Schlumberger

Ramos 1-23C Surveys (Gyro + MWD_DMAG) Survey Report

Report Date:	November 30, 2006	**Survey / DLS Computation Method:**	Minimum Curvature / Lubinski
Client:	Noble Energy, Inc.	**Vertical Section Azimuth:**	65.910°
Field:	CO, Garfield County (NAD 27 CZ) Noble Energy 2006	**Vertical Section Origin:**	N 0.000 ft, E 0.000 ft
Structure / Slot:	Noble 01-8S-96W (1K Ramos Pad) Nabors 457 / Ramos 01-23C	**TVD Reference Datum:**	RKB
Well:	Ramos 01-23C	**TVD Reference Elevation:**	5934.0 ft relative to MSL
Borehole:	Original Hole	**Sea Bed / Ground Level Elevation:**	5920.000 ft relative to MSL
UWI/API#:		**Magnetic Declination:**	10.978°
Survey Name / Date:	Ramos 1-23C Surveys (Gyro + MWD_DMAG) 16-Nov-06 / November 16, 2006	**Total Field Strength:**	52643.664 nT
Tort / AHD / DDI / ERD ratio:	58.603° / 591.25 ft / 4.543 / 0.091	**Magnetic Dip:**	65.786°
Grid Coordinate System:	NAD27 Colorado State Planes, Central Zone, US Feet	**Declination Date:**	November 16, 2006
Location Lat/Long:	N 39 22 35.798, W 108 3 38.887	**Magnetic Declination Model:**	BGGM 2006
Location Grid N/E Y/X:	N 572251.810 ftUS, E 1276191.800 ftUS	**North Reference:**	Grid North
Grid Convergence Angle:	-1.61507111°	**Total Corr Mag North -> Grid North:**	+12.593°
Grid Scale Factor:	0.99994745	**Local Coordinates Referenced To:**	Well Head

Comments	Measured Depth (ft)	Inclination (deg)	Azimuth (deg)	TVD (ft)	Vertical Section (ft)	NS (ft)	EW (ft)	DLS (deg/100 ft)	Northing (ftUS)	Easting (ftUS)	Latitude	Longitude
Tie-In	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	572251.81	1276191.80	N 39 22 35.798	W 108 3 38.887
First Gyro Survey	123.00	1.50	142.00	122.99	0.39	-1.27	0.99	1.22	572250.54	1276192.79	N 39 22 35.785	W 108 3 38.874
	215.00	1.50	125.00	214.95	1.30	-2.91	2.72	0.48	572248.90	1276194.52	N 39 22 35.770	W 108 3 38.852
Last Gyro Survey	307.00	1.25	153.00	306.93	1.96	-4.49	4.16	0.77	572247.32	1276195.96	N 39 22 35.754	W 108 3 38.833
Start MWD Survey	398.00	2.00	108.28	397.90	3.19	-5.88	6.12	1.56	572245.93	1276197.92	N 39 22 35.741	W 108 3 38.807
	489.00	3.90	108.39	488.77	6.64	-7.35	10.56	2.09	572244.46	1276202.36	N 39 22 35.728	W 108 3 38.750
	580.00	6.48	101.16	579.39	13.12	-9.32	18.54	2.92	572242.49	1276210.34	N 39 22 35.711	W 108 3 38.648
	672.00	9.07	99.49	670.54	23.40	-11.52	30.79	2.83	572240.29	1276222.59	N 39 22 35.692	W 108 3 38.491
	764.00	10.21	104.32	761.24	35.83	-14.73	45.84	1.52	572237.08	1276237.64	N 39 22 35.665	W 108 3 38.299
	855.00	11.38	105.14	850.63	49.11	-19.07	62.32	1.30	572232.74	1276254.12	N 39 22 35.626	W 108 3 38.087
	947.00	11.82	106.93	940.75	63.25	-24.19	80.10	0.62	572227.62	1276271.89	N 39 22 35.581	W 108 3 37.859
	1038.00	13.14	105.01	1029.60	78.31	-29.58	99.01	1.52	572222.23	1276290.80	N 39 22 35.533	W 108 3 37.617
	1130.00	13.08	104.88	1119.20	94.52	-34.96	119.17	0.07	572216.85	1276310.96	N 39 22 35.485	W 108 3 37.358
	1225.00	12.73	92.65	1211.82	112.23	-38.21	140.02	2.89	572213.60	1276331.81	N 39 22 35.459	W 108 3 37.091
	1321.00	13.64	81.82	1305.30	132.56	-37.09	161.79	2.74	572214.73	1276353.58	N 39 22 35.476	W 108 3 36.815
	1485.00	14.93	74.24	1464.24	172.07	-28.60	201.27	1.38	572223.22	1276393.06	N 39 22 35.571	W 108 3 36.315
8 5/8" CSG	1545.00	14.90	72.87	1522.22	187.37	-24.22	216.08	0.59	572227.59	1276407.87	N 39 22 35.618	W 108 3 36.128
	1611.00	14.87	71.35	1586.00	204.22	-19.02	232.21	0.59	572232.79	1276424.00	N 39 22 35.674	W 108 3 35.925
	1707.00	13.32	67.61	1679.11	227.54	-10.86	254.11	1.87	572240.95	1276445.89	N 39 22 35.761	W 108 3 35.649
	1803.00	12.17	56.98	1772.76	248.59	-1.14	272.82	2.72	572250.67	1276464.60	N 39 22 35.862	W 108 3 35.414
	1895.00	10.61	48.03	1862.95	266.24	9.81	287.25	2.56	572261.62	1276479.03	N 39 22 35.974	W 108 3 35.234
	1995.00	9.84	44.38	1961.36	282.95	22.08	300.07	1.01	572273.89	1276491.85	N 39 22 36.099	W 108 3 35.076
	2091.00	9.10	30.76	2056.07	296.79	34.47	309.69	2.45	572286.27	1276501.48	N 39 22 36.224	W 108 3 34.958
	2184.00	8.53	31.25	2147.97	308.47	46.68	317.03	0.62	572298.49	1276508.81	N 39 22 36.347	W 108 3 34.869
	2280.00	8.41	29.78	2242.92	320.00	58.86	324.21	0.26	572310.67	1276515.99	N 39 22 36.469	W 108 3 34.782
	2377.00	8.31	35.33	2338.89	331.77	70.74	331.79	0.84	572322.54	1276523.57	N 39 22 36.589	W 108 3 34.689
	2473.00	7.87	35.42	2433.94	343.40	81.75	339.61	0.46	572333.56	1276531.39	N 39 22 36.700	W 108 3 34.594
	2569.00	7.47	35.19	2529.08	354.43	92.21	347.02	0.42	572344.01	1276538.80	N 39 22 36.805	W 108 3 34.503
	2665.00	7.37	37.24	2624.27	365.20	102.21	354.34	0.29	572354.02	1276546.12	N 39 22 36.906	W 108 3 34.414
	2761.00	7.14	38.89	2719.50	375.91	111.76	361.81	0.32	572363.56	1276553.59	N 39 22 37.002	W 108 3 34.322
	2856.00	6.54	39.02	2813.83	386.00	120.56	368.92	0.63	572372.36	1276560.70	N 39 22 37.091	W 108 3 34.235
	2952.00	6.14	33.60	2909.24	395.21	129.08	375.21	0.75	572380.88	1276566.99	N 39 22 37.177	W 108 3 34.158
	3048.00	5.67	26.26	3004.73	403.20	137.61	380.15	0.93	572389.41	1276571.92	N 39 22 37.263	W 108 3 34.098
	3143.00	4.43	25.27	3099.36	409.60	145.14	383.79	1.31	572396.94	1276575.57	N 39 22 37.338	W 108 3 34.054
	3239.00	4.06	20.59	3195.10	414.81	151.67	386.57	0.53	572403.47	1276578.34	N 39 22 37.404	W 108 3 34.021
	3335.00	3.49	17.95	3290.89	419.15	157.63	388.66	0.62	572409.43	1276580.44	N 39 22 37.463	W 108 3 33.997
	3430.00	2.89	15.14	3385.74	422.60	162.69	390.18	0.65	572414.49	1276581.96	N 39 22 37.514	W 108 3 33.979
	3526.00	2.53	3.39	3481.64	425.11	167.14	390.94	0.69	572418.95	1276582.71	N 39 22 37.558	W 108 3 33.971
	3622.00	1.91	2.26	3577.56	426.80	170.86	391.12	0.65	572422.66	1276582.90	N 39 22 37.594	W 108 3 33.970
	3718.00	1.50	355.81	3673.52	427.94	173.71	391.10	0.47	572425.51	1276582.87	N 39 22 37.623	W 108 3 33.971
	3908.00	0.74	278.65	3863.49	427.75	176.37	389.70	0.80	572428.18	1276581.48	N 39 22 37.649	W 108 3 33.990

Comments	Measured Depth (ft)	Inclination (deg)	Azimuth (deg)	TVD (ft)	Vertical Section (ft)	NS (ft)	EW (ft)	DLS (deg/100 ft)	Northing (ftUS)	Easting (ftUS)	Latitude	Longitude
	4099.00	1.58	265.58	4054.45	424.23	176.36	385.86	0.46	572428.16	1276577.63	N 39 22 37.647	W 108 3 34.039
	4291.00	1.58	262.32	4246.38	419.20	175.80	380.59	0.05	572427.60	1276572.37	N 39 22 37.640	W 108 3 34.106
	4481.00	2.26	252.46	4436.27	412.97	174.32	374.43	0.40	572426.12	1276566.20	N 39 22 37.624	W 108 3 34.184
	4577.00	1.87	253.85	4532.21	409.54	173.31	371.12	0.41	572425.11	1276562.90	N 39 22 37.613	W 108 3 34.226
	4768.00	0.52	273.99	4723.16	405.68	172.51	367.26	0.73	572424.31	1276559.04	N 39 22 37.604	W 108 3 34.274
	4959.00	1.55	265.37	4914.13	402.48	172.36	363.82	0.54	572424.16	1276555.60	N 39 22 37.602	W 108 3 34.318
	5159.00	2.01	243.68	5114.03	396.43	170.59	357.98	0.40	572422.39	1276549.76	N 39 22 37.583	W 108 3 34.392
	5341.00	1.70	230.82	5295.94	390.63	167.47	353.02	0.28	572419.27	1276544.81	N 39 22 37.550	W 108 3 34.454
	5532.00	2.91	242.40	5486.78	383.06	163.43	346.53	0.68	572415.23	1276538.31	N 39 22 37.509	W 108 3 34.535
	5723.00	2.00	281.11	5677.62	375.49	161.83	338.96	0.96	572413.63	1276530.75	N 39 22 37.491	W 108 3 34.631
	5915.00	2.19	269.99	5869.49	369.41	162.47	332.01	0.23	572414.27	1276523.79	N 39 22 37.495	W 108 3 34.719
	6107.00	2.71	251.74	6061.32	361.54	161.05	324.03	0.48	572412.85	1276515.81	N 39 22 37.479	W 108 3 34.821
	6298.00	2.53	271.81	6252.12	353.26	159.77	315.53	0.49	572411.57	1276507.31	N 39 22 37.464	W 108 3 34.928
Last MWD Survyes	6480.00	2.41	244.93	6433.96	345.82	158.27	308.05	0.63	572410.07	1276499.83	N 39 22 37.447	W 108 3 35.023
Proj to TD	6530.00	2.32	237.53	6483.92	343.77	157.28	306.24	0.64	572409.08	1276498.02	N 39 22 37.437	W 108 3 35.046

Survey Type: Definitive Survey

Survey Error Model: **SLB ISCWSA version 24 *** 3-D 95.00% Confidence 2.7955 sigma**

Surveying Prog:

MD From (ft)	MD To (ft)	EOU Freq	Survey Tool Type	Borehole -> Survey
0.00	14.00	Act-Stns	SLB_NSG+SSHOT-Depth Only	Original Hole -> Ramos 1-23C Surveys (Gyro + MWD_DMAG) 16-Nov-06
14.00	307.00	Act-Stns	SLB_NSG+SSHOT	Original Hole -> Ramos 1-23C Surveys (Gyro + MWD_DMAG) 16-Nov-06
307.00	6480.00	Act-Stns	SLB_MWD+DMAG	Original Hole -> Ramos 1-23C Surveys (Gyro + MWD_DMAG) 16-Nov-06
6480.00	6530.00	Act-Stns	SLB_BLIND+TREND	Original Hole -> Ramos 1-23C Surveys (Gyro + MWD_DMAG) 16-Nov-06