

Noble Energy

CO, Weld County (NAD 83 NZ)
Sec 34 Twn 9 N Rng 59 W
Remora LC34-715 Original Hole
05-123-40592
H&P 273

Schlumberger

Final Survey Report

22-Jan-2016

Well Coordinates: NAD83 Colorado State Plane, Northern Zone, US Feet

N 40° 42' 43.41600"	W 103° 57' 24.98400"
1505969.2 ftUS	3427758.3 ftUS

Ground Level:	4814.00 ft MSL
TVD Reference:	KB 24ft @ 4838.00 ft MSL
Local Coordinate Origin:	Remora LC34-715 well head
Vertical Section Azimuth:	173.484° (Grid North)
North Reference:	Grid North

DOX Version: 2.9

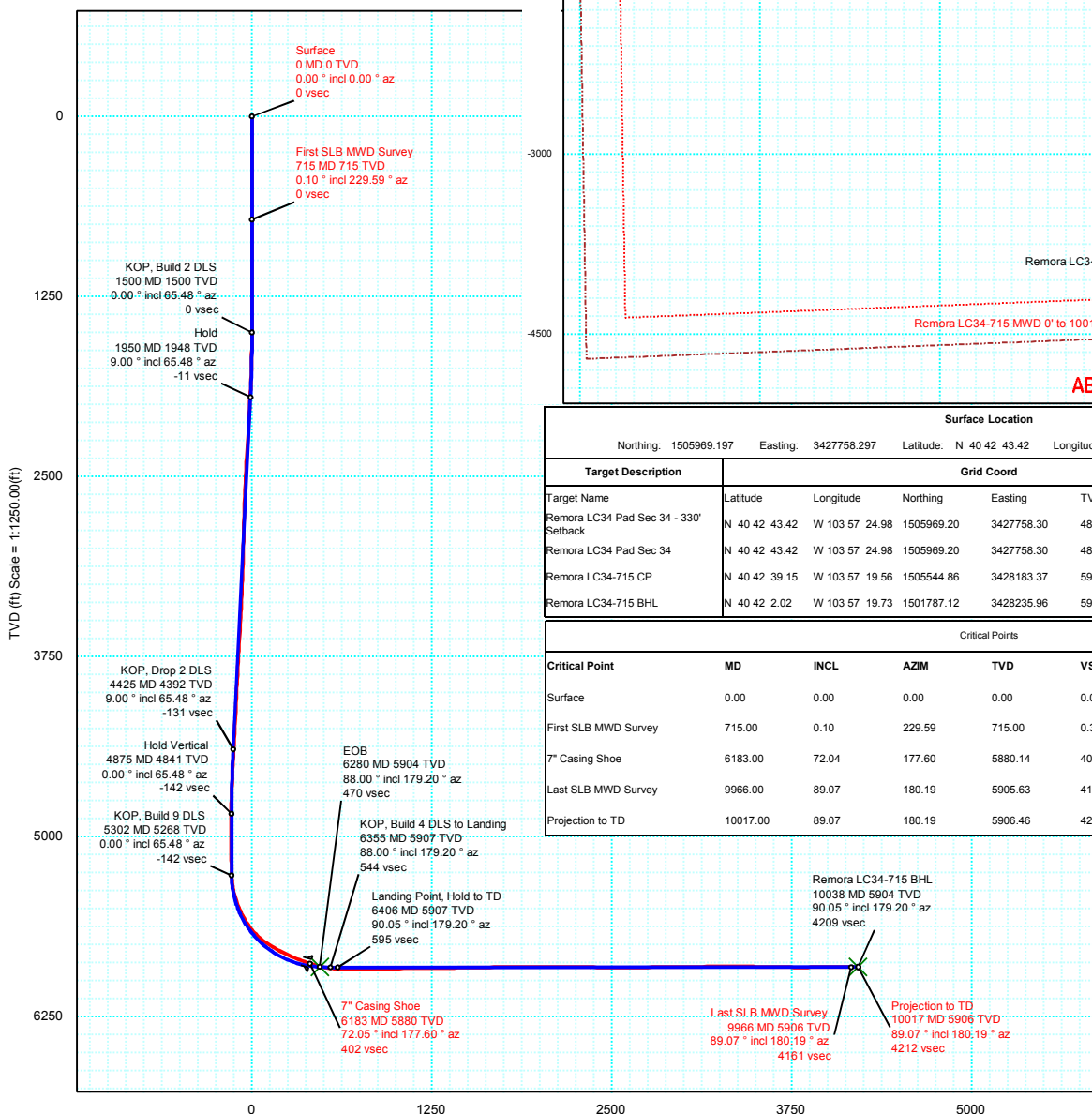
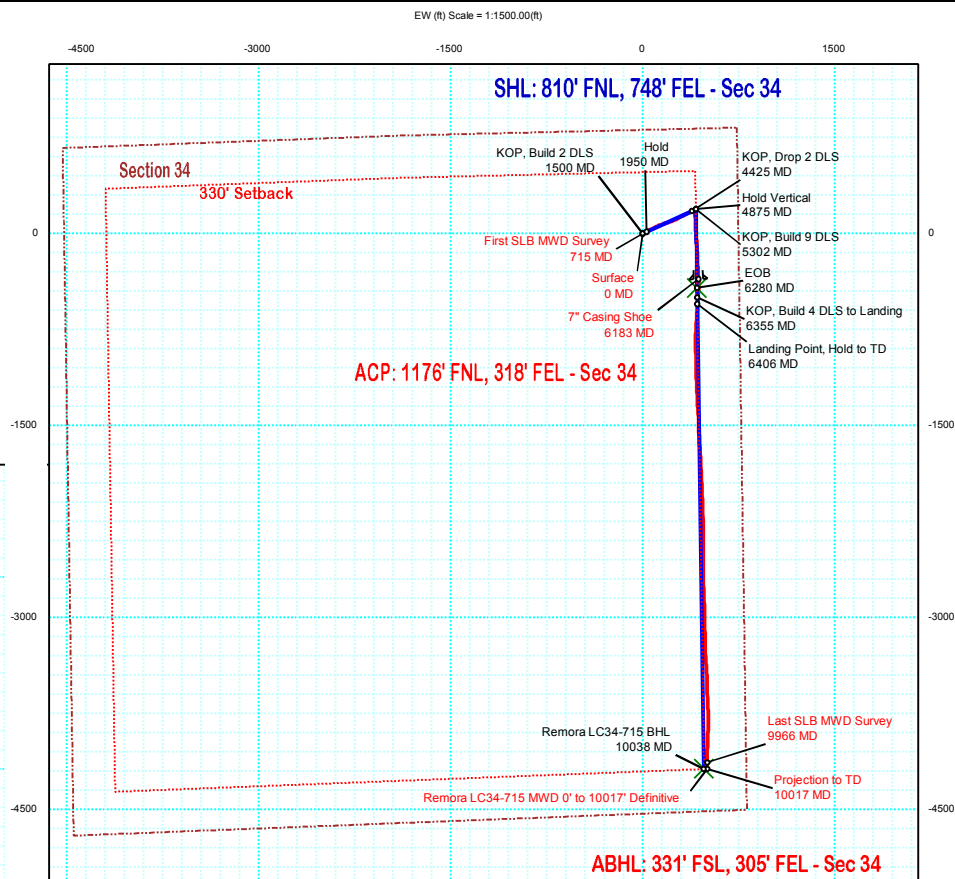
Borehole: Original Hole	Well: Remora LC34-715	Field: CO, Weld County (NAD 83 NZ)	Structure: 34-09N-59W (Remora LC34 Pad) - H&P 273
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Gravity & Magnetic Parameters	Surface Location NAD83 Colorado State Plane, Northern Zone, US Feet	Miscellaneous
Model: HDGM 2015 Dip: 67.196° Date: 28-Dec-2015	Lat: N 40 42 43.42 Northing: 1505969.2ftUS Grid Conv: 0.997°	Slot: Remora LC34-715 TVD Ref: KB 24ft(4838ft above MSL)
MagDec: 7.989° FS: 52804.539nT Gravity FS: 999.09mgn (9.80665 Based)	Lon: W 103 57 24.98 Easting: 3427758.3ftUS Scale Fact: 0.99998921	Plan: Remora LC34-715 MWD 0' to 10017' Definitive

PvA



Grid North
Tot Corr (M->G 6.992°)
Mag Dec (7.989°)
Grid Conv (0.997°)



Surface Location								
Northing: 1505969.197		Easting: 3427758.297		Latitude: N 40 42 43.42		Longitude: W 103 57 24.98		VSec Azimuth: 173.484
Target Description	Grid Coord						Local Coord	
Target Name	Latitude	Longitude	Northing	Easting	TVD	VSec	N(+)S(-)	E(+)W(-)
Remora LC34 Pad Sec 34 - 330' Setback	N 40 42 43.42	W 103 57 24.98	1505969.20	3427758.30	4838.00	0.00	0.00	0.00
Remora LC34 Pad Sec 34	N 40 42 43.42	W 103 57 24.98	1505969.20	3427758.30	4838.00	0.00	0.00	0.00
Remora LC34-715 CP	N 40 42 39.15	W 103 57 19.56	1505544.86	3428183.37	5903.94	469.84	-424.34	425.08
Remora LC34-715 BHL	N 40 42 2.02	W 103 57 19.73	1501787.12	3428235.96	5904.33	4209.32	-4182.13	477.67
Critical Points								
Critical Point	MD	INCL	AZIM	TVD	VSEC	N(+)S(-)	E(+)W(-)	DLS
Surface	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
First SLB MWD Survey	715.00	0.10	229.59	715.00	0.35	-0.40	-0.48	0.01
7" Casing Shoe	6183.00	72.04	177.60	5880.14	402.36	-355.22	435.64	2.39
Last SLB MWD Survey	9966.00	89.07	180.19	5905.63	4161.25	-4130.65	504.76	0.85
Projection to TD	10017.00	89.07	180.19	5906.46	4211.89	-4181.64	504.59	0.00

Critical Points								
Critical Point	MD	INCL	AZIM	TVD	VSEC	N(+)S(-)	E(+)W(-)	DLS
Surface	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
First SLB MWD Survey	715.00	0.10	229.59	715.00	0.35	-0.40	-0.48	0.01
7" Casing Shoe	6183.00	72.04	177.60	5880.14	402.36	-355.22	435.64	2.39
Last SLB MWD Survey	9966.00	89.07	180.19	5905.63	4161.25	-4130.65	504.76	0.85
Projection to TD	10017.00	89.07	180.19	5906.46	4211.89	-4181.64	504.59	0.00



Remora LC34-715 MWD 0' to 10017' Definitive Survey Geodetic Report

(Def Survey)

Report Date: January 21, 2016 - 03:19 PM
Client: Noble Energy
Field: CO, Weld County (NAD 83 NZ)
Structure / Slot: Noble 34-09N-59W (Remora LC34 Pad) - H&P 273 / Remora LC34-715
Well: Remora LC34-715
Borehole: Original Hole
UWI / API#: Unknown / Unknown
Survey Name: Remora LC34-715 MWD 0' to 10017' Definitive
Survey Date: January 07, 2016
Tort / AHD / DDI / ERD Ratio: 180.965 ° / 4833.284 ft / 6.170 / 0.817
Coordinate Reference System: NAD83 Colorado State Plane, Northern Zone, US Feet
Location Lat / Long: N 40° 42' 43.41600", W 103° 57' 24.98400"
Location Grid N/E Y/X: N 1505969.197 ftUS, E 3427758.297 ftUS
CRS Grid Convergence Angle: 0.9970 °
Grid Scale Factor: 0.99998921
Version / Patch: 2.9.355.0

Survey / DLS Computation: Minimum Curvature / Lubinski
Vertical Section Azimuth: 173.484 ° (Grid North)
Vertical Section Origin: 0.000 ft, 0.000 ft
TVD Reference Datum: KB 24ft
TVD Reference Elevation: 4838.000 ft above MSL
Seabed / Ground Elevation: 4814.000 ft above MSL
Magnetic Declination: 7.989 °
Total Gravity Field Strength: 999.0905mgn (9.80665 Based)
Gravity Model: GARM
Total Magnetic Field Strength: 52804.539 nT
Magnetic Dip Angle: 67.196 °
Declination Date: December 28, 2015
Magnetic Declination Model: HDGM 2015
North Reference: Grid North
Grid Convergence Used: 0.9970 °
Total Corr Mag North->Grid North: 6.9924 °
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	0.00	0.00	0.00	0.00	0.00	N/A	1505969.20	3427758.30	N 40 42 43.42	W 103 57 24.98	
First SLB MWD Survey	715.00	0.10	229.59	715.00	0.35	-0.40	-0.48	0.01	1505968.79	3427757.82	N 40 42 43.41	W 103 57 24.99	
	904.00	0.39	134.76	904.00	0.94	-0.96	-0.14	0.22	1505968.23	3427758.15	N 40 42 43.41	W 103 57 24.99	
	998.00	0.07	67.94	998.00	1.18	-1.17	0.14	0.39	1505968.03	3427758.43	N 40 42 43.40	W 103 57 24.98	
	1092.00	0.10	255.28	1092.00	1.17	-1.17	0.11	0.18	1505968.03	3427758.41	N 40 42 43.40	W 103 57 24.98	
	1276.00	0.23	322.59	1276.00	0.88	-0.91	-0.27	0.12	1505968.28	3427758.03	N 40 42 43.41	W 103 57 24.99	
	1367.00	0.43	309.50	1367.00	0.48	-0.55	-0.64	0.23	1505968.64	3427757.65	N 40 42 43.41	W 103 57 24.99	
	1459.00	0.34	302.79	1458.99	0.05	-0.19	-1.14	0.11	1505969.01	3427757.16	N 40 42 43.41	W 103 57 25.00	
	1551.00	1.67	65.76	1550.98	-0.53	0.51	-0.15	2.04	1505969.71	3427758.15	N 40 42 43.42	W 103 57 24.99	
	1641.00	3.69	68.80	1640.88	-1.66	2.10	3.75	2.25	1505971.30	3427762.05	N 40 42 43.44	W 103 57 24.93	
	1733.00	5.85	67.33	1732.55	-3.72	4.98	10.84	2.35	1505974.17	3427769.13	N 40 42 43.46	W 103 57 24.84	
	1825.00	7.09	66.63	1823.97	-6.67	9.04	20.38	1.35	1505978.23	3427778.67	N 40 42 43.50	W 103 57 24.72	
	1916.00	8.44	62.01	1914.13	-10.74	14.40	31.43	1.63	1505983.60	3427789.73	N 40 42 43.55	W 103 57 24.57	
	2007.00	8.15	60.64	2004.18	-15.69	20.70	42.95	0.39	1505989.89	3427801.24	N 40 42 43.61	W 103 57 24.42	
	2099.00	9.14	62.42	2095.13	-20.85	27.28	55.11	1.11	1505996.47	3427813.40	N 40 42 43.68	W 103 57 24.26	
	2190.00	9.13	60.35	2184.98	-26.28	34.19	67.79	0.36	1506003.39	3427826.09	N 40 42 43.74	W 103 57 24.10	
	2374.00	8.76	60.02	2366.74	-37.59	48.42	92.61	0.20	1506017.61	3427850.91	N 40 42 43.88	W 103 57 23.77	
	2466.00	8.94	64.25	2457.65	-42.74	55.02	105.12	0.73	1506024.22	3427863.41	N 40 42 43.94	W 103 57 23.61	
	2649.00	8.47	71.40	2638.54	-50.24	65.50	130.70	0.64	1506034.70	3427889.00	N 40 42 44.04	W 103 57 23.27	
	2741.00	8.43	72.23	2729.54	-52.98	69.72	143.54	0.14	1506038.92	3427901.84	N 40 42 44.08	W 103 57 23.10	
	2835.00	8.56	71.87	2822.51	-55.73	74.00	156.75	0.15	1506043.20	3427915.05	N 40 42 44.12	W 103 57 22.93	
	2930.00	8.39	71.80	2916.48	-58.56	78.36	170.06	0.18	1506047.56	3427928.35	N 40 42 44.16	W 103 57 22.76	
	3025.00	7.67	72.27	3010.54	-61.20	82.46	182.68	0.76	1506051.66	3427940.97	N 40 42 44.20	W 103 57 22.59	
	3119.00	8.04	71.00	3103.66	-63.84	86.51	194.87	0.43	1506055.71	3427953.16	N 40 42 44.24	W 103 57 22.43	
	3214.00	8.02	70.77	3197.73	-66.73	90.86	207.41	0.04	1506060.05	3427965.70	N 40 42 44.28	W 103 57 22.27	
	3309.00	9.50	69.78	3291.62	-70.05	95.75	221.02	1.57	1506064.94	3427979.32	N 40 42 44.32	W 103 57 22.09	
	3403.00	10.14	69.53	3384.24	-73.88	101.32	236.06	0.68	1506070.52	3427994.35	N 40 42 44.38	W 103 57 21.90	
	3498.00	10.42	67.55	3477.72	-78.26	107.53	251.83	0.47	1506076.72	3428010.12	N 40 42 44.44	W 103 57 21.69	
	3687.00	10.40	62.61	3663.61	-89.03	121.90	282.77	0.47	1506091.10	3428041.07	N 40 42 44.57	W 103 57 21.29	
	3782.00	8.30	63.34	3757.34	-94.44	128.93	296.52	2.21	1506098.12	3428054.81	N 40 42 44.64	W 103 57 21.11	
	3876.00	7.96	59.51	3850.40	-99.43	135.27	308.19	0.68	1506104.47	3428066.48	N 40 42 44.70	W 103 57 20.95	
	3971.00	7.39	56.57	3944.55	-104.86	141.98	318.96	0.73	1506111.17	3428077.25	N 40 42 44.76	W 103 57 20.81	
	4066.00	7.36	67.77	4038.77	-109.28	147.64	329.69	1.51	1506116.84	3428087.98	N 40 42 44.82	W 103 57 20.67	
	4161.00	8.14	62.35	4132.90	-113.35	153.07	341.28	1.12	1506122.26	3428099.57	N 40 42 44.87	W 103 57 20.52	
	4255.00	7.89	61.30	4225.98	-118.19	159.25	352.83	0.31	1506128.45	3428111.12	N 40 42 44.93	W 103 57 20.37	
	4350.00	7.32	58.61	4320.14	-123.19	165.54	363.72	0.71	1506134.73	3428122.01	N 40 42 44.99	W 103 57 20.22	
	4444.00	6.20	51.37	4413.49	-128.41	171.83	372.80	1.49	1506141.02	3428131.09	N 40 42 45.05	W 103 57 20.10	
	4539.00	6.29	57.40	4507.93	-133.43	177.83	381.19	0.70	1506147.03	3428139.48	N 40 42 45.11	W 103 57 19.99	
	4633.00	5.69	60.56	4601.42	-137.51	182.90	389.58	0.73	1506152.09	3428147.88	N 40 42 45.16	W 103 57 19.88	
	4728.00	4.71	53.39	4696.02	-141.30	187.54	396.82	1.24	1506156.73	3428155.11	N 40 42 45.20	W 103 57 19.79	
	4822.00	2.56	60.41	4789.83	-144.05	190.88	401.74	2.33	1506160.07	3428160.03	N 40 42 45.23	W 103 57 19.72	
	4916.00	1.00	57.42	4883.78	-145.24	192.35	404.26	1.66	1506161.55	3428162.55	N 40 42 45.25	W 103 57 19.69	
	5010.00	0.38	186.87	4977.78	-145.29	192.49	404.91	1.36	1506161.68	3428163.20	N 40 42 45.25	W 103 57 19.68	
	5105.00	0.85	152.99	5072.77	-144.33	191.55	405.19	0.61	1506160.74	3428163.48	N 40 42 45.24	W 103 57 19.68	
	5199.00	0.71	135.66	5166.76	-143.21	190.51	405.92	0.29	1506159.70	3428164.21	N 40 42 45.23	W 103 57 19.67	
	5293.00	1.88	172.52	5260.74	-141.21	188.56	406.52	1.47	1506157.76	3428164.82	N 40 42 45.21	W 103 57 19.66	
	5389.00	9.85	175.96	5356.16	-131.42	178.80	407.31	8.31	1506147.99	3428165.60	N 40 42 45.11	W 103 57 19.66	
	5483.00	18.55	176.25	5447.20	-108.41	155.81	408.86	9.26	1506125.01	3428167.15	N 40 42 44.89	W 103 57 19.64	
	5577.00	26.40	177.48	5533.99	-72.57	119.96	410.76	8.37	1506089.15	3428169.05	N 40 42 44.53	W 103 57 19.62	
	5672.00	35.49	178.65	5615.39	-23.93	71.18	412.34	9.59	1506040.38	3428170.63	N 40 42 44.05	W 103 57 19.61	
	5766.00	46.07	174.92	5686.47	37.26	10.01	415.99	11.55	1505979.20	3428174.28	N 40 42 43.44	W 103 57 19.58	
	5860.00	57.15	176.60	5744.76	110.76	-63.36	421.34	11.87	1505905.84	3428179.64	N 40 42 42.72	W 103 57 19.53	
	5954.00	62.29	177.54	5792.14	191.75	-144.40	425.48	5.54	1505824.80	3428183.77	N 40 42 41.92	W 103 57 19.49	
	6048.00	66.15	177.11	5833.02	276.19	-228.93	429.43	4.13	1505740.27	3428187.72	N 40 42 41.08	W 103 57 19.46	
	6142.00	71.18	177.11	5867.21	363.54	-316.35	433.84	5.35	1505652.85	3428192.13	N 40 42 40.22	W 103 57 19.42	
7" Casing Shoe	6183.00	72.04	177.60	5880.14	402.36	-355.22	435.64	2.39	1505613.99	3428193.93	N 40 42 39.83	W 103 57 19.41	
	6197.00	72.34	177.76	5884.42	415.65	-368.53	436.18	2.39	1505600.67	3428194.47	N 40 42 39.70	W 103 57 19.40	
	6289.00	79.25	182.55	5907.00	504.15	-457.64	435.88	9.05	1505511.56	3428194.17	N 40 42 38.82	W 103 57 19.43	
	6381.00	87.59	184.46	5917.53	594.06	-548.78	430.29	9.30	1505420.43	3428188.58	N 40 42 37.92	W 103 57 19.52	
	6472.00	91.10	183.96	5918.57	683.45	-639.51	423.61	3.90	1505329.70	3428181.90	N 40 42 37.03	W 103 57 19.63	
	6564.00	90.96	183.45	5916.92	773.97	-731.30	417.66	0.57	1505237.90	3428175.96	N 40 42 36.12	W 103 57 19.73	
	6656.00	90.55	180.10	5915.70	864.99	-823.24	414.81	3.67	1505145.97	3428173.11	N 40 42 35.21	W 103 57 19.78	
	6750.00	90.10	179.38	5915.17	958.43	-917.23	415.24	0.90	1505051.98	3428173.53	N 40 42 34.28	W 103 57 19.80	
	6845.00	90.65	178.97	5914.55	1052.96	-1012.22	416.61	0.72	1504956.99	3428174.90	N 40 42 33.34	W 103 57 19.80	
	6939.00	90.48	178.32	5913.62	1146.57	-1106.19	418.83	0.71	1504863.02	3428177.12	N 40 42 32.42	W 103 57 19.80	
	7034.00	90.58	176.72	5912.74	1241.33	-1201.09	422.94	1.69	1504768.12	3428181.23	N 40 42 31.48	W 103 57 19.76	
	7129.00	90.58	177.65	5911.78	1336.13	-1295.97	427.61	0.98	1504673.24	3428185.90	N 40 42 30.54	W 103 57 19.73	
	7223.00	91.31	175.63	5910.23	1429.97	-1389.79	433.12	2.28	1504579.42	3428191.41	N 40 42 29.61	W 103 57 19.67	
	7318.00	90.62	179.10	5908.63	1524.72	-1484.66	437.48	3.72	1504484.55	3428195.77	N 40 42 28.67	W 103 57 19.64	
	7412.00	91.00	176.36	5907.30	1618.44	-1578.57	441.20	2.94	1504390.65	3428199.50	N 40 42 27.74	W 103 57 19.61	
		7507.00	91.55	176.57	5905.19	1713.29	-1673.37	447.06	0.62	1504295.85	3428205.35	N 40 42 26.81	W 103 57 19.56
		7601.00</											

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 ° ' ")
	8168.00	88.80	179.26	5906.16	2372.37	-2333.78	472.85	1.44	1503635.44	3428231.14	N 40 42 20.28	W 103 57 19.37
	8263.00	89.45	180.35	5907.61	2466.78	-2428.77	473.17	1.34	1503540.46	3428231.46	N 40 42 19.34	W 103 57 19.39
	8357.00	89.59	180.23	5908.40	2560.11	-2522.76	472.69	0.20	1503446.47	3428230.99	N 40 42 18.41	W 103 57 19.42
	8452.00	90.96	179.56	5907.94	2654.51	-2617.76	472.87	1.61	1503351.47	3428231.16	N 40 42 17.47	W 103 57 19.44
	8547.00	90.69	178.73	5906.58	2749.04	-2712.74	474.29	0.92	1503256.49	3428232.58	N 40 42 16.53	W 103 57 19.44
	8641.00	90.62	177.91	5905.50	2842.70	-2806.69	477.04	0.88	1503162.54	3428235.33	N 40 42 15.60	W 103 57 19.43
	8736.00	90.34	177.57	5904.71	2937.43	-2901.61	480.79	0.46	1503067.62	3428239.08	N 40 42 14.67	W 103 57 19.40
	8831.00	90.58	179.00	5903.94	3032.09	-2996.57	483.63	1.53	1502972.67	3428241.92	N 40 42 13.73	W 103 57 19.38
	8926.00	90.86	178.95	5902.75	3126.65	-3091.54	485.33	0.30	1502877.69	3428243.62	N 40 42 12.79	W 103 57 19.38
	9020.00	91.24	178.75	5901.03	3220.22	-3185.51	487.22	0.46	1502783.73	3428245.51	N 40 42 11.86	W 103 57 19.38
	9115.00	89.76	177.64	5900.20	3314.89	-3280.45	490.21	1.95	1502688.79	3428248.50	N 40 42 10.92	W 103 57 19.36
	9209.00	88.97	174.95	5901.24	3408.76	-3374.24	496.28	2.98	1502595.00	3428254.57	N 40 42 9.99	W 103 57 19.30
	9303.00	89.66	179.06	5902.36	3502.56	-3468.09	501.19	4.43	1502501.16	3428259.48	N 40 42 9.07	W 103 57 19.26
	9398.00	88.97	177.81	5903.50	3597.19	-3563.04	503.79	1.50	1502406.20	3428262.08	N 40 42 8.13	W 103 57 19.25
	9493.00	88.59	177.05	5905.52	3691.95	-3657.92	508.04	0.89	1502311.32	3428266.33	N 40 42 7.19	W 103 57 19.22
	9587.00	89.69	178.01	5906.93	3785.70	-3751.82	512.09	1.55	1502217.42	3428270.39	N 40 42 6.26	W 103 57 19.18
	9682.00	90.86	182.36	5906.48	3880.03	-3846.80	511.79	4.74	1502122.45	3428270.08	N 40 42 5.32	W 103 57 19.21
	9777.00	90.69	182.64	5905.19	3973.84	-3941.70	507.64	0.34	1502027.55	3428265.94	N 40 42 4.39	W 103 57 19.28
	9871.00	89.86	180.34	5904.74	4066.92	-4035.66	505.20	2.60	1501933.59	3428263.49	N 40 42 3.46	W 103 57 19.34
Last SLB MWD Survey	9966.00	89.07	180.19	5905.63	4161.25	-4130.65	504.76	0.85	1501838.60	3428263.05	N 40 42 2.52	W 103 57 19.36
Projection to TD	10017.00	89.07	180.19	5906.46	4211.89	-4181.64	504.59	0.00	1501787.61	3428262.88	N 40 42 2.02	W 103 57 19.38

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	Casing Diameter (in)	Survey Tool Type	Borehole / Survey
Surface	1	0.000	24.000	Act Stns	13.750	9.625	SLB_MWD-STD-Depth Only	Original Hole / Remora LC34-715 MWD 0' to 10017' Definitive
Surface	1	24.000	523.000	1/98.425	13.750	9.625	SLB_MWD-STD	Original Hole / Remora LC34-715 MWD 0' to 10017' Definitive
Intermediate	1	523.000	6183.000	Act Stns	8.750	7.000	SLB_MWD-STD	Original Hole / Remora LC34-715 MWD 0' to 10017' Definitive
Lateral	1	6183.000	9966.000	Act Stns	6.125	4.500	SLB_MWD-STD	Original Hole / Remora LC34-715 MWD 0' to 10017' Definitive
Projection to TD	1	9966.000	10017.000	Act Stns	6.125	4.500	SLB_BLIND+TREND	Original Hole / Remora LC34-715 MWD 0' to 10017' Definitive