



Real Time Log

Natural Formation Evaluation
Gamma Ray

Scale:

1:240

True Vertical Depth

Company: Kerr-McGee Oil & Gas Onshore LP

Well: Wirkner-Vance 29N-36HZ

Field: Weld County (Kerr McGee)

Region: Continental US Country: United States

Status:

Final Print

Surface Location:

Latitude: 40° 10' 30.979" N

Longitude: 104° 50' 42.875" W

Other Services:

Directional
VSS

API Number:
051233788100

Section: 66

TWN: 3N Range: 67W

Permanent Datum (P.D.): Ground Level Elevation: 4822.00 ft.

Log Measured From: Kelly Bushing 13.00 ft. Above P.D.

Depth Reference: Driller's Depth

Elevations:
KB: 4835.00 ft.
DF: N/A
GL: 4822.00 ft.

Interval Logged

Dates

Magnetic Field Reference

Top: 6572ft. Date From: 15/Dec/13 Date To: 21/Dec/13 Dip Angle: 66.98 ° Azi Reference North: True

Bottom: 11642 ft. Date To: 21/Dec/13 Total Mag to Reference

Spud Date: 15/Dec/13 Field Strength: 52713.0 nT North Correction: 8.58 °

Borehole Record

Casing Record

Hole Size	From	To	Size	Weight	From	To
8.750 in.	1015 ft.	7603 ft.	9.625 in.	36.00 lb/ft	Surface	1015 ft.
6.125 in.	7603 ft.	11696 ft.	7.000 in.	26.00 lb/ft	1015 ft.	7593 ft.

Mud Record

Deviation Record

Type	From	To	Hole Size	Interval	Inc / Az (Start)	Inc / Az (End)
Water Based - Fresh	1015 ft.	11696 ft.	8.750 in.	6588 ft.	0.2 ° / 225.7 °	88.8 ° / 358.8 °
			6.125 in.	4093 ft.	88.8 ° / 358.8 °	89.2 ° / 357.6 °
					/	/
					/	/
					/	/
					/	/
					/	/
					/	/
					/	/

Acquisition System Software Version

Other

Advantage 2.20U4 Rig: / Contractor: Ensign 138 / Ensign Drilling

PATS 6.4.1.34 Job No: 5856991

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	1	2	8.750	PDC	3.000	Steerable	6572	7550	1015	7603	15/Dec/2013 17:35	18/Dec/2013 16:00	37.6
2	2	3	6.125	PDC	6.000	Steerable	7550	11642	7603	11696	19/Dec/2013 18:51	22/Dec/2013 10:00	27.7

Crew

Name	Arrive	Depart	Name	Arrive	Depart	Name	Arrive	Depart
	Wellsite	Wellsite		Wellsite	Wellsite		Wellsite	Wellsite
David Browning	15/Dec/13	18/Dec/13	Andrew Overbey	15/Dec/13	22/Dec/13	Brad Jones	18/Dec/13	22/Dec/13
Will Drake	15/Dec/13	22/Dec/13	Steve Martinez	15/Dec/13	21/Dec/13	Peter Adebayo	15/Dec/13	17/Dec/13
Robert Bartlett	17/Dec/13	22/Dec/13						

Mud Properties Record

Date / Time	LWD Run No.	Measured Depth (ft.)	Mud Type	Density (ppg)	Viscosity (cp)	pH	Fluid Loss (cc)	Oil / Water	Source	Total Chlorides (ppm)	K+ (%)
15/Dec/13 21:00	1	1018	Water Based - Fresh	8.4	29	8.5	N/A	99/0	Active Mud Pits	800	0.0
16/Dec/13 21:00	1	4524	Water Based - Fresh	8.5	29	8.5	N/A	99/0	Active Mud Pits	1000	0.0
17/Dec/13 21:00	1	6823	Water Based - Fresh	10.1	38	8.5	N/A	91/0	Active Mud Pits	1400	0.0
18/Dec/13 21:00	1	7603	Water Based - Fresh	10.2	37	8.4	N/A	91/0	Active Mud Pits	1800	0.0
19/Dec/13 21:00	2	7603	Water Based - Fresh	9.2	34	10.3	N/A	95/0	Active Mud Pits	1500	0.0
20/Dec/13 21:00	2	7822	Water Based - Fresh	9.3	38	9.7	N/A	94/1	Active Mud Pits	1200	0.0
21/Dec/13 21:00	2	11264	Water Based - Fresh	9.3	36	8.6	N/A	94/1	Active Mud Pits	1250	0.0

Mnemonics

Curve	Description	Units
GRAX	Gamma Ray Apparent, 0.5 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	klbs

Equipment and Service Data

LWD Run No.	Tool	Serial Number	Measurement	Bit Offset (ft.)	Max O.D. (in.)	Min I.D. (in.)
1	DIR	12456778	Directional	58.56	6.750	3.250
1	SRIG	12673191	Gamma	55.18	6.750	3.250
2	DIR	13108409	Directional	54.27	4.750	2.750
2	SRIG	12595022	Gamma	50.89	4.750	2.750

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 NaviTrak services (Directional only) behind an 8 3/4 inch bit and steerable assembly from 1015 to 6572 feet MD (1015 to 6501 feet TVD).</p> <p>3.) 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 6572 to 7603 feet MD (6501 to 7132 feet TVD).</p> <p>4.) The interval from 1015 to 6572 feet MD (1015 to 6501 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> <p>5.) Baker Hughes run 2 utilized 4 3/4 inch NaviGamma services (Gamma Ray and Directional) behind an 6 1/8 inch bit and steerable assembly from 7603 to 11696 feet MD (7132 to 7148 feet TVD).</p>

6.) The interval from 11642 to 11696 feet MD (7147 to 7148 feet TVD) was not logged due gamma ray sensor to bit offset.

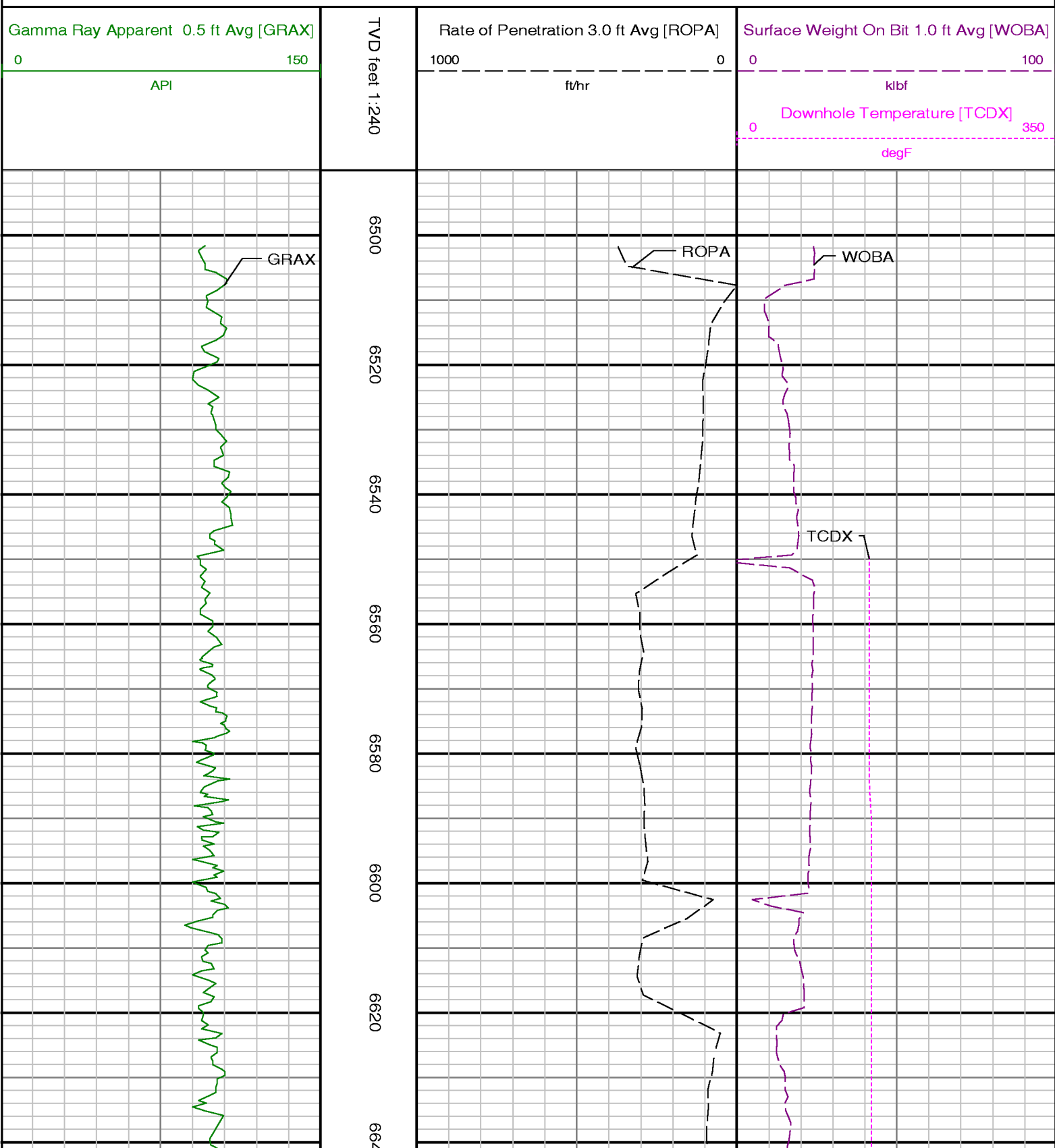


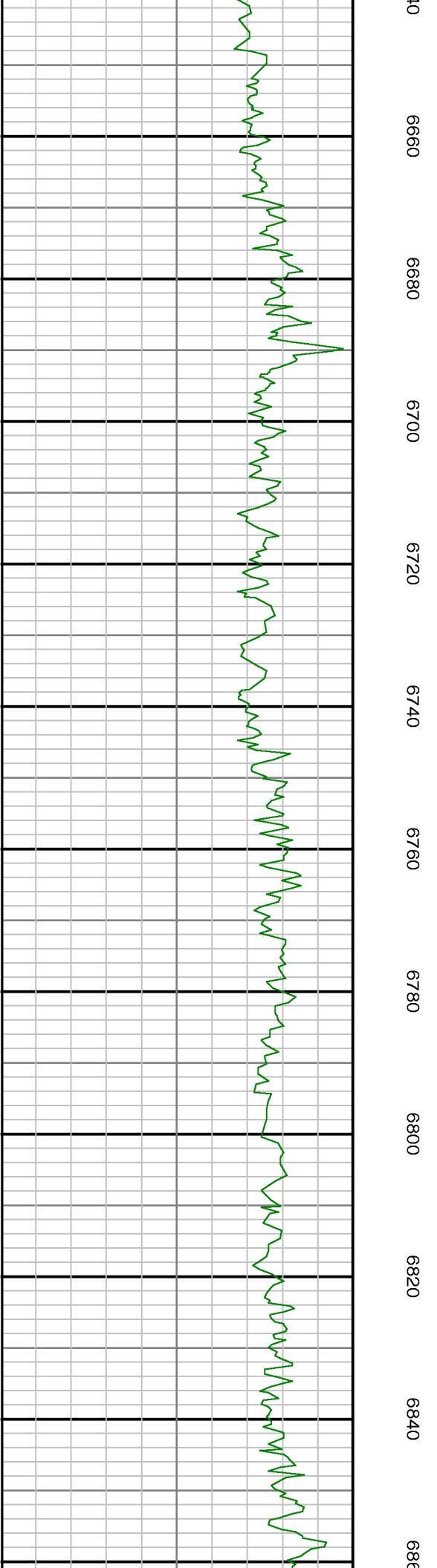
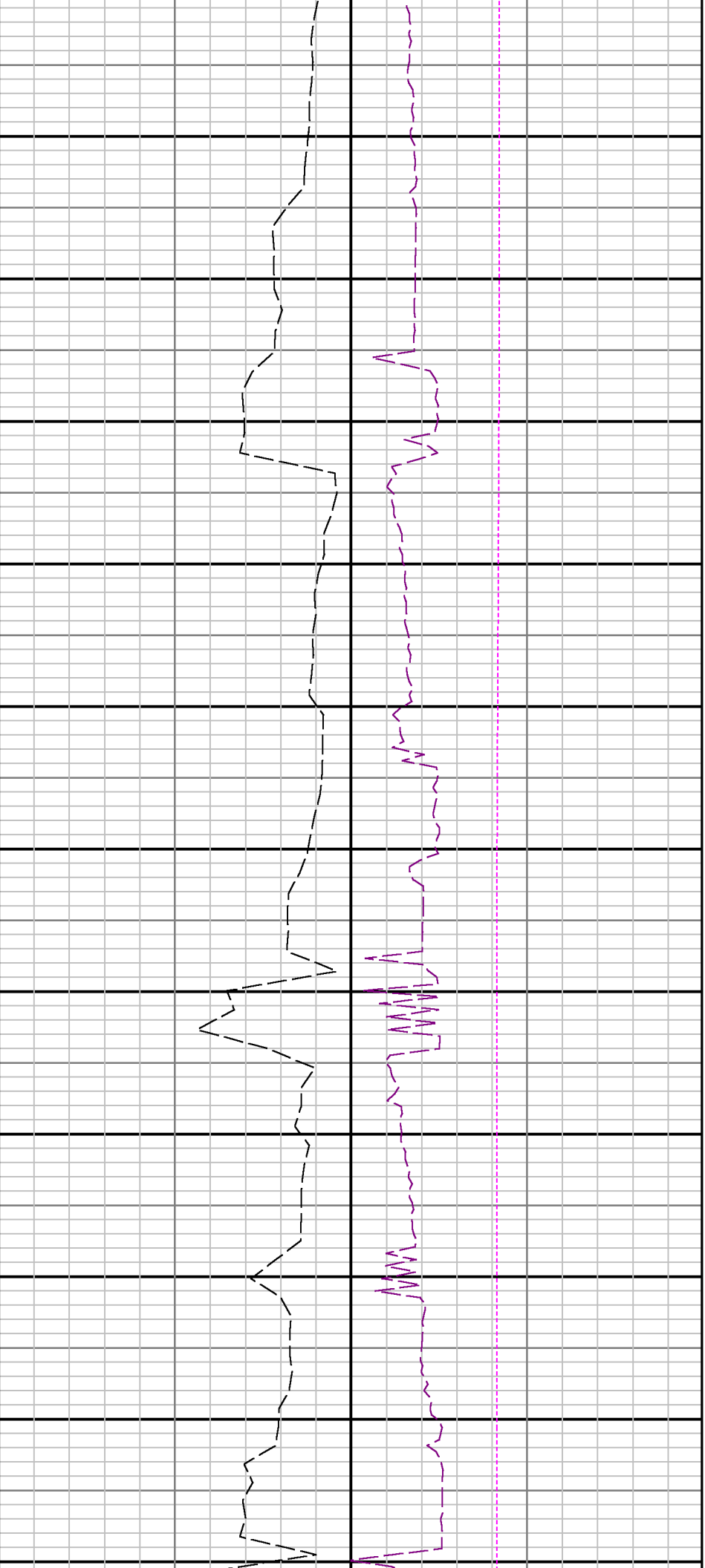
Company : Kerr-McGee Oil & Gas Onshore LP

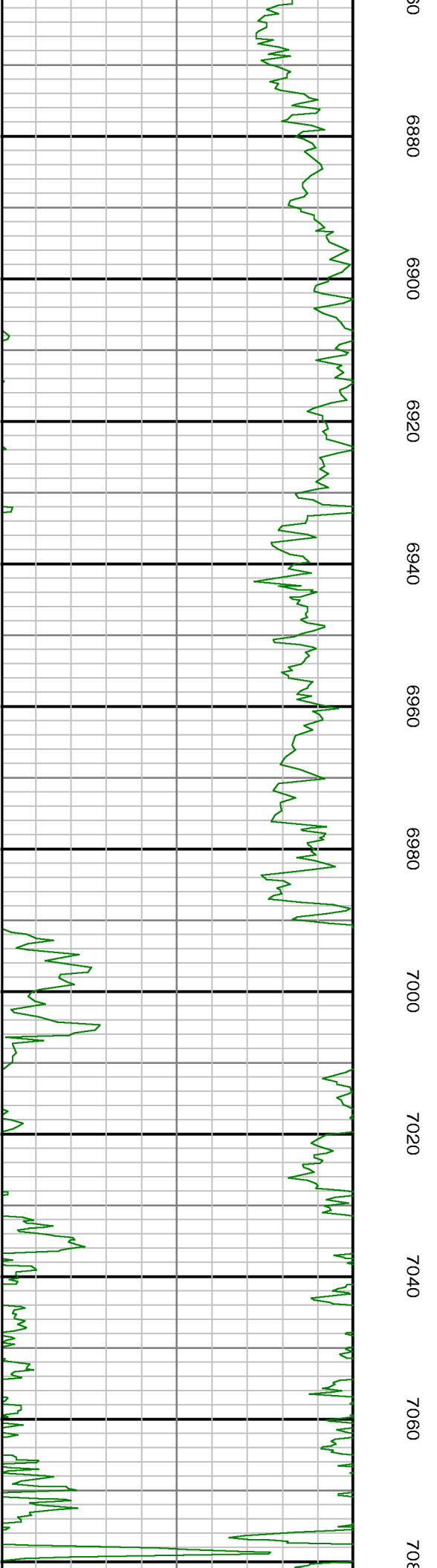
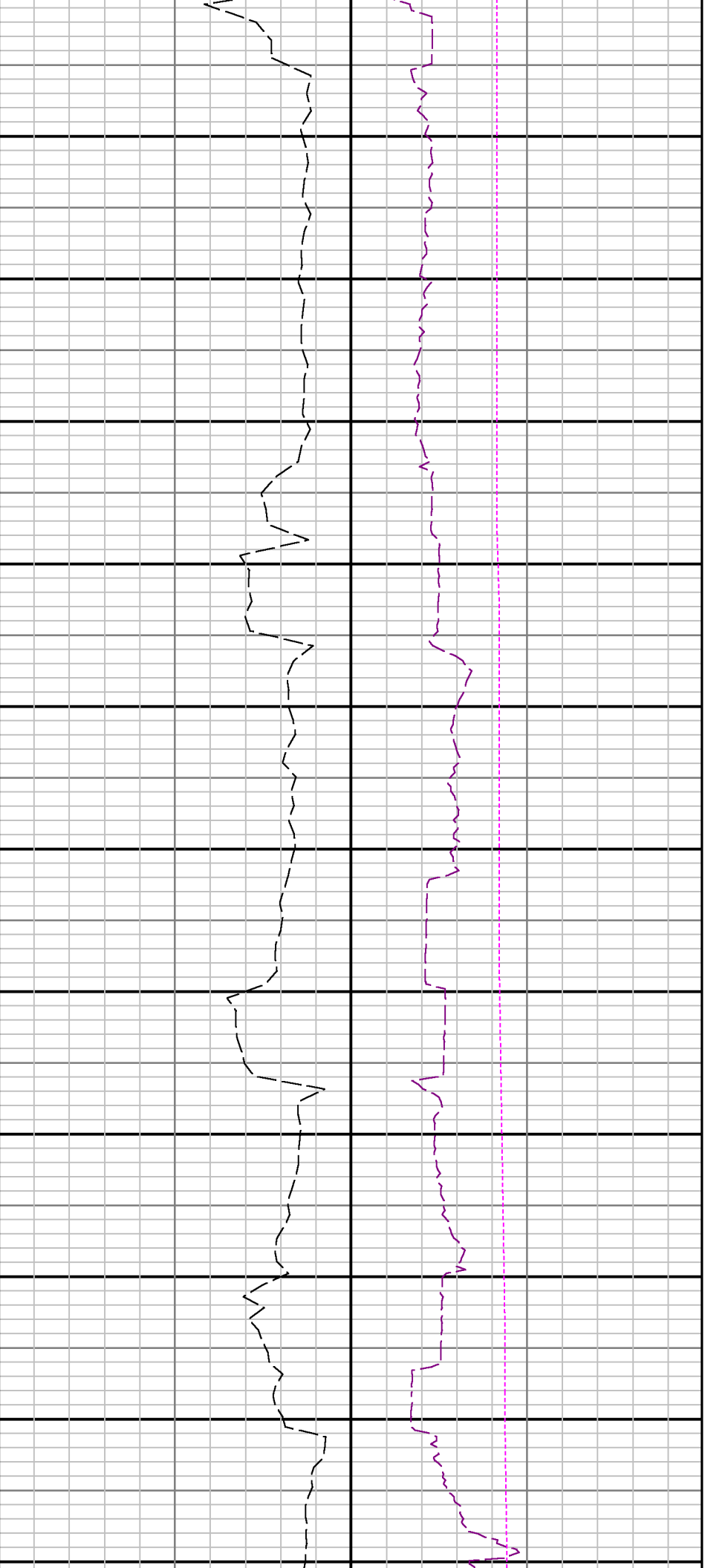
Well : Wirkner-Vance 29N-36HZ

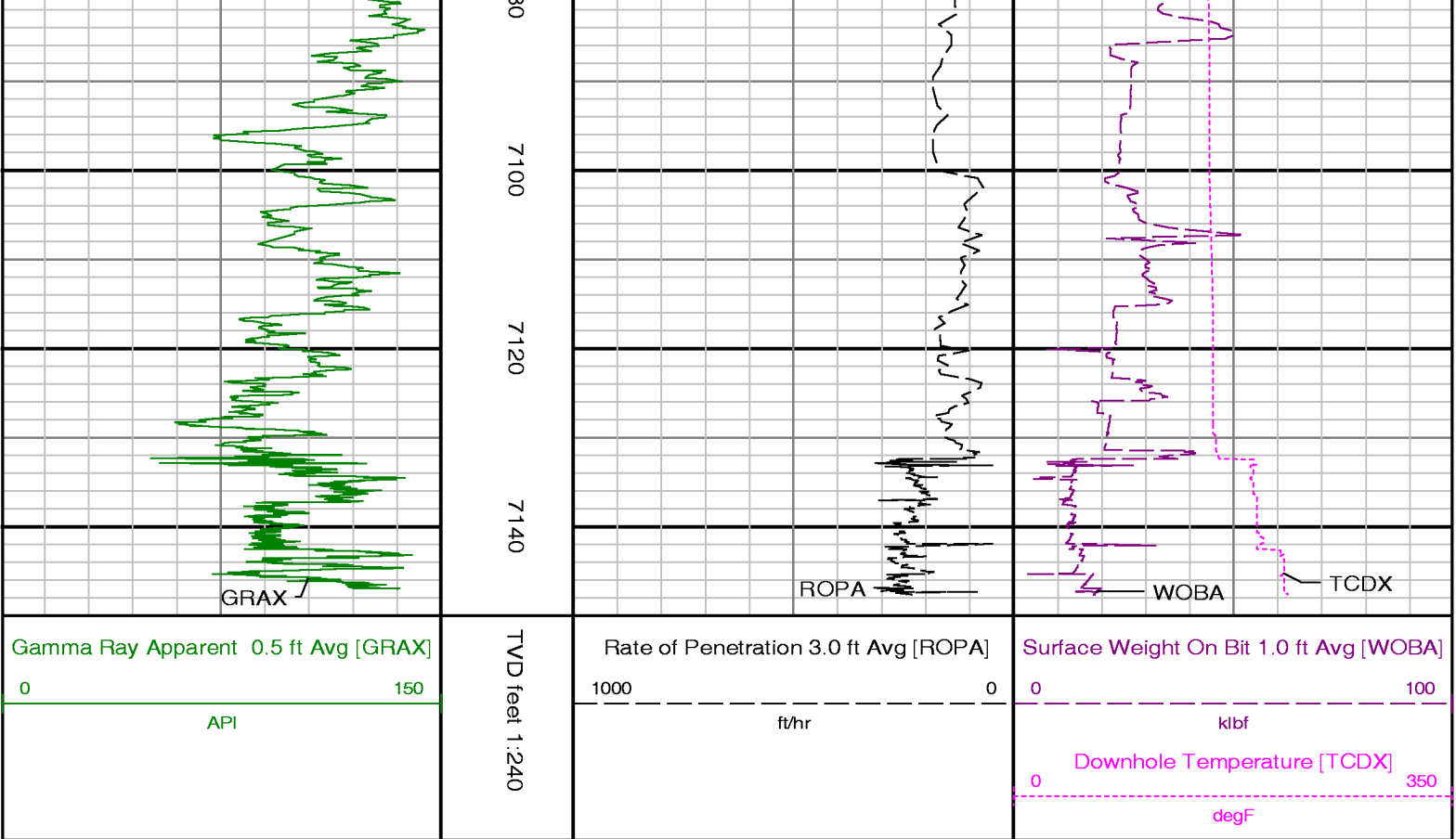
Interval : 6490.00 - 7150.00 feet

Created : 21/Dec/2013 10:46:39 PM









ADVANTAGE Field Survey Listing												
Operator : Kerr-McGee Oil & Gas Onshore LPField : Weld County (Kerr McGee) API No : 051233788100												
Well : Wirkner-Vance 29N-36HZ Rig : Ensgin 138 Job : 5856991												
Wellbore : Wirkner-Vance 29N-36HZ Orig Hole												
Well Origin												
Latitude		40.1753 deg			Longitude		-104.8452 deg					
North Reference		True			Drill Depth Zero		NULL					
Vertical Datum is		Mean Sea Level			Vertical Datum to DDZ		4835.00 ft					
Vertical Section North		0.00 ft			Vertical Section East		0.00 ft					
Vertical Section Azimuth		358.2700 deg			Vertical Section Depth		0.00ft					
Grid Convergence		0.0000 deg			Magnetic Declination		8.5800 deg					
Total Correction		8.5800 deg			TVD Calculation Method		Minimal Curvature					
D-Row Calculation		Magcorr1			Local Magnetic Field		52713 nT					
Local Magnetic Dip Angle		66.9800 deg			Local Gravity Field		9.802 m/s^2					
Tie	MD	Incl	Azim	North	East	TVD	VS	Incr VS	Crs Len	DLS	Build	Turn
	ft	deg	deg	ft	ft	ft	ft	ft	ft	deg/100ft	deg/100ft	deg/100ft
	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00				
	13.00	0.0000	298.3200	0.00	0.00	13.00	0.00	0.00	13.00	0.00	0.00	-474.46
	113.00	0.2600	298.3200	0.11	-0.20	113.00	0.11	0.23	100.00	0.26	0.26	0.00
	213.00	0.3800	295.4700	0.36	-0.70	213.00	0.38	0.79	100.00	0.12	0.12	-2.85
	313.00	0.2300	278.4000	0.53	-1.20	313.00	0.57	1.31	100.00	0.17	-0.15	-17.07
	413.00	0.2900	264.7400	0.54	-1.65	413.00	0.59	1.76	100.00	0.09	0.06	-13.66
	513.00	0.1300	259.6900	0.49	-2.01	512.99	0.55	2.13	100.00	0.16	-0.16	-5.05
	613.00	0.4100	274.0800	0.50	-2.48	612.99	0.57	2.60	100.00	0.29	0.28	14.39
	713.00	0.2900	280.8500	0.57	-3.08	712.99	0.66	3.21	100.00	0.13	-0.12	6.77
	813.00	0.3200	274.2400	0.64	-3.61	812.99	0.75	3.74	100.00	0.05	0.03	-6.61
U	913.00	0.1600	225.2700	0.56	-3.99	912.99	0.68	4.12	100.00	0.25	-0.16	-48.97
	1080.00	0.3000	352.2000	0.83	-4.21	1079.99	0.96	4.47	167.00	0.25	0.08	76.01

	1171.00	2.5000	92.3000	0.99	-2.26	1170.96	1.05	6.43	91.00	2.82	2.42	110.00
	1262.00	4.8000	101.4000	0.15	3.45	1261.77	0.05	12.21	91.00	2.60	2.53	10.00
	1353.00	5.1000	105.4000	-1.67	11.08	1352.43	-2.01	20.06	91.00	0.50	0.33	4.40
	1444.00	6.4000	110.8000	-4.55	19.73	1442.97	-5.14	29.16	91.00	1.55	1.43	5.93
	1534.00	6.2000	108.4000	-7.86	29.03	1532.43	-8.74	39.04	90.00	0.37	-0.22	-2.67
	1625.00	7.7000	117.4000	-12.22	39.10	1622.76	-13.39	50.01	91.00	2.03	1.65	9.89
	1735.00	10.1000	114.0000	-19.54	54.46	1731.43	-21.17	67.02	110.00	2.23	2.18	-3.09
	1826.00	11.8000	115.5000	-26.79	70.15	1820.77	-28.89	84.31	91.00	1.89	1.87	1.65
	1917.00	11.6000	115.0000	-34.66	86.84	1909.88	-37.27	102.76	91.00	0.25	-0.22	-0.55
	2008.00	11.5000	114.6000	-42.30	103.38	1999.03	-45.40	120.98	91.00	0.14	-0.11	-0.44
	2098.00	11.9000	114.6000	-49.90	119.97	2087.16	-53.50	139.23	90.00	0.44	0.44	0.00
	2189.00	11.8000	114.5000	-57.66	136.97	2176.23	-61.77	157.92	91.00	0.11	-0.11	-0.11
	2281.00	11.8000	114.1000	-65.41	154.12	2266.28	-70.03	176.73	92.00	0.09	0.00	-0.43
	2372.00	11.4000	120.6000	-73.78	170.35	2355.43	-78.89	195.00	91.00	1.50	-0.44	7.14
	2555.00	10.9000	122.0000	-92.16	200.59	2534.97	-98.17	230.39	183.00	0.31	-0.27	0.77
	2646.00	12.1000	119.6000	-101.43	216.18	2624.14	-107.91	248.53	91.00	1.42	1.32	-2.64
	2830.00	12.3000	120.4000	-120.87	249.85	2803.99	-128.36	287.41	184.00	0.14	0.11	0.43
	3013.00	11.5000	121.6000	-140.30	282.20	2983.05	-148.75	325.14	183.00	0.46	-0.44	0.66
	3106.00	11.0000	120.8000	-149.70	297.72	3074.27	-158.62	343.28	93.00	0.56	-0.54	-0.86
	3199.00	11.4000	119.8000	-158.81	313.32	3165.50	-168.19	361.35	93.00	0.48	0.43	-1.08
	3293.00	10.9000	119.1000	-167.75	329.15	3257.72	-177.61	379.53	94.00	0.55	-0.53	-0.74
	3387.00	11.2000	119.0000	-176.49	344.90	3349.98	-186.83	397.54	94.00	0.32	0.32	-0.11
	3482.00	12.0000	118.4000	-185.66	361.65	3443.04	-196.50	416.64	95.00	0.85	0.84	-0.63
	3577.00	11.8000	118.0000	-194.92	378.92	3536.00	-206.27	436.23	95.00	0.23	-0.21	-0.42
	3672.00	10.8000	118.4000	-203.72	395.32	3629.15	-215.56	454.85	95.00	1.06	-1.05	0.42
	3766.00	11.1000	116.6000	-211.96	411.16	3721.44	-224.27	472.70	94.00	0.48	0.32	-1.91
	3861.00	10.7000	113.9000	-219.62	427.40	3814.73	-232.43	490.66	95.00	0.68	-0.42	-2.84
	3955.00	12.5000	117.2000	-227.81	444.43	3906.81	-241.12	509.55	94.00	2.04	1.91	3.51
	4049.00	12.5000	118.5000	-237.31	462.42	3998.58	-251.17	529.90	94.00	0.30	0.00	1.38
	4145.00	12.4000	118.5000	-247.19	480.60	4092.32	-261.59	550.59	96.00	0.10	-0.10	0.00
	4333.00	11.0000	115.1000	-264.43	514.59	4276.41	-279.85	588.70	188.00	0.83	-0.74	-1.81
	4524.00	9.6000	113.3000	-278.46	545.72	4464.33	-294.81	622.85	191.00	0.75	-0.73	-0.94
	4618.00	9.5000	113.4000	-284.64	560.04	4557.03	-301.42	638.44	94.00	0.11	-0.11	0.11
	4713.00	8.8000	112.5000	-290.54	573.95	4650.82	-307.73	653.55	95.00	0.75	-0.74	-0.95
	4807.00	9.8000	123.2000	-297.67	587.28	4743.59	-315.26	668.67	94.00	2.12	1.06	11.38
	4902.00	9.4000	123.1000	-306.33	600.55	4837.26	-324.32	684.52	95.00	0.42	-0.42	-0.11
	4997.00	8.9000	123.8000	-314.66	613.15	4931.05	-333.03	699.62	95.00	0.54	-0.53	0.74
	5092.00	8.3000	122.6000	-322.44	625.04	5024.98	-341.16	713.83	95.00	0.66	-0.63	-1.26
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
	5187.00	7.4000	122.3000	-329.40	635.98	5119.09	-348.45	726.80	95.00	0.95	-0.95	-0.32
	5283.00	6.5000	120.6000	-335.47	645.89	5214.38	-354.82	738.42	96.00	0.96	-0.94	-1.77
	5378.00	6.3000	120.5000	-340.86	655.01	5308.79	-360.48	749.01	95.00	0.21	-0.21	-0.11
	5473.00	5.7000	117.4000	-345.67	663.69	5403.27	-365.55	758.93	95.00	0.72	-0.63	-3.26
	5568.00	4.9000	114.7000	-349.54	671.56	5497.86	-369.65	767.71	95.00	0.88	-0.84	-2.84
	5663.00	4.5000	113.2000	-352.70	678.67	5592.54	-373.03	775.49	95.00	0.44	-0.42	-1.58
	5758.00	2.5000	128.8000	-355.47	683.71	5687.36	-375.95	781.24	95.00	2.31	-2.11	16.42
	5852.00	2.2000	122.5000	-357.72	686.83	5781.28	-378.30	785.09	94.00	0.42	-0.32	-6.70
	5946.00	1.5000	127.9000	-359.45	689.33	5875.23	-380.10	788.12	94.00	0.77	-0.74	5.74
	6041.00	1.2000	101.6000	-360.41	691.28	5970.21	-381.12	790.30	95.00	0.72	-0.32	-27.68
	6136.00	1.3000	108.7000	-360.96	693.28	6065.19	-381.72	792.37	95.00	0.19	0.11	7.47
	6232.00	1.3000	285.6000	-361.01	693.26	6161.18	-381.78	792.43	96.00	2.71	0.00	184.27
	6420.00	0.7000	291.4000	-360.02	690.14	6349.15	-380.69	795.71	188.00	0.32	-0.32	3.09
	6514.00	3.7000	350.9000	-356.82	689.12	6443.07	-377.46	799.07	94.00	3.62	3.19	63.30
	6608.00	8.5000	351.3000	-346.95	687.59	6536.51	-367.55	809.05	94.00	5.11	5.11	0.43
	6703.00	11.6000	353.8000	-330.51	685.50	6630.05	-351.05	825.63	95.00	3.29	3.26	2.63
	6797.00	19.5000	2.2000	-305.39	685.08	6720.54	-325.94	850.74	94.00	8.72	8.40	8.94
	6893.00	26.8000	358.3000	-267.70	685.05	6808.76	-288.26	888.44	96.00	7.77	7.60	-4.06
	6988.00	36.9000	350.0000	-218.05	679.44	6889.39	-238.46	938.40	95.00	11.57	10.63	-8.74
	7081.00	47.0000	350.6000	-156.85	669.02	6958.47	-176.97	1000.49	93.00	10.87	10.86	0.65
	7176.00	53.6000	355.2000	-84.37	660.13	7019.14	-104.26	1073.51	95.00	7.88	6.95	4.84
	7271.00	62.9000	359.6000	-3.78	656.63	7069.09	-23.60	1154.17	95.00	10.55	9.79	4.63
	7366.00	72.6000	1.0000	84.03	657.12	7105.02	64.16	1241.99	95.00	10.30	10.21	1.47

	7460.00	82.1000	0.4000	175.64	658.23	7125.58	155.69	1333.60	94.00	10.13	10.11	-0.64
	7543.00	88.8000	358.8000	258.33	657.65	7132.16	238.35	1416.29	83.00	8.30	8.07	-1.93
	7604.00	91.8000	358.3000	319.30	656.11	7131.84	299.35	1477.28	61.00	4.99	4.92	-0.82
	7700.00	91.8000	359.4000	415.23	654.18	7128.83	395.29	1573.23	96.00	1.15	0.00	1.15
	7794.00	90.9000	358.5000	509.19	652.46	7126.61	489.26	1667.21	94.00	1.35	-0.96	-0.96
	7889.00	89.2000	359.4000	604.17	650.72	7126.53	584.25	1762.20	95.00	2.02	-1.79	0.95
	7984.00	90.6000	0.1000	699.16	650.30	7126.70	679.21	1857.20	95.00	1.65	1.47	0.74
	8079.00	88.9000	0.0000	794.16	650.39	7127.11	774.16	1952.19	95.00	1.79	-1.79	-0.11
	8173.00	89.9000	0.5000	888.15	650.80	7128.10	868.10	2046.19	94.00	1.19	1.06	0.53
	8269.00	89.2000	359.9000	984.15	651.13	7128.85	964.04	2142.18	96.00	0.96	-0.73	-0.62
	8362.00	89.7000	359.3000	1077.14	650.48	7129.74	1057.01	2235.18	93.00	0.84	0.54	-0.65
	8550.00	90.8000	358.6000	1265.10	647.04	7128.92	1244.99	2423.17	188.00	0.69	0.59	-0.37
	8645.00	90.9000	359.7000	1360.08	645.63	7127.51	1339.97	2518.16	95.00	1.16	0.11	1.16
	8740.00	89.3000	358.3000	1455.06	643.97	7127.35	1434.95	2613.16	95.00	2.24	-1.68	-1.47
	8834.00	89.7000	358.4000	1549.02	641.26	7128.17	1528.95	2707.15	94.00	0.44	0.43	0.11
	8929.00	90.1000	357.1000	1643.94	637.54	7128.33	1623.94	2802.15	95.00	1.43	0.42	-1.37
	9023.00	88.6000	357.3000	1737.82	632.94	7129.40	1717.92	2896.14	94.00	1.61	-1.60	0.21
	9119.00	89.4000	357.9000	1833.72	628.92	7131.07	1813.90	2992.13	96.00	1.04	0.83	0.63
	9212.00	89.2000	358.4000	1926.66	625.92	7132.21	1906.89	3085.12	93.00	0.58	-0.22	0.54
	9307.00	90.0000	358.7000	2021.63	623.52	7132.87	2001.88	3180.11	95.00	0.90	0.84	0.32
	9496.00	88.5000	358.3000	2210.54	618.57	7135.35	2190.86	3369.09	189.00	0.82	-0.79	-0.21
	9686.00	88.3000	359.7000	2400.44	615.26	7140.65	2380.77	3559.01	190.00	0.74	-0.11	0.74
	9876.00	90.8000	0.1000	2590.41	614.93	7142.15	2570.67	3748.99	190.00	1.33	1.32	0.21
	10067.00	90.6000	0.1000	2781.40	615.26	7139.81	2761.56	3939.98	191.00	0.10	-0.10	0.00
	10161.00	90.1000	358.1000	2875.38	613.78	7139.24	2855.54	4033.97	94.00	2.19	-0.53	-2.13
	10256.00	90.8000	358.5000	2970.34	610.96	7138.49	2950.54	4128.97	95.00	0.85	0.74	0.42
	10445.00	88.9000	357.6000	3159.21	604.53	7138.99	3139.52	4317.96	189.00	1.11	-1.01	-0.48
Tie	MD	Incl	Azim	North	East	TVD	VS	Incr VS	Crs Len	DLS	Build	Turn
	ft	deg	deg	ft	ft	ft	ft	ft	ft	deg/100ft	deg/100ft	deg/100ft
	10539.00	89.3000	357.7000	3253.12	600.68	7140.46	3233.51	4411.94	94.00	0.44	0.43	0.11
	10729.00	90.7000	358.0000	3442.99	593.55	7140.46	3423.50	4601.94	190.00	0.75	0.74	0.16
	10918.00	89.9000	357.3000	3631.82	585.80	7139.47	3612.48	4790.93	189.00	0.56	-0.42	-0.37
	11107.00	91.1000	357.3000	3820.60	576.90	7137.82	3801.44	4979.92	189.00	0.63	0.63	0.00
	11202.00	90.2000	357.2000	3915.48	572.34	7136.75	3896.42	5074.92	95.00	0.95	-0.95	-0.11
	11297.00	87.7000	356.5000	4010.32	567.12	7138.49	3991.37	5169.89	95.00	2.73	-2.63	-0.74
	11487.00	88.8000	357.2000	4199.94	556.69	7144.29	4181.22	5359.80	190.00	0.69	0.58	0.37
	11642.00	89.2000	357.6000	4354.75	549.66	7146.99	4336.17	5514.78	155.00	0.36	0.26	0.26