

# Noble Energy

CO, Weld County (NAD 83 NZ)  
Sec 25 Twn 4 N Rng 65 W  
Heartland State H01-73-1HN Original Hole  
05-123-39552  
PD 829



A Schlumberger Company

## Final Survey Report

26-Sep-2014

Well Coordinates:	NAD83 CO State Plane,N Zone, US Ft
	N 40° 16' 36.22785"    W 104° 36' 18.82800"
	1344913.63 usFt        3249651.6 usFt
Ground Level:	4834.00 ft MSL
TVD Reference:	RB 16ft @ 4850.00 ft MSL
Local Coordinate Origin:	Heartland State H01-73-1HN well head
Vertical Section Azimuth:	180.880 ° (Grid North)
North Reference:	Grid North

DOX Version: 2.8

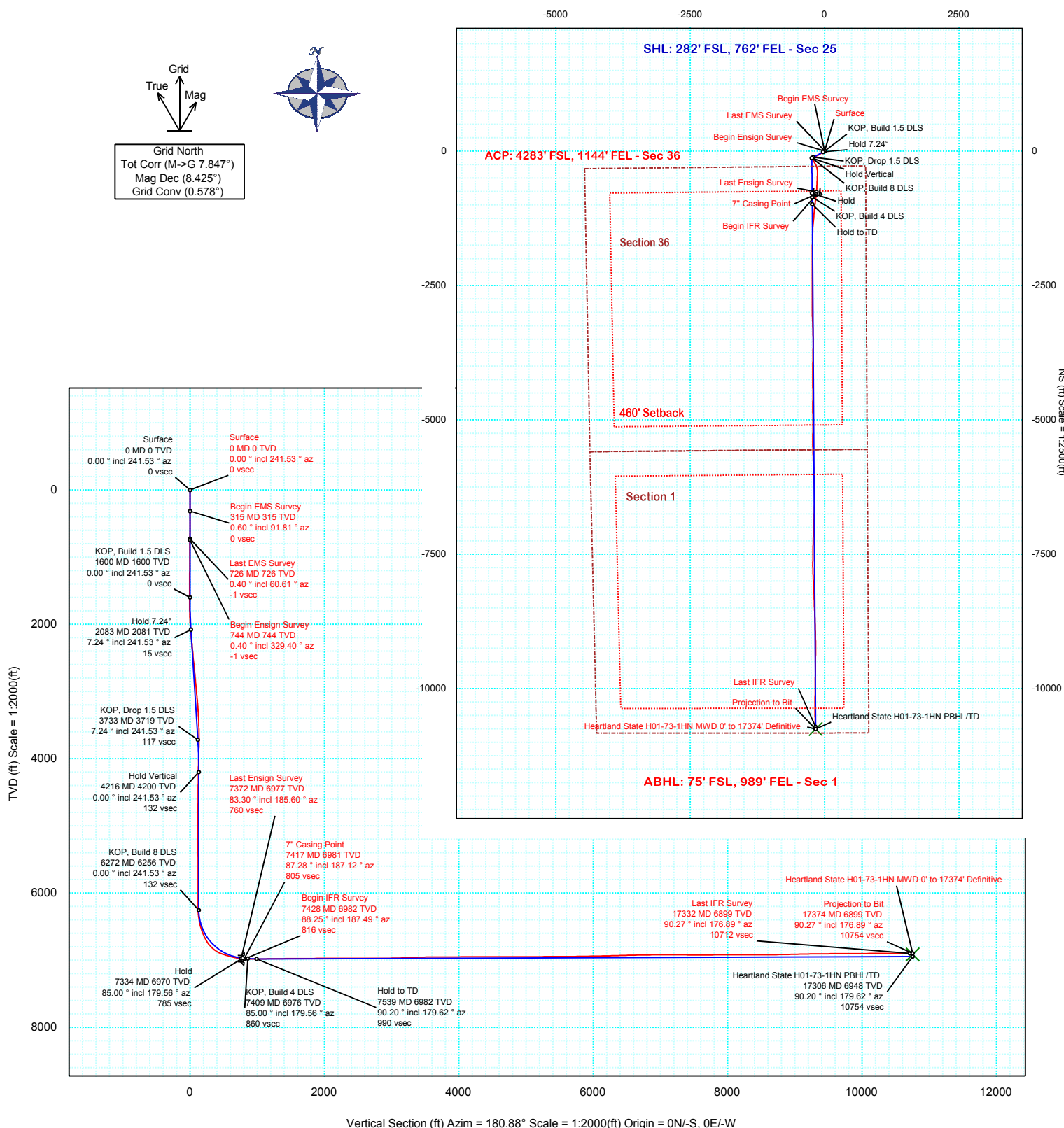
<b>Borehole:</b> Original Hole	<b>Well:</b> Heartland State H01-73-1HN	<b>Field:</b> CO, Weld County (NAD 83 NZ)	<b>Structure:</b> 25-04N-65W (Heartland State G36-75-1HN Pad) - PD 829
<b>Gravity &amp; Magnetic Parameters</b> Model: BGGM 2014 Dip: 66.86° Date: 28-Aug-2014 MagDec: 8.425° FS: 52642.145nT Gravity FS: 999.019mgm (9.80665 Based)		<b>Surface Location</b> NAD83 Colorado State Plane, Northern Zone, US Feet Lat: N 40 16 36.23 Northing: 1344914.08ftU Grid Conv: 0.5782° Lon: W 104 36 18.25 Easting: S 3249696.24ftU Scale Fact: 0.99995695	
		<b>Miscellaneous</b> Heartland Slot: State H01-73-1HN TVD Ref: RB 16ft(4850ft above MSL) Plan: Heartland State H01-73-1HN MWD 0' to 17374' Definitive	

PvA

EW (ft) Scale = 1:2500(ft)



Grid North  
Tot Corr (M->G 7.847°)  
Mag Dec (8.425°)  
Grid Conv (0.578°)





# Heartland State H01-73-1HN MWD 0' to 17374' Definitive Survey Geodetic Report (Def Survey)



**Report Date:** September 17, 2014 - 09:37 AM  
**Client:** Noble Energy  
**Field:** CO, Weld County (NAD 83 NZ)  
**Structure / Slot:** Noble 25-04N-65W (Heartland State G36-75-1HN Pad) - PD 829 / Heartland State H01-73-1HN  
**Well:** Heartland State H01-73-1HN  
**Borehole:** Original Hole  
**UWI / API#:** Unknown / Unknown  
**Survey Name:** Heartland State H01-73-1HN MWD 0' to 17374' Definitive  
**Survey Date:** August 28, 2014  
**Tort / AHD / DDI / ERD Ratio:** 238.639 ° / 11021.835 ft / 6.816 / 1.578  
**Coordinate Reference System:** NAD83 Colorado State Plane, Northern Zone, US Feet  
**Location Lat / Long:** N 40° 16' 36.22785", W 104° 36' 18.25201"  
**Location Grid N/E Y/X:** N 1344914.080 ftUS, E 3249696.240 ftUS  
**CRS Grid Convergence Angle:** 0.5782 °  
**Grid Scale Factor:** 0.99995695  
**Version / Patch:** 2.8.551.0

**Survey / DLS Computation:** Minimum Curvature / Lubinski  
**Vertical Section Azimuth:** 180.880 ° (Grid North)  
**Vertical Section Origin:** 0.000 ft, 0.000 ft  
**TVD Reference Datum:** RB 16ft  
**TVD Reference Elevation:** 4850.000 ft above MSL  
**Seabed / Ground Elevation:** 4834.000 ft above MSL  
**Magnetic Declination:** 8.425 °  
**Total Gravity Field Strength:** 999.0190mgn (9.80665 Based)  
**Gravity Model:** GARM  
**Total Magnetic Field Strength:** 52642.145 nT  
**Magnetic Dip Angle:** 66.860 °  
**Declination Date:** August 28, 2014  
**Magnetic Declination Model:** BGGM 2014  
**North Reference:** Grid North  
**Grid Convergence Used:** 0.5782 °  
**Total Corr Mag North->Grid North:** 7.8468 °  
**Local Coord Referenced To:** Well Head

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
Surface	0.00	0.00	241.53	0.00	0.00	0.00	0.00	N/A	1344914.08	3249696.24	N 40 16 36.23	W 104 36 18.25
Begin EMS Survey	315.00	0.60	91.81	314.99	0.03	-0.05	1.65	0.19	1344914.03	3249697.89	N 40 16 36.23	W 104 36 18.23
Last EMS Survey	726.00	0.40	60.61	725.98	-0.66	0.58	5.05	0.08	1344914.66	3249701.29	N 40 16 36.23	W 104 36 18.19
Begin Ensign Survey	744.00	0.40	329.40	743.98	-0.75	0.67	5.07	3.18	1344914.75	3249701.31	N 40 16 36.23	W 104 36 18.19
	833.00	0.40	3.40	832.98	-1.32	1.25	4.93	0.26	1344915.33	3249701.17	N 40 16 36.24	W 104 36 18.19
	923.00	0.50	4.60	922.97	-2.03	1.95	4.98	0.11	1344916.03	3249701.22	N 40 16 36.25	W 104 36 18.19
	1012.00	0.40	346.50	1011.97	-2.72	2.64	4.94	0.19	1344916.72	3249701.18	N 40 16 36.25	W 104 36 18.19
	1102.00	0.40	332.50	1101.97	-3.30	3.22	4.72	0.11	1344917.30	3249700.96	N 40 16 36.26	W 104 36 18.19
	1197.00	0.40	302.60	1196.97	-3.76	3.70	4.29	0.22	1344917.78	3249700.53	N 40 16 36.26	W 104 36 18.20
	1292.00	0.50	300.50	1291.96	-4.14	4.09	3.65	0.11	1344918.17	3249699.89	N 40 16 36.27	W 104 36 18.20
	1390.00	0.60	305.80	1389.96	-4.65	4.60	2.87	0.11	1344918.68	3249699.11	N 40 16 36.27	W 104 36 18.21
	1484.00	0.60	298.90	1483.95	-5.16	5.13	2.04	0.08	1344919.21	3249698.28	N 40 16 36.28	W 104 36 18.23
	1578.00	0.50	307.20	1577.95	-5.63	5.62	1.28	0.14	1344919.70	3249697.52	N 40 16 36.28	W 104 36 18.23
	1672.00	1.10	242.70	1671.94	-5.45	5.45	0.15	1.06	1344919.53	3249696.39	N 40 16 36.28	W 104 36 18.25
	1767.00	2.20	249.80	1766.90	-4.36	4.40	-2.37	1.18	1344918.48	3249693.87	N 40 16 36.27	W 104 36 18.28
	1861.00	3.60	242.40	1860.78	-2.31	2.41	-6.68	1.54	1344916.49	3249689.56	N 40 16 36.25	W 104 36 18.34
	1955.00	4.20	226.20	1954.56	1.52	-1.34	-11.78	1.33	1344912.74	3249684.46	N 40 16 36.22	W 104 36 18.40
	2049.00	5.80	226.70	2048.20	7.25	-6.98	-17.72	1.70	1344907.10	3249678.52	N 40 16 36.16	W 104 36 18.48
	2144.00	7.40	227.20	2142.57	14.82	-14.43	-25.70	1.69	1344899.65	3249670.54	N 40 16 36.09	W 104 36 18.59
	2238.00	8.70	231.90	2235.64	23.47	-22.93	-35.74	1.55	1344891.15	3249660.50	N 40 16 36.00	W 104 36 18.72
	2332.00	9.70	240.10	2328.44	32.00	-31.26	-48.20	1.75	1344882.82	3249648.04	N 40 16 35.92	W 104 36 18.88
	2426.00	9.00	236.50	2421.19	40.20	-39.27	-61.19	0.97	1344874.81	3249635.05	N 40 16 35.85	W 104 36 19.05
	2520.00	10.20	234.90	2513.87	49.25	-48.11	-74.14	1.31	1344865.97	3249622.11	N 40 16 35.76	W 104 36 19.21
	2595.00	9.40	233.80	2587.78	56.84	-55.55	-84.51	1.10	1344858.53	3249611.73	N 40 16 35.69	W 104 36 19.35
	2685.00	10.70	239.70	2676.39	65.60	-64.11	-97.66	1.84	1344849.98	3249598.59	N 40 16 35.60	W 104 36 19.52
	2774.00	11.60	243.80	2763.72	73.95	-72.22	-112.82	1.35	1344841.86	3249583.43	N 40 16 35.53	W 104 36 19.72
	2864.00	11.70	244.90	2851.86	82.06	-80.09	-129.20	0.27	1344833.99	3249567.04	N 40 16 35.45	W 104 36 19.93
	2954.00	11.50	243.10	2940.02	90.24	-88.02	-145.47	0.46	1344826.06	3249550.78	N 40 16 35.37	W 104 36 20.14
	3043.00	11.60	242.20	3027.22	98.67	-96.21	-161.29	0.23	1344817.88	3249534.95	N 40 16 35.29	W 104 36 20.35
	3133.00	10.50	237.80	3115.55	107.49	-104.80	-176.24	1.54	1344809.29	3249520.01	N 40 16 35.21	W 104 36 20.54
	3222.00	10.70	246.90	3203.04	115.28	-112.36	-190.70	1.89	1344801.72	3249505.55	N 40 16 35.14	W 104 36 20.73
	3312.00	9.20	243.50	3291.68	121.98	-118.85	-204.83	1.79	1344795.23	3249491.42	N 40 16 35.07	W 104 36 20.91
	3402.00	7.30	251.00	3380.75	127.23	-123.92	-216.67	2.42	1344790.16	3249479.58	N 40 16 35.02	W 104 36 21.06
	3492.00	6.00	248.80	3470.14	130.95	-127.49	-226.46	1.47	1344786.60	3249469.79	N 40 16 34.99	W 104 36 21.19
	3581.00	5.00	263.20	3558.74	133.21	-129.63	-234.65	1.91	1344784.46	3249461.60	N 40 16 34.97	W 104 36 21.30
	3671.00	3.60	262.50	3648.48	134.15	-130.46	-241.35	1.56	1344783.63	3249454.90	N 40 16 34.96	W 104 36 21.38
	3760.00	1.30	294.20	3737.40	134.16	-130.41	-245.04	2.91	1344783.67	3249451.21	N 40 16 34.96	W 104 36 21.43
	3850.00	1.30	307.60	3827.38	133.14	-129.37	-246.78	0.34	1344784.72	3249449.47	N 40 16 34.97	W 104 36 21.45
	3940.00	1.50	323.60	3917.35	131.60	-127.80	-248.29	0.49	1344786.29	3249447.96	N 40 16 34.99	W 104 36 21.47
	4029.00	1.80	23.30	4006.32	129.38	-125.58	-248.43	1.87	1344788.51	3249447.82	N 40 16 35.01	W 104 36 21.47
	4119.00	1.60	17.00	4096.28	126.86	-123.08	-247.50	0.30	1344791.01	3249448.75	N 40 16 35.04	W 104 36 21.46
	4208.00	1.00	52.10	4185.26	125.18	-121.41	-246.52	1.09	1344792.67	3249449.73	N 40 16 35.05	W 104 36 21.45
	4298.00	0.90	42.70	4275.24	124.16	-120.41	-245.43	0.21	1344793.68	3249450.83	N 40 16 35.06	W 104 36 21.43
	4388.00	0.70	21.60	4365.24	123.12	-119.38	-244.74	0.39	1344794.71	3249451.51	N 40 16 35.07	W 104 36 21.43
	4477.00	0.50	354.00	4454.23	122.23	-118.49	-244.58	0.39	1344795.60	3249451.67	N 40 16 35.08	W 104 36 21.42
	4567.00	0.90	328.30	4544.22	121.24	-117.50	-245.00	0.55	1344796.59	3249451.25	N 40 16 35.09	W 104 36 21.43
	4657.00	1.00	310.90	4634.21	120.14	-116.38	-245.96	0.34	1344797.70	3249450.29	N 40 16 35.10	W 104 36 21.44
	4747.00	1.30	298.50	4724.19	119.16	-115.38	-247.45	0.43	1344798.71	3249448.80	N 40 16 35.11	W 104 36 21.46
	4836.00	1.70	283.70	4813.16	118.40	-114.58	-249.62	0.62	1344799.50	3249446.63	N 40 16 35.12	W 104 36 21.49
	4926.00	2.10	278.00	4903.11	117.90	-114.04	-252.55	0.49	1344800.05	3249443.70	N 40 16 35.13	W 104 36 21.53
	5015.00	1.60	13.40	4992.08	116.49	-112.60	-253.88	3.10	1344801.48	3249442.37	N 40 16 35.14	W 104 36 21.54
	5105.00	2.00	73.20	5082.05	114.78	-110.93	-252.09	2.03	1344803.16	3249444.17	N 40 16 35.16	W 104 36 21.52
	5195.00	2.50	115.10	5171.98	115.11	-111.31	-248.80	1.86	1344802.78	3249447.45	N 40 16 35.15	W 104 36 21.48
	5284.00	2.80	117.70	5260.89	116.89	-113.14	-245.12	0.36	1344800.95	3249451.13	N 40 16 35.13	W 104 36 21.43
	5374.00	0.70	185.80	5350.85	118.43	-114.71	-243.23	2.91	1344799.38	3249453.02	N 40 16 35.12	W 104 36 21.40
	5464.00	0.80	209.30	5440.84	119.53	-115.80	-243.59	0.36	1344798.28	3249452.66	N 40 16 35.11	W 104 36 21.41
	5554.00	0.60	234.20	5530.83	120.36	-116.63	-244.28	0.40	1344797.46	3249451.97	N 40 16 35.10	W 104 36 21.42
	5643.00	0.60	241.50	5619.83	120.87	-117.12	-245.07	0.09	1344796.96	3249451.18	N 40 16 35.09	W 104 36 21.43
	5733.00	0.90	282.60	5709.82	120.96	-117.19	-246.17	0.66	1344796.89	3249450.08	N 40 16 35.09	W 104 36 21.44
	5823.00	0.70	271.00	5799.81	120.81	-117.03	-247.41	0.28	1344797.06	3249448.84	N 40 16 35.10	W 104 36 21.46
	5912.00	0.60	285.50	5888.80	120.69	-116.89	-248.41	0.22	1344797.19	3249447.84	N 40 16 35.10	W 104 36 21.47
	6002.00	0.20	273.50	5978.80	120.57	-116.76	-249.02	0.45	1344797.33	3249447.23	N 40 16 35.10	W 104 36 21.48
	6091.00	0.60	281.80	6067.80	120.47	-116.65	-249.63	0.45	1344797.43	3249446.62	N 40 16 35.10	W 104 36 21.49
	6181.00	1.10	290.20	6157.79	120.10	-116.26	-250.90	0.57	1344797.83	3249445.35	N 40 16 35.10	W 104 36 21.50
	6226.00	1.10	287.40	6202.78	119.83	-115.98	-251.72	0.12	1344798.10	3249444.53	N 40 16 35.11	W 104 36 21.51
	6271.00	1.90	185.00	6247.77	120.45	-116.60	-252.20	5.31	1344797.49	3249444.06	N 40 16 35.10	W 104 36 21.52
	6316.00	4.80	150.80	6292.69	122.83	-118.98	-251.34	7.56	1344795.10	3249444.91	N 40 16 35.08	W 104 36 21.51

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
	6360.00	8.40	140.60	6336.40	126.87	-123.07	-248.40	8.57	1344791.01	3249447.85	N 40 16 35.04	W 104 36 21.47
	6405.00	11.90	138.00	6380.69	132.78	-129.06	-243.21	7.84	1344785.02	3249453.04	N 40 16 34.98	W 104 36 21.41
	6450.00	14.70	135.60	6424.47	140.20	-136.59	-236.11	6.34	1344777.49	3249460.14	N 40 16 34.90	W 104 36 21.32
	6495.00	17.30	138.60	6467.73	149.17	-145.69	-227.69	6.06	1344768.39	3249468.56	N 40 16 34.81	W 104 36 21.21
	6540.00	19.40	144.40	6510.44	160.13	-156.79	-218.91	6.18	1344757.30	3249477.34	N 40 16 34.70	W 104 36 21.10
	6584.00	21.70	149.40	6551.64	172.95	-169.74	-210.51	6.57	1344744.35	3249485.73	N 40 16 34.57	W 104 36 20.99
	6629.00	23.90	153.80	6593.13	188.16	-185.08	-202.25	6.18	1344729.01	3249494.00	N 40 16 34.42	W 104 36 20.89
	6674.00	27.30	153.00	6633.70	205.41	-202.46	-193.54	7.59	1344711.63	3249502.71	N 40 16 34.25	W 104 36 20.78
	6719.00	30.80	149.30	6673.04	224.35	-221.57	-182.97	8.74	1344692.52	3249513.28	N 40 16 34.06	W 104 36 20.64
	6763.00	34.30	147.90	6710.12	244.35	-241.76	-170.63	8.14	1344672.33	3249525.62	N 40 16 33.86	W 104 36 20.48
	6808.00	38.90	154.50	6746.25	267.67	-265.28	-157.79	13.44	1344648.81	3249538.45	N 40 16 33.62	W 104 36 20.32
	6853.00	42.50	161.70	6780.38	294.71	-292.49	-146.93	13.14	1344621.61	3249549.32	N 40 16 33.35	W 104 36 20.19
	6898.00	46.20	168.60	6812.57	324.96	-322.87	-138.94	13.50	1344591.23	3249557.31	N 40 16 33.05	W 104 36 20.09
	6942.00	51.00	174.60	6841.68	357.51	-355.49	-134.19	14.95	1344558.61	3249562.06	N 40 16 32.73	W 104 36 20.03
	6987.00	57.50	179.20	6867.97	393.91	-391.92	-132.27	16.65	1344522.17	3249563.97	N 40 16 32.37	W 104 36 20.01
	7032.00	65.20	182.10	6889.53	433.36	-431.38	-132.76	18.02	1344482.72	3249563.49	N 40 16 31.98	W 104 36 20.02
	7077.00	69.60	182.80	6906.82	474.88	-472.87	-134.54	9.88	1344441.23	3249561.71	N 40 16 31.57	W 104 36 20.05
	7122.00	72.50	182.80	6921.43	517.41	-515.38	-136.62	6.44	1344398.73	3249559.63	N 40 16 31.15	W 104 36 20.08
	7167.00	73.90	182.80	6934.44	560.47	-558.40	-138.72	3.11	1344355.70	3249557.53	N 40 16 30.72	W 104 36 20.11
	7211.00	74.70	182.70	6946.34	602.80	-600.71	-140.75	1.83	1344313.39	3249555.49	N 40 16 30.31	W 104 36 20.15
	7256.00	76.80	182.80	6957.42	646.39	-644.28	-142.84	4.67	1344269.83	3249553.40	N 40 16 29.88	W 104 36 20.18
	7301.00	79.80	183.60	6966.54	690.42	-688.27	-145.31	6.89	1344225.84	3249550.94	N 40 16 29.44	W 104 36 20.22
	7346.00	81.30	184.70	6973.93	734.73	-732.54	-148.52	4.11	1344181.58	3249547.73	N 40 16 29.00	W 104 36 20.26
Last Ensign Survey	7372.00	83.30	185.60	6977.41	760.42	-758.20	-150.83	8.42	1344155.92	3249545.41	N 40 16 28.75	W 104 36 20.30
7" Casing Point	7417.00	87.28	187.12	6981.11	805.06	-802.76	-155.80	9.46	1344111.36	3249540.45	N 40 16 28.31	W 104 36 20.37
Begin IFR Survey	7428.00	88.25	187.49	6981.54	815.98	-813.66	-157.20	9.46	1344100.46	3249539.05	N 40 16 28.20	W 104 36 20.39
	7473.00	88.49	186.83	6982.82	860.69	-858.29	-162.81	1.56	1344055.83	3249533.44	N 40 16 27.76	W 104 36 20.46
	7563.00	89.52	186.35	6984.38	950.23	-947.68	-173.13	1.26	1343966.44	3249523.12	N 40 16 26.88	W 104 36 20.61
	7652.00	90.93	186.09	6984.03	1038.84	-1036.16	-182.77	1.61	1343877.97	3249513.47	N 40 16 26.01	W 104 36 20.74
	7742.00	91.44	185.25	6982.17	1128.51	-1125.70	-191.66	1.09	1343788.44	3249504.58	N 40 16 25.12	W 104 36 20.87
	7831.00	90.86	185.66	6980.39	1217.20	-1214.27	-200.12	0.80	1343699.86	3249496.13	N 40 16 24.25	W 104 36 20.99
	7921.00	90.69	185.57	6979.17	1306.89	-1303.83	-208.93	0.21	1343610.31	3249487.32	N 40 16 23.37	W 104 36 21.12
	8011.00	90.48	183.75	6978.25	1396.68	-1393.53	-216.24	2.04	1343520.62	3249480.01	N 40 16 22.48	W 104 36 21.22
	8100.00	90.52	181.69	6977.47	1485.63	-1482.42	-220.46	2.31	1343431.73	3249475.79	N 40 16 21.60	W 104 36 21.29
	8190.00	90.79	181.36	6976.44	1575.62	-1572.38	-222.86	0.47	1343341.77	3249473.39	N 40 16 20.71	W 104 36 21.33
	8279.00	90.45	180.95	6975.48	1664.61	-1661.36	-224.65	0.60	1343252.80	3249471.60	N 40 16 19.83	W 104 36 21.37
	8369.00	90.03	180.90	6975.10	1754.61	-1751.34	-226.10	0.47	1343162.81	3249470.15	N 40 16 18.94	W 104 36 21.40
	8459.00	90.21	180.45	6974.91	1844.61	-1841.34	-227.16	0.54	1343072.82	3249469.09	N 40 16 18.06	W 104 36 21.42
	8548.00	90.07	180.34	6974.70	1933.61	-1930.34	-227.78	0.20	1342983.83	3249468.47	N 40 16 17.18	W 104 36 21.44
	8638.00	90.24	179.68	6974.45	2023.59	-2020.33	-227.79	0.76	1342893.84	3249468.46	N 40 16 16.29	W 104 36 21.45
	8728.00	90.27	179.96	6974.05	2113.58	-2110.33	-227.51	0.31	1342803.84	3249468.74	N 40 16 15.40	W 104 36 21.46
	8817.00	90.28	179.83	6973.63	2202.56	-2199.33	-227.35	0.15	1342714.85	3249468.90	N 40 16 14.52	W 104 36 21.47
	8907.00	90.14	179.75	6973.30	2292.55	-2289.33	-227.02	0.18	1342624.85	3249469.23	N 40 16 13.63	W 104 36 21.48
	8997.00	90.10	180.48	6973.11	2382.54	-2379.33	-227.20	0.81	1342534.86	3249469.05	N 40 16 12.74	W 104 36 21.49
	9086.00	90.10	181.57	6972.95	2471.54	-2468.31	-228.79	1.22	1342445.88	3249467.46	N 40 16 11.86	W 104 36 21.52
	9176.00	90.27	179.29	6972.66	2561.53	-2558.31	-229.47	2.54	1342355.89	3249466.78	N 40 16 10.97	W 104 36 21.55
	9266.00	90.51	179.31	6972.05	2651.49	-2648.30	-228.37	0.27	1342265.90	3249467.88	N 40 16 10.08	W 104 36 21.54
	9355.00	90.03	179.57	6971.63	2740.46	-2737.29	-227.50	0.61	1342176.91	3249468.75	N 40 16 9.20	W 104 36 21.54
	9445.00	89.90	181.53	6971.68	2830.46	-2827.28	-228.36	2.18	1342086.92	3249467.89	N 40 16 8.31	W 104 36 21.57
	9534.00	89.97	179.19	6971.45	2919.45	-2916.27	-228.92	2.63	1341997.94	3249467.33	N 40 16 7.43	W 104 36 21.58
	9624.00	90.65	179.60	6971.30	3009.41	-3006.27	-227.97	0.88	1341907.95	3249468.28	N 40 16 6.54	W 104 36 21.58
	9714.00	91.96	177.46	6969.25	3099.31	-3096.21	-225.66	2.79	1341818.01	3249470.59	N 40 16 5.66	W 104 36 21.57
	9804.00	92.37	177.40	6965.85	3189.08	-3186.05	-221.63	0.46	1341728.17	3249474.62	N 40 16 4.77	W 104 36 21.53
	9893.00	92.37	177.54	6962.17	3277.85	-3274.89	-217.70	0.16	1341639.34	3249478.55	N 40 16 3.89	W 104 36 21.49
	9983.00	92.06	178.73	6958.69	3367.67	-3364.77	-214.78	1.37	1341549.46	3249481.47	N 40 16 3.00	W 104 36 21.46
	10072.00	91.58	178.95	6955.86	3456.57	-3453.71	-212.98	0.59	1341460.53	3249483.27	N 40 16 2.12	W 104 36 21.45
	10162.00	91.17	180.08	6953.70	3546.52	-3543.68	-212.22	1.34	1341370.56	3249484.03	N 40 16 1.23	W 104 36 21.45
	10252.00	90.52	180.75	6952.38	3636.51	-3633.67	-212.87	1.04	1341280.58	3249483.38	N 40 16 0.34	W 104 36 21.47
	10341.00	90.34	181.26	6951.71	3725.50	-3722.65	-214.43	0.61	1341191.60	3249481.82	N 40 15 59.46	W 104 36 21.50
	10431.00	89.86	181.14	6951.55	3815.50	-3812.63	-216.31	0.55	1341101.62	3249479.94	N 40 15 58.58	W 104 36 21.54
	10521.00	89.90	180.44	6951.74	3905.50	-3902.62	-217.55	0.78	1341011.64	3249478.70	N 40 15 57.69	W 104 36 21.57
	10610.00	90.21	180.32	6951.65	3994.50	-3991.62	-218.14	0.37	1340922.64	3249478.11	N 40 15 56.81	W 104 36 21.59
	10700.00	90.34	180.58	6951.22	4084.49	-4081.61	-218.85	0.32	1340832.65	3249477.40	N 40 15 55.92	W 104 36 21.61
	10790.00	90.28	180.39	6950.74	4174.49	-4171.61	-219.61	0.22	1340742.66	3249476.64	N 40 15 55.03	W 104 36 21.63
	10879.00	89.97	179.54	6950.54	4263.48	-4260.61	-219.56	1.02	1340653.66	3249476.69	N 40 15 54.15	W 104 36 21.64
	10966.00	90.31	178.95	6950.35	4340.44	-4337.60	-218.54	0.88	1340576.68	3249477.71	N 40 15 53.39	W 104 36 21.64
	11050.00	90.34	179.76	6949.82	4434.41	-4431.59	-217.49	0.86	1340482.69	3249478.76	N 40 15 52.46	W 104 36 21.63
	11142.00	90.17	179.98	6949.41	4526.39	-4523.59	-217.28	0.30	1340390.69	3249478.97	N 40 15 51.55	W 104 36 21.64
	11236.00	89.90	180.21	6949.35	4620.38	-4617.59	-217.43	0.38	1340296.70	3249478.82	N 40 15 50.62	W 104 36 21.66
	11330.00	89.90	180.25	6949.52	4714.38	-4711.59	-217.81	0.04	1340202.70	3249478.44	N 40 15 49.69	W 104 36 21.67
	11424.00	90.00	179.90	6949.60	4808.37	-4805.59	-217.93	0.39	1340108.71	3249478.32	N 40 15 48.76	W 104 36 21.69
	11516.00	90.21	179.45	6949.43	4900.35	-4897.59	-217.41	0.54	1340016.71	3249478.84	N 40 15 47.85	W 104 36 21.69
	11608.00	90.31	180.07	6949.01	4992.33	-4989.59	-217.03	0.68	1339924.72	3249479.22	N 40 15 46.95	W 104 36 21.70
	11700.00	90.27	179.63	6948.55	5084.31	-5081.58	-216.79	0.48	1339832.73	3249479.46	N 40 15 46.04	W 104 36 21.71
	11792.00	89.90	180.47	6948.41	5176.30	-5173.58	-216.87	1.00	1			

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
	14089.00	90.03	180.29	6921.76	7471.60	-7469.19	-214.51	0.66	1337445.23	3249481.74	N 40 15 22.44	W 104 36 21.99
	14179.00	89.86	181.38	6921.85	7561.60	-7559.18	-215.82	1.23	1337355.24	3249480.43	N 40 15 21.55	W 104 36 22.02
	14268.00	89.59	180.99	6922.27	7650.60	-7648.16	-217.66	0.53	1337266.27	3249478.59	N 40 15 20.68	W 104 36 22.05
	14358.00	90.76	179.11	6922.00	7740.58	-7738.15	-217.74	2.46	1337176.28	3249478.51	N 40 15 19.79	W 104 36 22.07
	14448.00	90.55	178.30	6920.97	7830.51	-7828.12	-215.70	0.93	1337086.31	3249480.55	N 40 15 18.90	W 104 36 22.05
	14537.00	90.21	176.74	6920.38	7919.35	-7917.03	-211.85	1.79	1336997.40	3249484.40	N 40 15 18.02	W 104 36 22.01
	14627.00	89.93	176.72	6920.27	8009.12	-8006.89	-206.72	0.31	1336907.56	3249489.53	N 40 15 17.13	W 104 36 21.96
	14716.00	89.90	177.22	6920.40	8097.91	-8095.76	-202.01	0.56	1336818.68	3249494.24	N 40 15 16.25	W 104 36 21.91
	14806.00	89.97	177.74	6920.50	8187.75	-8185.67	-198.06	0.58	1336728.78	3249498.19	N 40 15 15.36	W 104 36 21.87
	14896.00	89.83	178.13	6920.66	8277.63	-8275.61	-194.81	0.46	1336638.84	3249501.44	N 40 15 14.47	W 104 36 21.84
	14985.00	90.31	178.44	6920.55	8366.54	-8364.57	-192.15	0.64	1336549.88	3249504.10	N 40 15 13.59	W 104 36 21.82
	15075.00	90.31	178.44	6920.06	8456.46	-8454.54	-189.70	0.00	1336459.92	3249506.55	N 40 15 12.70	W 104 36 21.80
	15165.00	90.24	175.66	6919.63	8546.24	-8544.41	-185.07	3.09	1336370.05	3249511.18	N 40 15 11.82	W 104 36 21.75
	15254.00	90.41	179.19	6919.13	8635.07	-8633.30	-181.07	3.97	1336281.16	3249515.18	N 40 15 10.94	W 104 36 21.71
	15344.00	90.69	178.03	6918.26	8724.99	-8723.27	-178.89	1.33	1336191.20	3249517.36	N 40 15 10.05	W 104 36 21.69
	15433.00	90.69	178.04	6917.19	8813.87	-8812.21	-175.84	0.01	1336102.26	3249520.41	N 40 15 9.17	W 104 36 21.67
	15523.00	91.44	178.23	6915.52	8903.76	-8902.15	-172.91	0.86	1336012.33	3249523.34	N 40 15 8.28	W 104 36 21.64
	15613.00	91.31	178.52	6913.36	8993.64	-8992.09	-170.36	0.35	1335922.40	3249525.89	N 40 15 7.39	W 104 36 21.62
	15702.00	91.27	178.54	6911.36	9082.55	-9081.04	-168.07	0.05	1335833.45	3249528.17	N 40 15 6.51	W 104 36 21.60
	15792.00	91.38	179.69	6909.27	9172.48	-9171.00	-166.68	1.28	1335743.49	3249529.56	N 40 15 5.62	W 104 36 21.60
	15882.00	91.07	179.87	6907.35	9262.44	-9260.98	-166.34	0.40	1335653.52	3249529.91	N 40 15 4.73	W 104 36 21.60
	15971.00	90.83	180.93	6905.87	9351.42	-9349.96	-166.96	1.22	1335564.54	3249529.29	N 40 15 3.85	W 104 36 21.62
	16061.00	90.10	180.38	6905.14	9441.42	-9439.95	-167.99	1.02	1335474.55	3249528.26	N 40 15 2.96	W 104 36 21.65
	16151.00	90.41	180.74	6904.74	9531.42	-9529.95	-168.87	0.53	1335384.56	3249527.38	N 40 15 2.08	W 104 36 21.67
	16240.00	90.31	180.80	6904.18	9620.41	-9618.94	-170.06	0.13	1335295.58	3249526.18	N 40 15 1.20	W 104 36 21.70
	16330.00	90.45	180.44	6903.59	9710.41	-9708.93	-171.04	0.43	1335205.59	3249525.21	N 40 15 0.31	W 104 36 21.72
	16419.00	90.34	181.02	6902.97	9799.41	-9797.92	-172.17	0.66	1335116.60	3249524.08	N 40 14 59.43	W 104 36 21.75
	16509.00	90.21	180.46	6902.54	9889.41	-9887.91	-173.33	0.64	1335026.61	3249522.91	N 40 14 58.54	W 104 36 21.77
	16599.00	90.34	180.31	6902.11	9979.40	-9977.91	-173.94	0.22	1334936.62	3249522.31	N 40 14 57.65	W 104 36 21.79
	16688.00	90.28	180.79	6901.63	10068.40	-10066.90	-174.79	0.54	1334847.63	3249521.45	N 40 14 56.77	W 104 36 21.82
	16778.00	90.31	180.66	6901.16	10158.40	-10156.89	-175.93	0.15	1334757.64	3249520.32	N 40 14 55.88	W 104 36 21.84
	16868.00	90.24	180.34	6900.73	10248.39	-10246.89	-176.72	0.36	1334667.65	3249519.53	N 40 14 54.99	W 104 36 21.86
	16957.00	90.07	180.30	6900.49	10337.39	-10335.89	-177.21	0.20	1334578.66	3249519.03	N 40 14 54.11	W 104 36 21.88
	17047.00	90.38	180.11	6900.14	10427.38	-10425.89	-177.54	0.40	1334488.66	3249518.71	N 40 14 53.22	W 104 36 21.90
	17137.00	89.90	178.73	6899.92	10517.35	-10515.88	-176.63	1.62	1334398.67	3249519.62	N 40 14 52.33	W 104 36 21.90
	17226.00	90.17	177.42	6899.86	10606.24	-10604.83	-173.64	1.50	1334309.73	3249522.61	N 40 14 51.45	W 104 36 21.87
Last IFR Survey	17332.00	90.27	176.89	6899.46	10712.02	-10710.69	-168.37	0.51	1334203.87	3249527.87	N 40 14 50.41	W 104 36 21.82
Projection to Bit	17374.00	90.27	176.89	6899.26	10753.92	-10752.63	-166.10	0.00	1334161.93	3249530.15	N 40 14 49.99	W 104 36 21.79

Survey Type: Def Survey

Survey Error Model: ISCWSA Rev 0 \*\*\* 3-D 95.000% Confidence 2.7955 sigma  
Survey Program:

Description	Part	MD From (ft)	MD To (ft)	EOU Freq (ft)	Hole Size (in)	Casing Diameter (in)	Survey Tool Type	Borehole / Survey
Surface	1	0.000	16.000	Act Stns	13.750	9.625	SLB_EMS-STD-Depth Only	Original Hole / Heartland State H01-73-1HN MWD 0' to 17374'
Surface	1	16.000	726.000	1/98.425	13.750	9.625	SLB_EMS-STD	Original Hole / Heartland State H01-73-1HN MWD 0' to 17374'
Intermediate	1	726.000	7372.000	Act Stns	8.750	7.000	SLB_MWD-STD	Original Hole / Heartland State H01-73-1HN MWD 0' to 17374'
Lateral	1	7372.000	7428.000	Act Stns	6.125	4.500	SLB_INC_ONLY<10	Original Hole / Heartland State H01-73-1HN MWD 0' to 17374'
* Lateral	1	7428.000	17332.000	Act Stns	6.125	4.500	SLB_MWD+IFR+DMAG	Original Hole / Heartland State H01-73-1HN MWD 0' to 17374'
Bit Projection	1	17332.000	17374.000	Act Stns	6.125	4.500	SLB_BLIND+TREND	Original Hole / Heartland State H01-73-1HN MWD 0' to 17374'

\* SLB\_MWD+IFR+DMAG =  
MWD+IFR1+MS\_WY