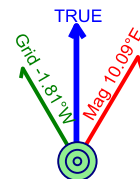




**Job Number:** 15093  
**Company:** Black Hills Plateau Production LLC  
**Lease/Well:** Homer Deep Unit 7-23CH  
**Location:** Garfield County, CO  
**Rig Name:** Ensign 161  
**State/Country:** CO/ Garfield  
**Country:** USA  
**Elev. GL:** 5673.00 ft  
**RKB:** 25.00 ft  
**System:** US State Plane 1983  
**Group:** Colorado Central Zone  
**Datum:** GRS80  
**Mag. Decl.:** 10.09° (C:\HawkEye\IGRF2015.MIF)  
**Grid Conv.:** -1.80981 W  
**Date:** Wednesday, July 22, 2015

### NOVA Directional Inc. Survey Report

Calculated by HawkEye Software  
 Minimum Curvature Method  
 Vertical Section Plane 147.70°  
 Northing (US ft): 1573232.94 Easting (US ft): 2188915.52  
 Latitude: 39°22'19.5960" N Longitude: -108°22'10.4520" W  
 Well Location: 1886 FSL, 2471 FWL, Section 7, T8S, R98W, Sixth Principal Meridian, Garfield County, CO  
 Direction Reference: True North



Measured Depth (Ft)	INC Deg	AZM Deg	TVD (Ft)	NS (Ft)	EW (Ft)	VS (Ft)	Closure (Ft)	Closure Dir Deg	DLS %/100 Ft
<b>Surface</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>First NOVA MWD survey</b>									
241.00	0.20	114.10	241.00	-0.17	0.38	0.35	0.42	114.10	0.08
334.00	0.80	125.40	334.00	-0.61	1.06	1.09	1.23	120.06	0.65
428.00	0.50	126.90	427.99	-1.24	1.92	2.08	2.29	122.81	0.32
521.00	1.10	156.50	520.98	-2.30	2.60	3.34	3.48	131.48	0.76
613.00	1.20	158.00	612.96	-4.01	3.32	5.16	5.20	140.37	0.11
705.00	1.30	175.90	704.94	-5.94	3.75	7.03	7.03	147.71	0.44
798.00	1.50	162.10	797.91	-8.15	4.20	9.14	9.17	152.72	0.42
891.00	2.10	172.30	890.87	-11.00	4.81	11.86	12.00	156.40	0.73
955.00	2.30	170.50	954.82	-13.43	5.17	14.11	14.39	158.92	0.33
1064.00	2.50	173.60	1063.72	-17.95	5.80	18.27	18.86	162.09	0.22
1160.00	2.10	172.50	1159.65	-21.77	6.26	21.75	22.65	163.95	0.42
1252.00	2.30	177.80	1251.58	-25.29	6.55	24.88	26.12	165.47	0.31
1341.00	1.10	186.20	1340.54	-27.92	6.53	27.09	28.67	166.84	1.37
1431.00	0.90	187.30	1430.52	-29.48	6.35	28.31	30.16	167.85	0.22
1520.00	0.20	121.20	1519.52	-30.25	6.39	28.99	30.92	168.07	0.94
1610.00	0.40	80.00	1609.52	-30.28	6.84	29.25	31.04	167.28	0.31
1699.00	0.40	81.10	1698.52	-30.18	7.45	29.49	31.08	166.14	0.01
1788.00	0.20	118.70	1787.52	-30.21	7.89	29.75	31.22	165.36	0.30
1878.00	0.20	61.10	1877.51	-30.20	8.17	29.89	31.29	164.87	0.21
1967.00	0.40	204.50	1966.51	-30.41	8.17	30.07	31.49	164.96	0.64
2057.00	0.50	216.10	2056.51	-31.02	7.81	30.39	31.98	165.86	0.15
2146.00	0.70	203.10	2145.51	-31.83	7.37	30.84	32.67	166.96	0.27
2235.00	0.50	191.50	2234.50	-32.71	7.08	31.43	33.47	167.79	0.26
2325.00	0.50	208.70	2324.50	-33.44	6.81	31.91	34.13	168.49	0.17
2414.00	0.70	202.00	2413.49	-34.28	6.42	32.41	34.88	169.39	0.24
2504.00	0.70	196.40	2503.49	-35.32	6.06	33.09	35.84	170.26	0.08
2593.00	0.70	192.90	2592.48	-36.37	5.79	33.84	36.83	170.96	0.05
2682.00	1.20	198.20	2681.47	-37.79	5.37	34.81	38.17	171.91	0.57
2771.00	0.40	174.60	2770.46	-38.98	5.11	35.68	39.32	172.53	0.95
2861.00	0.40	174.60	2860.46	-39.61	5.17	36.24	39.94	172.56	0.00
2950.00	0.70	194.70	2949.45	-40.44	5.06	36.89	40.76	172.87	0.40
3039.00	0.50	55.40	3038.45	-40.75	5.24	37.25	41.08	172.67	1.27
3129.00	0.40	57.20	3128.45	-40.36	5.83	37.23	40.77	171.78	0.11
3218.00	0.40	190.10	3217.45	-40.49	6.04	37.45	40.94	171.52	0.82
3307.00	0.70	24.10	3306.44	-40.30	6.21	37.38	40.78	171.25	1.23
3397.00	0.70	29.10	3396.44	-39.32	6.70	36.81	39.89	170.33	0.07
3486.00	0.40	64.20	3485.43	-38.71	7.24	36.59	39.38	169.40	0.49
3575.00	0.40	118.70	3574.43	-38.72	7.79	36.90	39.50	168.62	0.41
3665.00	0.70	19.90	3664.43	-38.36	8.26	36.83	39.24	167.85	0.95

Measured Depth (Ft)	INC Deg	AZM Deg	TVD (Ft)	NS (Ft)	EW (Ft)	VS (Ft)	Closure (Ft)	Closure Dir Deg	DLS °/100 Ft
3754.00	0.50	359.90	3753.42	-37.46	8.44	36.17	38.40	167.30	0.32
3843.00	0.20	356.40	3842.42	-36.91	8.43	35.71	37.87	167.14	0.34
3932.00	0.20	228.40	3931.42	-36.86	8.30	35.60	37.79	167.30	0.40
4022.00	0.50	225.20	4021.42	-37.24	7.91	35.71	38.07	168.01	0.33
4111.00	0.50	344.40	4110.42	-37.14	7.53	35.42	37.90	168.54	0.97
4201.00	0.20	332.50	4200.42	-36.63	7.35	34.89	37.36	168.65	0.34
4290.00	0.40	265.30	4289.42	-36.51	6.97	34.59	37.17	169.20	0.42
4379.00	0.70	218.60	4378.41	-36.96	6.32	34.62	37.50	170.30	0.58
4469.00	0.50	227.30	4468.41	-37.66	5.69	34.87	38.09	171.41	0.24
4558.00	0.50	78.60	4557.41	-37.85	5.78	35.08	38.29	171.31	1.08
4647.00	0.50	87.10	4646.40	-37.75	6.55	35.41	38.31	170.15	0.08
4737.00	0.70	140.50	4736.40	-38.15	7.29	36.15	38.85	169.18	0.63
4826.00	0.90	171.80	4825.39	-39.27	7.74	37.33	40.02	168.85	0.53
4915.00	0.40	252.30	4914.39	-40.05	7.54	37.89	40.76	169.33	1.04
5005.00	0.90	227.30	5004.38	-40.63	6.72	37.93	41.18	170.60	0.63
5094.00	0.20	64.60	5093.38	-41.03	6.35	38.08	41.52	171.20	1.23
5183.00	1.20	51.60	5182.37	-40.39	7.22	38.00	41.03	169.86	1.13
5272.00	0.70	79.00	5271.36	-39.71	8.49	38.10	40.60	167.94	0.74
5362.00	0.50	138.80	5361.35	-39.90	9.28	38.68	40.96	166.90	0.69
5451.00	0.70	41.40	5450.35	-39.78	9.90	38.92	40.99	166.03	1.02
5540.00	0.50	23.80	5539.34	-39.02	10.42	38.55	40.38	165.05	0.30
5629.00	0.50	257.60	5628.34	-38.75	10.19	38.20	40.06	165.26	1.00
5719.00	1.10	218.90	5718.33	-39.50	9.27	38.34	40.58	166.80	0.86
5808.00	1.80	220.70	5807.30	-41.23	7.82	39.03	41.96	169.26	0.79
5897.00	1.90	218.60	5896.26	-43.44	5.99	39.92	43.85	172.15	0.14
5987.00	2.30	217.50	5986.20	-46.04	3.96	41.03	46.21	175.09	0.45
6076.00	1.80	196.40	6075.14	-48.80	2.48	42.57	48.86	177.10	1.01
6165.00	1.80	196.80	6164.10	-51.48	1.68	44.41	51.50	178.13	0.01
6210.00	2.60	152.50	6209.07	-53.06	1.94	45.89	53.09	177.90	4.04
6255.00	7.00	123.60	6253.90	-55.48	4.70	49.41	55.68	175.16	10.86
6299.00	11.80	112.70	6297.30	-58.70	11.09	55.55	59.74	169.30	11.59
6344.00	16.00	108.20	6340.98	-62.42	21.23	64.10	65.93	161.22	9.63
6389.00	20.10	106.80	6383.75	-66.59	34.53	74.74	75.01	152.59	9.16
6434.00	23.60	106.40	6425.51	-71.37	50.58	87.35	87.48	144.68	7.78
6478.00	27.10	107.10	6465.27	-76.81	68.61	101.59	102.99	138.23	7.98
6523.00	30.40	107.80	6504.72	-83.30	89.25	118.11	122.09	133.02	7.37
6587.00	32.40	105.70	6559.35	-92.89	121.18	143.28	152.69	127.47	3.56
6617.00	32.20	108.20	6584.70	-97.57	136.52	155.42	167.80	125.55	4.50
6648.00	32.00	108.50	6610.96	-102.75	152.15	168.15	183.60	124.03	0.83
6679.00	31.70	108.90	6637.30	-108.00	167.65	180.87	199.42	122.79	1.18
6709.00	31.50	108.90	6662.85	-113.09	182.52	193.12	214.71	121.78	0.67
6740.00	31.10	108.90	6689.34	-118.31	197.75	205.67	230.44	120.89	1.29
6771.00	30.30	109.20	6715.99	-123.47	212.71	218.03	245.95	120.13	2.63
6802.00	30.10	109.60	6742.79	-128.65	227.42	230.27	261.29	119.50	0.92
6832.00	29.60	109.90	6768.80	-133.70	241.48	242.04	276.02	118.97	1.74
6863.00	29.40	109.90	6795.79	-138.89	255.83	254.10	291.10	118.50	0.65
6894.00	29.00	109.90	6822.85	-144.04	270.05	266.05	306.06	118.07	1.29
6924.00	28.50	109.90	6849.15	-148.95	283.62	277.45	320.35	117.71	1.67
6955.00	28.20	110.60	6876.43	-154.05	297.43	289.14	334.95	117.38	1.44
6985.00	27.60	110.30	6902.94	-158.95	310.58	300.32	348.89	117.10	2.05
7016.00	27.10	110.60	6930.48	-163.93	323.93	311.65	363.04	116.84	1.67
7047.00	28.20	112.70	6957.94	-169.24	337.29	323.28	377.37	116.65	4.74
7077.00	29.60	115.50	6984.20	-175.16	350.52	335.36	391.85	116.55	6.49
<b>CH LP, Dist. 228.76 ft , target is 0.00 ft north, 0.00 ft east</b>									
7088.35	30.10	116.97	6994.04	-177.66	355.59	340.18	397.50	116.55	7.79
7108.00	31.00	119.40	7010.97	-182.38	364.39	348.87	407.48	116.59	7.79

Measured Depth (Ft)	INC Deg	AZM Deg	TVD (Ft)	NS (Ft)	EW (Ft)	VS (Ft)	Closure (Ft)	Closure Dir Deg	DLS °/100 Ft
7139.00	32.00	123.30	7037.40	-190.81	378.21	363.38	423.62	116.77	7.32
<b>CH BHL, Dist. 9991.98 ft , target is 0.00 ft north, 0.00 ft east</b>									
7153.60	32.61	124.45	7049.75	-195.16	384.69	370.52	431.36	116.90	5.92
7170.00	33.30	125.70	7063.51	-200.28	391.99	378.75	440.19	117.06	5.92
7200.00	35.20	128.20	7088.30	-210.44	405.47	394.54	456.83	117.43	7.88
7231.00	37.30	130.00	7113.30	-222.00	419.69	411.91	474.79	117.88	7.59
7262.00	39.40	131.70	7137.61	-234.59	434.23	430.32	493.55	118.38	7.58
7292.00	41.50	132.10	7160.44	-247.59	448.72	449.05	512.49	118.89	7.05
7323.00	44.30	132.40	7183.15	-261.77	464.34	469.39	533.04	119.41	9.06
7354.00	46.60	132.10	7204.89	-276.63	480.69	490.68	554.60	119.92	7.45
7384.00	49.30	131.00	7224.99	-291.40	497.36	512.07	576.44	120.37	9.40
7415.00	52.10	130.00	7244.62	-306.97	515.60	534.99	600.07	120.77	9.37
7446.00	54.20	128.60	7263.21	-322.68	534.80	558.52	624.61	121.11	7.68
7477.00	56.70	128.20	7280.79	-338.54	554.81	582.62	649.94	121.39	8.13
7507.00	59.60	127.90	7296.62	-354.24	574.88	606.61	675.25	121.64	9.70
7538.00	63.00	128.20	7311.50	-371.00	596.28	632.22	702.28	121.89	11.00
7570.00	65.30	127.90	7325.45	-388.75	618.96	659.33	730.91	122.13	7.24
7602.00	67.90	128.20	7338.16	-406.85	642.09	686.99	760.13	122.36	8.17
7633.00	70.40	128.60	7349.20	-424.84	664.79	714.33	788.94	122.58	8.15
7665.00	72.30	129.30	7359.43	-443.90	688.36	743.04	819.08	122.82	6.29
7697.00	74.40	130.30	7368.60	-463.52	711.92	772.21	849.52	123.07	7.21
7729.00	75.80	132.10	7376.83	-483.89	735.18	801.86	880.14	123.35	6.98
7761.00	78.80	134.50	7383.86	-505.30	757.89	832.09	910.90	123.69	11.89
7793.00	82.50	135.90	7389.06	-527.70	780.14	862.91	941.85	124.08	12.34
7825.00	85.20	137.70	7392.49	-550.89	801.91	894.15	972.90	124.49	10.12
7857.00	86.60	140.50	7394.78	-575.02	822.81	925.71	1003.82	124.95	9.76
7889.00	89.20	142.30	7395.95	-600.00	842.75	957.49	1034.52	125.45	9.88
7921.00	89.70	142.30	7396.26	-625.32	862.32	989.34	1065.19	125.95	1.56
7952.00	89.70	143.70	7396.42	-650.08	880.98	1020.24	1094.86	126.42	4.52
7984.00	89.60	146.10	7396.61	-676.26	899.38	1052.20	1125.26	126.94	7.51
8016.00	90.10	145.80	7396.70	-702.77	917.29	1084.18	1155.56	127.46	1.82
8048.00	90.40	145.40	7396.56	-729.17	935.37	1116.16	1186.01	127.94	1.56
8080.00	90.60	146.80	7396.28	-755.73	953.22	1148.15	1216.45	128.41	4.42
8112.00	90.80	146.80	7395.89	-782.51	970.74	1180.14	1246.86	128.87	0.62
8144.00	91.30	146.50	7395.30	-809.23	988.33	1212.13	1277.36	129.31	1.82
8176.00	91.50	146.50	7394.52	-835.91	1005.98	1244.11	1307.96	129.72	0.62
8208.00	91.80	145.80	7393.60	-862.47	1023.80	1276.09	1338.67	130.11	2.38
8240.00	92.20	145.80	7392.48	-888.92	1041.78	1308.05	1369.48	130.47	1.25
8272.00	92.60	145.40	7391.14	-915.31	1059.84	1340.00	1400.37	130.81	1.77
8303.00	92.40	146.10	7389.79	-940.90	1077.27	1370.95	1430.32	131.13	2.35
8335.00	92.60	146.50	7388.39	-967.50	1095.01	1402.91	1461.20	131.46	1.40
8367.00	92.90	146.10	7386.86	-994.09	1112.74	1434.87	1492.12	131.78	1.56
8399.00	93.30	145.40	7385.13	-1020.51	1130.73	1466.80	1523.15	132.07	2.52
8431.00	93.80	145.10	7383.15	-1046.75	1148.93	1498.71	1554.26	132.34	1.82
8463.00	92.00	145.40	7381.53	-1073.01	1167.15	1530.64	1585.43	132.59	5.70
8495.00	91.70	145.10	7380.49	-1099.28	1185.38	1562.59	1616.65	132.84	1.33
8527.00	92.00	144.70	7379.46	-1125.45	1203.77	1594.54	1647.94	133.07	1.56
8559.00	92.20	144.40	7378.29	-1151.50	1222.32	1626.47	1679.29	133.29	1.13
8590.00	91.80	145.10	7377.21	-1176.80	1240.20	1657.41	1709.66	133.50	2.60
8627.00	91.70	147.90	7376.08	-1207.64	1260.61	1694.38	1745.71	133.77	7.57
8659.00	92.00	147.90	7375.04	-1234.73	1277.60	1726.36	1776.75	134.02	0.94
8691.00	92.40	147.20	7373.81	-1261.72	1294.76	1758.34	1807.85	134.26	2.52
8721.00	92.70	146.80	7372.48	-1286.85	1311.08	1788.31	1837.10	134.47	1.67
8752.00	92.90	146.10	7370.96	-1312.66	1328.19	1819.26	1867.39	134.66	2.35
8782.00	93.30	145.80	7369.34	-1337.48	1344.97	1849.20	1896.78	134.84	1.67
8813.00	92.60	146.10	7367.75	-1363.13	1362.30	1880.15	1927.17	135.02	2.46

Measured Depth (Ft)	INC Deg	AZM Deg	TVD (Ft)	NS (Ft)	EW (Ft)	VS (Ft)	Closure (Ft)	Closure Dir Deg	DLS °/100 Ft
8843.00	92.40	146.50	7366.44	-1388.06	1378.93	1910.11	1956.57	135.19	1.49
8874.00	92.40	146.80	7365.14	-1413.93	1395.96	1941.08	1986.93	135.37	0.97
8905.00	92.60	147.50	7363.79	-1439.95	1412.76	1972.05	2017.26	135.55	2.35
8935.00	92.70	148.20	7362.40	-1465.32	1428.70	2002.01	2046.55	135.72	2.35
8966.00	93.10	147.90	7360.83	-1491.59	1445.09	2032.97	2076.81	135.91	1.61
8997.00	93.40	147.50	7359.08	-1517.75	1461.63	2063.92	2107.11	136.08	1.61
9027.00	93.30	147.20	7357.32	-1542.97	1477.78	2093.87	2136.49	136.24	1.05
9058.00	92.90	147.50	7355.65	-1569.03	1494.48	2124.83	2166.88	136.39	1.61
9089.00	92.70	147.50	7354.13	-1595.15	1511.12	2155.79	2197.27	136.55	0.65
9120.00	92.60	148.20	7352.70	-1621.37	1527.60	2186.75	2227.64	136.71	2.28
9150.00	92.70	147.50	7351.31	-1646.74	1543.55	2216.72	2257.05	136.85	2.35
9181.00	93.30	146.80	7349.69	-1672.75	1560.34	2247.68	2287.52	136.99	2.97
9212.00	92.70	146.50	7348.07	-1698.61	1577.36	2278.63	2318.04	137.12	2.16
9242.00	92.40	147.50	7346.73	-1723.74	1593.68	2308.60	2347.57	137.25	3.48
9273.00	92.60	147.50	7345.38	-1749.86	1610.32	2339.57	2378.05	137.38	0.65
9304.00	92.70	148.60	7343.95	-1776.14	1626.71	2370.53	2408.49	137.51	3.56
9334.00	93.30	148.90	7342.38	-1801.75	1642.25	2400.49	2437.88	137.65	2.24
9365.00	93.60	148.60	7340.51	-1828.20	1658.30	2431.43	2468.26	137.79	1.37
9396.00	94.10	148.20	7338.43	-1854.55	1674.51	2462.35	2498.66	137.92	2.06
9426.00	94.30	147.90	7336.23	-1879.93	1690.34	2492.27	2528.12	138.04	1.20
9457.00	94.10	147.90	7333.96	-1906.12	1706.77	2523.19	2558.59	138.16	0.65
9488.00	94.10	147.90	7331.74	-1932.32	1723.20	2554.11	2589.07	138.27	0.00
9518.00	94.70	147.50	7329.44	-1957.60	1739.18	2584.02	2618.58	138.38	2.40
9549.00	92.90	147.50	7327.39	-1983.69	1755.80	2614.95	2649.12	138.49	5.81
9580.00	92.70	147.50	7325.87	-2009.80	1772.44	2645.91	2679.71	138.59	0.65
9610.00	93.30	147.50	7324.30	-2035.07	1788.54	2675.87	2709.31	138.69	2.00
9641.00	91.80	147.50	7322.93	-2061.19	1805.18	2706.84	2739.92	138.79	4.84
9672.00	91.70	147.20	7321.98	-2087.27	1821.89	2737.83	2770.56	138.88	1.02
9703.00	90.60	147.90	7321.36	-2113.43	1838.52	2768.82	2801.20	138.98	4.21
9733.00	90.60	147.90	7321.04	-2138.84	1854.46	2798.82	2830.84	139.07	0.00
9764.00	91.00	147.50	7320.61	-2165.04	1871.03	2829.81	2861.49	139.17	1.82
9795.00	91.30	147.20	7319.99	-2191.14	1887.75	2860.81	2892.17	139.25	1.37
9825.00	91.50	146.50	7319.25	-2216.25	1904.15	2890.79	2921.91	139.33	2.43
9856.00	91.30	146.10	7318.50	-2242.03	1921.34	2921.78	2952.67	139.40	1.44
9886.00	91.10	146.50	7317.87	-2266.98	1937.98	2951.76	2982.45	139.47	1.49
9917.00	91.00	147.20	7317.30	-2292.93	1954.93	2982.75	3013.19	139.55	2.28
9948.00	91.00	147.90	7316.76	-2319.09	1971.56	3013.75	3043.88	139.63	2.26
9979.00	91.30	148.20	7316.14	-2345.39	1987.97	3044.74	3074.55	139.72	1.37
10009.00	91.10	148.60	7315.51	-2370.93	2003.68	3074.73	3104.20	139.80	1.49
10040.00	91.30	148.20	7314.86	-2397.33	2019.92	3105.72	3134.85	139.88	1.44
10071.00	91.80	148.20	7314.02	-2423.67	2036.25	3136.71	3165.51	139.96	1.61
10101.00	92.40	147.90	7312.92	-2449.11	2052.12	3166.69	3195.20	140.04	2.24
10132.00	92.70	146.80	7311.54	-2475.18	2068.82	3197.66	3225.92	140.11	3.67
10163.00	92.90	146.80	7310.03	-2501.09	2085.78	3228.62	3256.67	140.17	0.65
10193.00	92.40	147.20	7308.64	-2526.22	2102.10	3258.58	3286.43	140.24	2.13
10224.00	92.90	146.80	7307.21	-2552.19	2118.96	3289.55	3317.18	140.30	2.06
10255.00	92.40	146.80	7305.77	-2578.11	2135.92	3320.51	3347.95	140.36	1.61
10285.00	91.50	147.50	7304.75	-2603.29	2152.18	3350.49	3377.73	140.42	3.80
10316.00	91.80	147.20	7303.86	-2629.38	2168.90	3381.48	3408.49	140.48	1.37
10347.00	92.20	147.50	7302.78	-2655.47	2185.62	3412.46	3439.25	140.54	1.61
10378.00	91.50	148.20	7301.78	-2681.70	2202.10	3443.44	3469.98	140.61	3.19
10408.00	91.80	147.50	7300.91	-2707.09	2218.06	3473.43	3499.73	140.67	2.54
10439.00	92.60	147.50	7299.72	-2733.22	2234.71	3504.40	3530.49	140.73	2.58
10471.00	91.80	147.90	7298.50	-2760.24	2251.79	3536.38	3562.23	140.79	2.79
10503.00	91.50	148.20	7297.58	-2787.39	2268.72	3568.37	3593.97	140.86	1.33
10535.00	92.20	148.20	7296.54	-2814.57	2285.57	3600.35	3625.69	140.92	2.19

Measured Depth (Ft)	INC Deg	AZM Deg	TVD (Ft)	NS (Ft)	EW (Ft)	VS (Ft)	Closure (Ft)	Closure Dir Deg	DLS °/100 Ft
10567.00	91.70	148.90	7295.45	-2841.85	2302.26	3632.33	3657.39	140.99	2.69
10598.00	91.70	149.30	7294.53	-2868.44	2318.17	3663.30	3688.07	141.06	1.29
10630.00	92.20	149.30	7293.44	-2895.94	2334.50	3695.27	3719.72	141.13	1.56
10662.00	92.70	148.60	7292.08	-2923.33	2350.99	3727.23	3751.40	141.19	2.69
10694.00	93.10	148.60	7290.46	-2950.61	2367.64	3759.19	3783.09	141.26	1.25
10726.00	92.90	148.20	7288.78	-2977.82	2384.38	3791.14	3814.80	141.32	1.40
10758.00	92.40	148.20	7287.30	-3004.99	2401.23	3823.11	3846.54	141.37	1.56
10790.00	92.00	148.60	7286.08	-3032.23	2417.98	3855.08	3878.28	141.43	1.77
10822.00	91.70	148.90	7285.04	-3059.57	2434.58	3887.06	3910.00	141.49	1.33
10854.00	92.20	148.90	7283.95	-3086.95	2451.10	3919.03	3941.72	141.55	1.56
10885.00	92.70	148.60	7282.63	-3113.43	2467.16	3950.00	3972.45	141.61	1.88
10917.00	92.40	148.60	7281.20	-3140.72	2483.82	3981.96	4004.18	141.66	0.94
10949.00	91.80	148.60	7280.03	-3168.01	2500.48	4013.94	4035.93	141.72	1.87
10981.00	92.40	148.90	7278.86	-3195.35	2517.07	4045.91	4067.67	141.77	2.10
11013.00	92.90	148.60	7277.38	-3222.68	2533.65	4077.87	4099.40	141.83	1.82
11045.00	91.80	147.50	7276.07	-3249.81	2550.57	4109.84	4131.18	141.87	4.86
11077.00	91.10	147.90	7275.26	-3276.85	2567.66	4141.83	4163.01	141.92	2.52
11109.00	91.30	147.20	7274.59	-3303.85	2584.83	4173.83	4194.85	141.96	2.27
11141.00	91.80	147.20	7273.72	-3330.73	2602.16	4205.81	4226.70	142.00	1.56
11173.00	92.40	147.20	7272.55	-3357.61	2619.48	4237.79	4258.55	142.04	1.87
11205.00	92.60	146.50	7271.15	-3384.38	2636.96	4269.76	4290.41	142.08	2.27
11236.00	91.80	146.50	7269.96	-3410.21	2654.06	4300.73	4321.29	142.11	2.58
11268.00	91.10	146.50	7269.15	-3436.89	2671.72	4332.71	4353.19	142.14	2.19
11300.00	90.10	146.50	7268.82	-3463.57	2689.38	4364.70	4385.10	142.17	3.12
11332.00	89.60	146.80	7268.90	-3490.30	2706.97	4396.69	4417.00	142.20	1.82
11364.00	89.90	146.50	7269.04	-3517.03	2724.56	4428.69	4448.90	142.24	1.33
11396.00	89.60	146.80	7269.18	-3543.76	2742.15	4460.68	4480.81	142.27	1.33
11428.00	89.60	147.20	7269.41	-3570.60	2759.58	4492.68	4512.70	142.30	1.25
11460.00	89.90	147.20	7269.54	-3597.49	2776.92	4524.68	4544.58	142.34	0.94
11492.00	90.40	147.90	7269.46	-3624.50	2794.09	4556.68	4576.45	142.37	2.69
11524.00	90.60	148.20	7269.18	-3651.65	2811.02	4588.67	4608.29	142.41	1.13
11556.00	91.10	147.90	7268.71	-3678.80	2827.95	4620.67	4640.14	142.45	1.82
11588.00	91.80	148.20	7267.90	-3705.94	2844.88	4652.66	4671.97	142.49	2.38
11619.00	92.60	148.60	7266.71	-3732.33	2861.11	4683.63	4702.79	142.53	2.88
11651.00	93.10	147.90	7265.12	-3759.50	2877.93	4715.59	4734.59	142.57	2.69
11683.00	92.20	147.50	7263.64	-3786.52	2895.01	4747.56	4766.43	142.60	3.08
11715.00	91.30	147.90	7262.66	-3813.56	2912.10	4779.54	4798.29	142.63	3.08
11769.00	91.30	145.80	7261.43	-3858.75	2941.62	4833.52	4852.12	142.68	3.89
11799.00	92.00	146.10	7260.57	-3883.60	2958.41	4863.49	4882.06	142.70	2.54
11830.00	92.60	146.80	7259.33	-3909.41	2975.53	4894.46	4912.97	142.72	2.97
11861.00	92.60	146.50	7257.92	-3935.28	2992.55	4925.42	4943.87	142.75	0.97
11892.00	92.70	146.50	7256.49	-3961.11	3009.65	4956.38	4974.77	142.77	0.32
11922.00	92.90	146.80	7255.02	-3986.14	3026.12	4986.34	5004.66	142.80	1.20
11953.00	92.40	147.20	7253.59	-4012.11	3042.98	5017.31	5035.55	142.82	2.06
11984.00	91.80	147.20	7252.45	-4038.15	3059.77	5048.28	5066.44	142.85	1.94
12014.00	92.20	147.20	7251.40	-4063.35	3076.01	5078.26	5096.33	142.87	1.33
12045.00	92.40	147.50	7250.16	-4089.43	3092.72	5109.24	5127.21	142.90	1.16
12076.00	92.20	147.20	7248.92	-4115.51	3109.43	5140.21	5158.10	142.93	1.16
12106.00	92.40	147.20	7247.71	-4140.71	3125.67	5170.19	5187.99	142.95	0.67
12137.00	92.90	147.50	7246.28	-4166.78	3142.37	5201.15	5218.87	142.98	1.88
12168.00	92.90	148.20	7244.71	-4192.99	3158.85	5232.11	5249.71	143.01	2.26
12199.00	93.10	147.90	7243.09	-4219.26	3175.23	5263.07	5280.55	143.04	1.16
12229.00	93.10	147.90	7241.47	-4244.64	3191.15	5293.03	5310.40	143.06	0.00
12260.00	93.30	148.60	7239.74	-4270.96	3207.44	5323.98	5341.23	143.09	2.35
12291.00	92.40	149.70	7238.19	-4297.54	3223.31	5354.93	5372.02	143.13	4.58
12321.00	92.40	149.70	7236.94	-4323.42	3238.44	5384.88	5401.79	143.17	0.00

Measured Depth (Ft)	INC Deg	AZM Deg	TVD (Ft)	NS (Ft)	EW (Ft)	VS (Ft)	Closure (Ft)	Closure Dir Deg	DLS °/100 Ft
12352.00	92.40	149.70	7235.64	-4350.16	3254.06	5415.84	5432.57	143.20	0.00
12384.00	92.20	149.30	7234.36	-4377.71	3270.29	5447.80	5464.35	143.24	1.40
12416.00	92.40	149.30	7233.07	-4405.20	3286.61	5479.76	5496.15	143.27	0.63
12448.00	92.60	149.30	7231.68	-4432.69	3302.94	5511.71	5527.94	143.31	0.62
12479.00	92.70	149.30	7230.24	-4459.32	3318.75	5542.67	5558.74	143.34	0.32
12511.00	93.30	149.30	7228.57	-4486.79	3335.06	5574.61	5590.52	143.38	1.87
12543.00	93.10	148.60	7226.78	-4514.17	3351.54	5606.56	5622.32	143.41	2.27
12575.00	92.20	147.90	7225.30	-4541.35	3368.36	5638.52	5654.17	143.44	3.56
12607.00	91.80	147.50	7224.19	-4568.38	3385.45	5670.50	5686.07	143.46	1.77
12639.00	91.80	147.90	7223.18	-4595.41	3402.54	5702.48	5717.96	143.48	1.25
12671.00	91.80	147.50	7222.17	-4622.45	3419.63	5734.47	5749.86	143.51	1.25
12703.00	92.00	147.90	7221.11	-4649.48	3436.72	5766.45	5781.76	143.53	1.40
12734.00	92.40	147.90	7219.92	-4675.72	3453.18	5797.43	5812.65	143.55	1.29
12766.00	92.40	147.90	7218.58	-4702.81	3470.17	5829.40	5844.53	143.58	0.00
12798.00	92.40	147.90	7217.24	-4729.89	3487.16	5861.37	5876.41	143.60	0.00
12830.00	92.20	147.90	7215.96	-4756.98	3504.15	5893.34	5908.29	143.62	0.63
12862.00	91.80	147.90	7214.84	-4784.07	3521.15	5925.32	5940.19	143.65	1.25
12894.00	91.80	147.90	7213.84	-4811.16	3538.14	5957.31	5972.08	143.67	0.00
12926.00	91.80	148.20	7212.83	-4838.30	3555.07	5989.29	6003.97	143.69	0.94
12958.00	92.20	148.20	7211.72	-4865.48	3571.92	6021.27	6035.85	143.72	1.25
12990.00	92.40	148.60	7210.43	-4892.72	3588.68	6053.24	6067.72	143.74	1.40
13022.00	92.60	148.60	7209.04	-4920.00	3605.33	6085.21	6099.58	143.77	0.62
13053.00	92.40	148.60	7207.68	-4946.44	3621.47	6116.18	6130.44	143.79	0.65
13085.00	92.20	148.60	7206.40	-4973.73	3638.13	6148.15	6162.30	143.82	0.63
13117.00	92.00	148.60	7205.23	-5001.02	3654.79	6180.12	6194.17	143.84	0.63
13149.00	92.00	148.20	7204.11	-5028.26	3671.55	6212.10	6226.05	143.86	1.25
13181.00	92.00	148.60	7202.99	-5055.50	3688.30	6244.08	6257.93	143.89	1.25
13213.00	92.20	148.60	7201.82	-5082.80	3704.96	6276.05	6289.80	143.91	0.63
13245.00	92.40	148.60	7200.54	-5110.09	3721.62	6308.02	6321.67	143.93	0.63
13277.00	92.40	148.90	7199.20	-5137.42	3738.21	6339.99	6353.53	143.96	0.94
13309.00	92.40	148.60	7197.86	-5164.76	3754.80	6371.95	6385.39	143.98	0.94
13340.00	92.20	148.60	7196.61	-5191.19	3770.93	6402.93	6416.26	144.00	0.65
13372.00	92.00	148.60	7195.44	-5218.49	3787.59	6434.90	6448.14	144.03	0.63
13404.00	92.00	148.90	7194.32	-5245.83	3804.19	6466.88	6480.01	144.05	0.94
13436.00	92.00	148.20	7193.21	-5273.11	3820.87	6498.85	6511.89	144.07	2.19
13468.00	91.70	147.50	7192.17	-5300.19	3837.89	6530.83	6543.81	144.09	2.38
13500.00	92.00	147.20	7191.14	-5327.12	3855.15	6562.82	6575.74	144.11	1.33
13532.00	92.60	147.50	7189.86	-5354.04	3872.40	6594.79	6607.66	144.12	2.10
13564.00	92.90	147.90	7188.32	-5381.06	3889.48	6626.75	6639.56	144.14	1.56
13596.00	92.90	147.90	7186.70	-5408.13	3906.46	6658.71	6671.45	144.16	0.00
13628.00	92.40	147.50	7185.22	-5435.15	3923.54	6690.68	6703.36	144.18	2.00
13659.00	91.30	147.20	7184.22	-5461.24	3940.25	6721.66	6734.30	144.19	3.68
13691.00	91.50	147.50	7183.44	-5488.17	3957.51	6753.65	6766.24	144.20	1.13
13723.00	91.50	147.50	7182.60	-5515.15	3974.70	6785.64	6798.17	144.22	0.00
13756.00	91.50	148.20	7181.74	-5543.08	3992.26	6818.63	6831.10	144.24	2.12
13788.00	91.50	148.20	7180.90	-5570.27	4009.11	6850.62	6863.01	144.26	0.00
13819.00	91.70	148.20	7180.03	-5596.61	4025.44	6881.60	6893.92	144.27	0.65
13851.00	91.70	148.60	7179.09	-5623.85	4042.20	6913.59	6925.83	144.29	1.25
13883.00	91.80	148.60	7178.11	-5651.15	4058.87	6945.57	6957.72	144.31	0.31
13915.00	91.80	148.90	7177.10	-5678.49	4075.46	6977.55	6989.61	144.33	0.94
13947.00	92.00	148.90	7176.04	-5705.88	4091.98	7009.52	7021.49	144.35	0.62
13979.00	91.80	148.90	7174.98	-5733.27	4108.50	7041.50	7053.38	144.37	0.62
14011.00	92.00	148.60	7173.92	-5760.61	4125.09	7073.47	7085.26	144.39	1.13
14043.00	92.20	149.30	7172.75	-5788.00	4141.58	7105.44	7117.14	144.41	2.27
14075.00	92.60	149.70	7171.41	-5815.55	4157.81	7137.40	7148.99	144.44	1.77
14107.00	92.70	148.90	7169.93	-5843.04	4174.13	7169.35	7180.84	144.46	2.52

Measured Depth (Ft)	INC Deg	AZM Deg	TVD (Ft)	NS (Ft)	EW (Ft)	VS (Ft)	Closure (Ft)	Closure Dir Deg	DLS °/100 Ft
14139.00	92.60	148.60	7168.45	-5870.37	4190.71	7201.31	7212.72	144.48	0.99
14170.00	92.60	148.60	7167.04	-5896.80	4206.85	7232.28	7243.60	144.50	0.00
14202.00	92.20	147.20	7165.70	-5923.88	4223.84	7264.25	7275.52	144.51	4.55
14234.00	91.80	146.50	7164.59	-5950.66	4241.33	7296.23	7307.47	144.52	2.52
14266.00	92.00	146.50	7163.52	-5977.33	4258.98	7328.20	7339.44	144.53	0.62
14298.00	92.20	146.50	7162.35	-6003.99	4276.63	7360.17	7371.40	144.54	0.63
14330.00	92.70	146.80	7160.98	-6030.70	4294.20	7392.14	7403.35	144.55	1.82
14362.00	92.90	146.80	7159.42	-6057.44	4311.71	7424.10	7435.28	144.56	0.62
14394.00	93.10	146.80	7157.75	-6084.18	4329.20	7456.05	7467.21	144.57	0.63
14426.00	92.70	146.80	7156.13	-6110.93	4346.70	7488.00	7499.15	144.58	1.25
14458.00	91.00	147.20	7155.09	-6137.75	4364.12	7519.98	7531.10	144.59	5.46
14490.00	90.80	147.20	7154.59	-6164.64	4381.45	7551.98	7563.07	144.60	0.62
14521.00	91.00	147.20	7154.10	-6190.70	4398.25	7582.97	7594.03	144.61	0.65
14553.00	91.10	147.20	7153.52	-6217.59	4415.58	7614.97	7625.99	144.62	0.31
14585.00	91.10	147.20	7152.90	-6244.48	4432.91	7646.96	7657.95	144.63	0.00
14617.00	91.30	147.20	7152.23	-6271.38	4450.24	7678.95	7689.91	144.64	0.62
14649.00	91.30	147.20	7151.51	-6298.27	4467.57	7710.94	7721.87	144.65	0.00
14681.00	91.30	147.20	7150.78	-6325.16	4484.90	7742.93	7753.83	144.66	0.00
14713.00	91.70	147.50	7149.94	-6352.09	4502.16	7774.92	7785.79	144.67	1.56
14745.00	91.70	147.20	7148.99	-6379.02	4519.41	7806.91	7817.74	144.68	0.94
14777.00	91.80	147.20	7148.02	-6405.91	4536.74	7838.89	7849.69	144.69	0.31
14809.00	92.20	146.50	7146.90	-6432.68	4554.23	7870.87	7881.65	144.70	2.52
14840.00	92.20	146.80	7145.71	-6458.56	4571.26	7901.84	7912.61	144.71	0.97
14871.00	92.70	146.80	7144.39	-6484.48	4588.22	7932.81	7943.56	144.72	1.61
14904.00	92.90	147.20	7142.77	-6512.12	4606.17	7965.76	7976.50	144.73	1.35
14936.00	93.10	147.20	7141.10	-6538.98	4623.48	7997.72	8008.42	144.74	0.63
14968.00	92.20	147.20	7139.62	-6565.85	4640.80	8029.68	8040.36	144.75	2.81
15000.00	91.50	147.50	7138.59	-6592.78	4658.05	8061.67	8072.31	144.76	2.38
15032.00	91.30	147.20	7137.80	-6619.71	4675.31	8093.65	8104.27	144.77	1.13
15064.00	91.50	147.50	7137.02	-6646.65	4692.57	8125.64	8136.23	144.78	1.13
15096.00	91.80	148.60	7136.10	-6673.79	4709.50	8157.63	8168.16	144.79	3.56
15128.00	92.20	148.60	7134.98	-6701.09	4726.16	8189.61	8200.07	144.81	1.25
15159.00	92.20	148.20	7133.79	-6727.47	4742.39	8220.58	8230.99	144.82	1.29
15191.00	92.20	148.20	7132.57	-6754.65	4759.24	8252.56	8262.91	144.83	0.00
15223.00	92.20	148.20	7131.34	-6781.82	4776.09	8284.53	8294.83	144.84	0.00
15255.00	92.20	147.90	7130.11	-6808.96	4793.01	8316.51	8326.75	144.86	0.94
15287.00	92.00	147.50	7128.94	-6835.99	4810.10	8348.49	8358.69	144.87	1.40
15319.00	92.00	147.50	7127.82	-6862.96	4827.28	8380.47	8390.64	144.88	0.00
15352.00	92.20	147.50	7126.61	-6890.77	4845.00	8413.44	8423.58	144.89	0.61
15383.00	92.20	147.50	7125.42	-6916.90	4861.64	8444.42	8454.53	144.90	0.00
15415.00	92.00	147.20	7124.25	-6943.82	4878.90	8476.40	8486.48	144.91	1.13
15447.00	91.70	147.20	7123.21	-6970.71	4896.22	8508.38	8518.44	144.92	0.94
15479.00	91.80	146.50	7122.24	-6997.49	4913.71	8540.36	8550.40	144.92	2.21
15510.00	91.70	146.10	7121.29	-7023.26	4930.91	8571.34	8581.38	144.93	1.33
15542.00	91.80	146.80	7120.31	-7049.92	4948.58	8603.32	8613.35	144.93	2.21
15574.00	91.70	147.20	7119.34	-7076.75	4966.00	8635.30	8645.32	144.94	1.29
15606.00	91.50	147.20	7118.44	-7103.63	4983.33	8667.28	8677.28	144.95	0.63
15638.00	91.80	147.20	7117.52	-7130.52	5000.66	8699.27	8709.24	144.96	0.94
15670.00	91.80	147.50	7116.52	-7157.45	5017.91	8731.25	8741.20	144.97	0.94
15702.00	91.70	146.50	7115.54	-7184.28	5035.33	8763.24	8773.16	144.97	3.14
15734.00	91.70	146.50	7114.59	-7210.95	5052.99	8795.21	8805.14	144.98	0.00
15765.00	91.50	146.50	7113.72	-7236.79	5070.09	8826.20	8836.12	144.98	0.65
15797.00	91.00	146.10	7113.03	-7263.40	5087.84	8858.18	8868.10	144.99	2.00
15829.00	91.00	147.20	7112.47	-7290.13	5105.43	8890.17	8900.08	145.00	3.44
15861.00	90.80	148.20	7111.96	-7317.18	5122.53	8922.16	8932.04	145.01	3.19
15893.00	90.60	148.60	7111.57	-7344.43	5139.29	8954.16	8963.98	145.02	1.40

Measured Depth (Ft)	INC Deg	AZM Deg	TVD (Ft)	NS (Ft)	EW (Ft)	VS (Ft)	Closure (Ft)	Closure Dir Deg	DLS °/100 Ft
15925.00	91.00	149.30	7111.13	-7371.84	5155.80	8986.15	8995.90	145.03	2.52
15957.00	91.10	149.70	7110.54	-7399.41	5172.04	9018.13	9027.80	145.05	1.29
15989.00	92.60	149.30	7109.51	-7426.96	5188.27	9050.09	9059.69	145.06	4.85
16021.00	93.80	149.70	7107.72	-7454.49	5204.48	9082.03	9091.54	145.08	3.95
16052.00	94.00	149.70	7105.61	-7481.20	5220.09	9112.94	9122.37	145.09	0.65
16084.00	94.00	149.70	7103.38	-7508.76	5236.19	9144.84	9154.19	145.11	0.00
16116.00	94.00	150.00	7101.15	-7536.36	5252.23	9176.74	9186.00	145.13	0.94
16148.00	94.00	150.40	7098.92	-7564.06	5268.09	9208.63	9217.80	145.14	1.25
16180.00	93.80	150.70	7096.74	-7591.86	5283.79	9240.52	9249.58	145.16	1.12
16212.00	93.80	150.70	7094.62	-7619.71	5299.41	9272.40	9281.36	145.18	0.00
16244.00	93.60	150.70	7092.55	-7647.56	5315.04	9304.29	9313.15	145.20	0.63
16276.00	93.40	150.70	7090.60	-7675.41	5330.67	9336.19	9344.94	145.22	0.62
16308.00	93.30	150.70	7088.73	-7703.27	5346.31	9368.09	9376.74	145.24	0.31
16339.00	92.20	150.00	7087.24	-7730.18	5361.62	9399.02	9407.58	145.25	4.20
16371.00	91.30	149.30	7086.27	-7757.78	5377.79	9430.99	9439.48	145.27	3.56
16403.00	90.40	148.20	7085.79	-7785.13	5394.38	9462.98	9471.41	145.28	4.44
16435.00	89.70	146.80	7085.76	-7812.12	5411.58	9494.98	9503.39	145.29	4.89
16467.00	89.20	146.10	7086.07	-7838.79	5429.26	9526.97	9535.38	145.29	2.69
16499.00	88.50	145.40	7086.71	-7865.23	5447.27	9558.94	9567.37	145.29	3.09
16531.00	88.70	145.10	7087.49	-7891.52	5465.50	9590.90	9599.36	145.29	1.13
16563.00	89.40	145.80	7088.02	-7917.87	5483.65	9622.87	9631.36	145.29	3.09
16595.00	91.00	145.40	7087.91	-7944.27	5501.72	9654.85	9663.36	145.30	5.15
16627.00	90.80	144.70	7087.41	-7970.50	5520.05	9686.81	9695.35	145.30	2.27
16659.00	90.10	144.00	7087.16	-7996.50	5538.70	9718.76	9727.35	145.29	3.09
16691.00	90.10	144.40	7087.10	-8022.45	5557.42	9750.70	9759.34	145.29	1.25
16722.00	91.10	145.10	7086.78	-8047.77	5575.31	9781.65	9790.34	145.29	3.94
16754.00	92.60	145.40	7085.75	-8074.05	5593.54	9813.61	9822.32	145.29	4.78
16786.00	92.70	145.10	7084.27	-8100.31	5611.76	9845.54	9854.28	145.29	0.99
16818.00	92.40	145.10	7082.84	-8126.53	5630.05	9877.48	9886.25	145.29	0.94
16850.00	91.00	144.70	7081.89	-8152.70	5648.44	9909.42	9918.24	145.28	4.55
16882.00	90.10	144.40	7081.59	-8178.76	5667.00	9941.37	9950.23	145.28	2.96
16914.00	90.10	144.70	7081.53	-8204.83	5685.56	9973.33	9982.23	145.28	0.94
16946.00	92.00	145.10	7080.94	-8231.01	5703.96	10005.28	10014.22	145.28	6.07
16978.00	94.80	145.40	7079.05	-8257.25	5722.17	10037.19	10046.16	145.28	8.80
17010.00	95.20	145.40	7076.26	-8283.49	5740.27	10069.04	10078.04	145.28	1.25
17042.00	94.50	145.10	7073.55	-8309.69	5758.44	10100.90	10109.92	145.28	2.38
17073.00	93.40	144.70	7071.42	-8334.99	5776.22	10131.79	10140.85	145.28	3.77
17105.00	92.20	144.40	7069.85	-8361.03	5794.76	10163.70	10172.81	145.28	3.87
17137.00	91.00	143.70	7068.96	-8386.92	5813.54	10195.62	10204.79	145.27	4.34
17169.00	91.50	143.30	7068.26	-8412.64	5832.57	10227.53	10236.77	145.27	2.00
17201.00	89.00	142.60	7068.12	-8438.18	5851.85	10259.42	10268.74	145.26	8.11
<b>Last NOVA MWD survey</b>									
17232.00	87.80	142.30	7068.99	-8462.74	5870.73	10290.27	10299.69	145.25	3.99
<b>CH Projection to TD</b>									
17284.00	87.80	142.30	7070.98	-8503.86	5902.51	10342.01	10351.58	145.24	0.00



