100ft	Build deg/100ft	Turn deg/100ft
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	4497.00	17.30	79.51	155.51	728.82	4396.23	-152.07	755.29	85.00	1.17	1.14	-0.95
	4582.00	15.98	78.99	160.04	752.74	4477.67	-156.49	779.63	85.00	1.56	-1.55	-0.61
	4667.00	15.94	79.27	164.45	775.69	4559.39	-160.79	803.00	85.00	0.10	-0.05	0.33
	4751.00	14.09	76.11	169.05	796.95	4640.52	-165.30	824.75	84.00	2.41	-2.20	-3.76
	4837.00	13.02	75.49	173.99	816.49	4724.12	-170.14	844.91	86.00	1.26	-1.24	-0.72
	4922.00	12.48	78.02	178.30	834.74	4807.03	-174.36	863.67	85.00	0.91	-0.64	2.98
	5007.00	12.02	82.30	181.39	852.50	4890.09	-177.37	881.69	85.00	1.20	-0.54	5.04
	5091.00	10.31	82.54	183.54	868.62	4972.50	-179.44	897.95	84.00	2.04	-2.04	0.29
	5177.00	8.77	82.32	185.41	882.75	5057.31	-181.25	912.21	86.00	1.79	-1.79	-0.26
	5263.00	8.15	82.22	187.22	895.41	5141.22	-182.21	924.72	85.00	2.75	-2.75	1.22

	5262.00	8.13	80.88	187.23	895.11	5141.39	-183.01	924.70	85.00	0.79	-0.75	-1.69
	5347.00	6.81	82.77	188.82	906.04	5225.66	-184.55	935.74	85.00	1.58	-1.55	2.22
	5432.00	5.81	84.67	189.85	915.32	5310.15	-185.54	945.08	85.00	1.20	-1.18	2.24
	5517.00	4.80	88.49	190.35	923.16	5394.78	-185.99	952.94	85.00	1.26	-1.19	4.49
	5603.00	3.44	90.80	190.41	929.34	5480.56	-186.02	959.12	86.00	1.59	-1.58	2.69
	5688.00	1.94	101.33	190.09	933.30	5565.46	-185.69	963.09	85.00	1.85	-1.76	12.39
	5773.00	1.12	47.46	190.37	935.32	5650.44	-185.96	965.13	85.00	1.84	-0.96	-63.38
	6028.00	0.72	288.94	192.57	935.65	5905.42	-188.16	967.36	255.00	0.63	-0.16	-46.48
	6283.00	0.44	16.17	194.03	934.40	6160.41	-189.63	969.28	255.00	0.32	-0.11	34.21
	6539.00	0.63	41.91	196.02	935.62	6416.40	-191.61	971.61	256.00	0.12	0.07	10.05
	6794.00	1.35	112.31	195.93	939.33	6671.37	-191.50	975.33	255.00	0.50	0.28	27.61
	6880.00	0.95	85.09	195.60	940.98	6757.35	-191.17	977.01	86.00	0.77	-0.47	-31.65
	6965.00	0.61	53.04	195.94	942.04	6842.34	-191.49	978.12	85.00	0.64	-0.40	-37.71
	7008.00	2.66	169.59	195.09	942.41	6885.33	-190.65	979.04	43.00	6.94	4.77	271.05
	7050.00	6.70	181.11	191.68	942.54	6927.18	-187.24	982.45	42.00	9.83	9.62	27.43
	7093.00	11.29	183.31	184.97	942.24	6969.64	-180.53	989.17	43.00	10.70	10.67	5.12
	7135.00	14.92	183.76	175.47	941.65	7010.54	-171.03	998.69	42.00	8.65	8.64	1.07
	7178.00	19.74	184.98	162.70	940.66	7051.57	-158.27	1011.50	43.00	11.24	11.21	2.84
	7220.00	23.73	183.06	147.19	939.59	7090.58	-142.76	1027.05	42.00	9.65	9.50	-4.57
	7263.00	27.95	182.84	128.48	938.63	7129.27	-124.05	1045.78	43.00	9.82	9.81	-0.51
	7306.00	31.38	181.68	107.21	937.80	7166.63	-102.79	1067.06	43.00	8.09	7.98	-2.70
	7349.00	34.19	182.56	83.95	936.93	7202.78	-79.53	1090.34	43.00	6.63	6.53	2.05
	7391.00	37.77	181.66	59.29	936.03	7236.76	-54.88	1115.01	42.00	8.62	8.52	-2.14
	7434.00	42.79	181.20	31.51	935.34	7269.55	-27.10	1142.80	43.00	11.69	11.67	-1.07
	7476.00	44.60	180.22	2.50	934.99	7299.92	1.90	1171.82	42.00	4.60	4.31	-2.33
	7519.00	49.30	180.34	-28.91	934.83	7329.27	33.32	1203.23	43.00	10.93	10.93	0.28
	7561.00	53.50	179.66	-61.73	934.84	7355.46	66.13	1236.05	42.00	10.08	10.00	-1.62
	7604.00	61.04	179.15	-97.87	935.22	7378.70	102.28	1272.19	43.00	17.56	17.53	-1.19
	7646.00	67.13	179.29	-135.63	935.74	7397.04	140.04	1309.95	42.00	14.50	14.50	0.33
	7689.00	69.60	179.51	-175.59	936.15	7412.89	180.00	1349.92	43.00	5.76	5.74	0.51
	7731.00	69.91	179.32	-215.00	936.56	7427.43	219.41	1389.32	42.00	0.85	0.74	-0.45
	7774.00	72.36	179.36	-255.68	937.02	7441.33	260.09	1430.01	43.00	5.70	5.70	0.09
	7816.00	77.15	179.27	-296.19	937.51	7452.37	300.60	1470.52	42.00	11.41	11.40	-0.21
	7859.00	79.82	179.65	-338.32	937.91	7460.95	342.73	1512.65	43.00	6.27	6.21	0.88
	7902.00	80.25	179.81	-380.67	938.10	7468.40	385.08	1555.00	43.00	1.07	1.00	0.37
	7948.00	84.72	179.82	-426.26	938.25	7474.41	430.68	1600.60	46.00	9.72	9.72	0.02
	8052.00	90.71	180.73	-530.13	937.75	7478.55	534.54	1704.47	104.00	5.83	5.76	0.87
	8137.00	90.58	179.57	-615.12	937.53	7477.60	619.53	1789.46	85.00	1.37	-0.15	-1.36
	8223.00	91.04	179.67	-701.11	938.10	7476.38	705.52	1875.45	86.00	0.55	0.53	0.12
	8308.00	91.81	180.15	-786.08	938.23	7474.27	790.50	1960.42	85.00	1.07	0.91	0.56
	8393.00	91.04	179.90	-871.06	938.20	7472.15	875.47	2045.40	85.00	0.95	-0.91	-0.29
Tie	MD ft	Incl deg	Azim deg	North ft	East ft	TVD ft	VS ft	Incr VS ft	Crs Len ft	DLS deg/100ft	Build deg/100ft	Turn deg/100ft
	8478.00	89.87	180.51	-956.05	937.89	7471.48	960.46	2130.39	85.00	1.55	-1.38	0.72
	8648.00	90.27	179.91	-1126.05	937.27	7471.27	1130.45	2300.39	170.00	0.42	0.24	-0.35
	8818.00	90.18	180.58	-1296.04	936.54	7470.60	1300.44	2470.39	170.00	0.40	-0.05	0.39
	8988.00	89.81	180.02	-1466.04	935.65	7470.62	1470.43	2640.39	170.00	0.39	-0.22	-0.33
	9159.00	89.13	179.71	-1637.03	936.05	7472.20	1641.43	2811.38	171.00	0.44	-0.40	-0.18
	9329.00	89.07	179.72	-1807.01	936.90	7474.87	1811.40	2981.36	170.00	0.04	-0.04	0.01
	9500.00	90.15	180.03	-1978.00	937.27	7476.04	1982.40	3152.35	171.00	0.66	0.63	0.18
	9670.00	89.47	179.58	-2148.00	937.85	7476.60	2152.39	3322.35	170.00	0.48	-0.40	-0.26
	9840.00	90.03	179.64	-2317.99	939.01	7477.34	2322.39	3492.35	170.00	0.33	0.33	0.04
	10011.00	89.84	178.87	-2488.98	941.23	7477.53	2493.38	3663.34	171.00	0.46	-0.11	-0.45
	10180.00	89.81	178.70	-2657.94	944.82	7478.05	2662.36	3832.34	169.00	0.10	-0.02	-0.10
	10351.00	89.47	177.43	-2828.83	950.59	7479.13	2833.28	4003.34	171.00	0.77	-0.20	-0.74
	10436.00	90.40	178.12	-2913.77	953.89	7479.22	2918.23	4088.34	85.00	1.36	1.09	0.81
	10521.00	90.52	178.59	-2998.73	956.33	7478.54	3003.20	4173.33	85.00	0.57	0.14	0.55
	10691.00	88.67	178.64	-3168.67	960.44	7479.74	3173.16	4343.32	170.00	1.09	-1.09	0.03
	10777.00	89.63	177.75	-3254.61	963.15	7481.02	3259.12	4429.31	86.00	1.52	1.12	-1.03
	10861.00	90.36	179.68	-3338.59	965.03	7481.02	3343.10	4513.30	84.00	2.46	0.87	2.30
	10947.00	89.81	179.12	-3424.58	965.93	7480.90	3429.10	4599.30	86.00	0.91	-0.64	-0.65
	11032.00	90.49	180.77	-3509.58	966.01	7480.67	3514.09	4684.30	85.00	2.10	0.80	1.94
	11202.00	89.01	179.46	-3679.57	965.67	7481.42	3684.08	4854.29	170.00	1.16	-0.87	-0.77
	11372.00	88.89	179.75	-3849.54	966.84	7484.53	3854.05	5024.26	170.00	0.18	-0.07	0.17
	11458.00	88.21	178.64	-3935.50	968.05	7486.71	3940.02	5110.23	86.00	1.51	-0.79	-1.29
	11543.00	87.40	177.79	-4020.39	970.70	7489.96	4024.92	5195.17	85.00	1.38	-0.95	-1.00
	11713.00	88.61	178.46	-4190.20	976.25	7495.88	4194.75	5365.06	170.00	0.81	0.71	0.39
	11883.00	90.06	180.29	-4360.16	978.11	7497.85	4364.72	5535.04	170.00	1.37	0.85	1.08
	12016.00	90.55	180.60	-4493.16	977.08	7497.15	4497.71	5668.04	133.00	0.44	0.37	0.23
Projection to TD:	12071.00	90.55	180.60	-4548.15	976.50	7496.62	4552.70	5723.03	55.00	0.00	0.00	0.00

