



Cimarex Marquardt 1 Federal #13H MWD 0ft to 11794ft Survey Report

(Def Survey)

Report Date: November 18, 2013 - 12:46 PM
Client: Cimarex Energy
Field: NM Eddy County (NAD 83)
Structure / Slot: Cactus 116 / Marquardt 1 Federal #13
Well: Marquardt 1 Federal #13H
Borehole: Original Borehole
UWI / API#: Unknown / Unknown
Survey Name: Cimarex Marquardt 1 Federal #13H MWD 0ft to 11794ft
Survey Date: November 05, 2013
Tort / AHD / DDI / ERD Ratio: 192.392 ° / 5005.414 ft / 6.201 / 0.700
Coordinate Reference System: NAD83 New Mexico State Plane, Eastern Zone, US Feet
Location Lat / Long: N 32° 9' 7.85624", W 104° 14' 35.94128"
Location Grid N/E Y/X: N 419110.900 ftUS, E 569195.300 ftUS
CRS Grid Convergence Angle: 0.0479 °
Grid Scale Factor: 0.99990998

Survey / DLS Computation: Minimum Curvature / Lubinski
Vertical Section Azimuth: 357.472 ° (Grid North)
Vertical Section Origin: 0.000 ft, 0.000 ft
TVD Reference Datum: RKB
TVD Reference Elevation: 3290.000 ft above
Seabed / Ground Elevation: 3272.000 ft above
Magnetic Declination: 7.709 °
Total Gravity Field Strength: 998.4934mgn (9.80665 Based)
Total Magnetic Field Strength: 48237.110 nT
Magnetic Dip Angle: 59.927 °
Declination Date: November 05, 2013
Magnetic Declination Model: BGGM 2013
North Reference: Grid North
Grid Convergence Used: 0.0479 °
Total Corr Mag North->Grid North: 7.6613 °
Local Coord Referenced To: Structure Reference Point

CONFIDENTIAL

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	Closure (ft)	Closure Azimuth (°)	DLS (°/100ft)	TF (°)
SHL Cimarex Marquardt 1 Federal #13H	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	26.69M
	38.84	0.22	26.69	38.84	0.07	0.07	0.03	0.07	26.69	0.57	188.67M
	193.69	0.31	188.67	193.69	-0.09	-0.08	0.10	0.13	128.25	0.34	188.89M
	253.77	0.62	188.89	253.77	-0.56	-0.56	0.03	0.56	177.04	0.52	184.19M
	331.49	0.48	184.19	331.48	-1.30	-1.30	-0.06	1.31	182.62	0.19	304.07M
	358.82	0.48	304.07	358.81	-1.35	-1.35	-0.16	1.36	186.86	3.04	194.47M
	620.00	1.01	194.47	619.98	-2.89	-2.97	-1.64	3.39	208.97	0.48	190.78M
	682.00	0.79	190.78	681.97	-3.83	-3.92	-1.86	4.34	205.40	0.37	223.87M
	741.00	1.10	223.87	740.96	-4.62	-4.73	-2.33	5.27	206.23	1.04	188.98M
	834.00	0.79	188.98	833.95	-5.86	-6.00	-3.05	6.73	206.92	0.69	186.91M
	922.00	0.88	186.91	921.94	-7.12	-7.27	-3.22	7.96	203.91	0.11	196.4M
	1013.00	1.01	196.40	1012.93	-8.57	-8.74	-3.53	9.42	202.03	0.22	187.17M
	1200.68	1.01	187.17	1200.58	-11.77	-11.96	-4.21	12.68	199.38	0.09	171M
	1288.00	1.01	171.00	1287.89	-13.29	-13.49	-4.18	14.12	197.23	0.33	145.47M
	1383.00	1.41	145.47	1382.87	-15.11	-15.28	-3.39	15.65	192.51	0.70	149.07M

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	Closure (ft)	Closure Azimuth (°)	DLS (°/100ft)	TF (°)
	1477.00	1.49	149.07	1476.84	-17.17	-17.28	-2.11	17.41	186.95	0.13	171M
	1572.00	1.10	171.00	1571.81	-19.16	-19.24	-1.33	19.29	183.95	0.66	151.58M
	1670.00	1.19	151.58	1669.79	-21.01	-21.06	-0.70	21.08	181.90	0.40	146.17M
	1765.00	1.58	146.17	1764.77	-23.02	-23.02	0.50	23.02	178.75	0.43	182.6M
	1861.00	0.70	182.60	1860.75	-24.73	-24.70	1.21	24.73	177.19	1.14	209.19M
	1899.00	0.40	209.19	1898.74	-25.08	-25.05	1.14	25.08	177.40	1.02	187.7M
	1953.00	0.62	187.70	1952.74	-25.53	-25.51	1.01	25.53	177.74	0.53	193.37M
	2143.00	0.79	193.37	2142.73	-27.80	-27.80	0.56	27.81	178.84	0.10	164.28M
	2236.00	0.48	164.28	2235.72	-28.79	-28.80	0.52	28.80	178.96	0.47	149.6M
	2374.00	0.70	149.60	2373.72	-30.10	-30.08	1.10	30.10	177.90	0.19	157.91M
	2424.00	0.70	157.91	2423.71	-30.66	-30.63	1.37	30.66	177.43	0.20	159.4M
	2518.00	0.48	159.40	2517.71	-31.57	-31.53	1.73	31.58	176.86	0.23	157.07M
	2615.00	0.70	157.07	2614.70	-32.52	-32.45	2.10	32.52	176.29	0.23	151.89M
	2709.00	0.88	151.89	2708.69	-33.71	-33.62	2.67	33.73	175.47	0.21	156.59M
	2804.00	0.79	156.59	2803.68	-34.97	-34.86	3.27	35.02	174.64	0.12	164.1M
	2899.00	1.01	164.10	2898.67	-36.40	-36.27	3.76	36.47	174.08	0.26	174.87M
	2993.00	1.01	174.87	2992.66	-38.04	-37.89	4.06	38.11	173.88	0.20	174.21M
	3087.00	1.01	174.21	3086.64	-39.69	-39.54	4.22	39.77	173.91	0.01	170.48M
	3182.00	0.88	170.48	3181.63	-41.25	-41.09	4.42	41.33	173.86	0.15	165.69M
	3274.00	0.88	165.69	3273.62	-42.64	-42.48	4.72	42.74	173.67	0.08	293.87M
	3370.00	0.70	293.87	3369.61	-43.10	-42.95	4.36	43.17	174.20	1.48	188.8M
	3463.00	0.79	188.80	3462.61	-43.48	-43.36	3.74	43.52	175.07	1.27	185.77M
	3563.00	0.88	185.77	3562.60	-44.92	-44.80	3.56	44.94	175.46	0.10	188.98M
	3657.00	0.88	188.98	3656.59	-46.34	-46.23	3.38	46.36	175.82	0.05	186.47M
	3751.00	1.01	186.47	3750.57	-47.86	-47.77	3.17	47.87	176.20	0.15	195.17M
	3846.00	1.01	195.17	3845.56	-49.49	-49.41	2.86	49.49	176.69	0.16	207.7M
	3939.00	1.10	207.70	3938.54	-51.04	-50.99	2.23	51.04	177.50	0.27	216.71M
	4035.00	1.32	216.71	4034.52	-52.69	-52.69	1.14	52.71	178.76	0.30	215.39M
	4132.00	1.41	215.39	4131.50	-54.50	-54.56	-0.22	54.56	180.23	0.10	223.87M
	4226.00	1.71	223.87	4225.46	-56.38	-56.52	-1.86	56.55	181.89	0.40	250.98M
	4321.00	1.01	250.98	4320.43	-57.59	-57.81	-3.64	57.92	183.60	0.98	269.7M
	4415.00	1.01	269.70	4414.42	-57.80	-58.08	-5.25	58.32	185.16	0.35	270.89M
	4509.00	0.79	270.89	4508.41	-57.73	-58.08	-6.73	58.47	186.61	0.23	261.88M
	4604.00	0.70	261.88	4603.40	-57.74	-58.15	-7.95	58.69	187.79	0.16	269.31M
	4699.00	0.48	269.31	4698.39	-57.79	-58.24	-8.93	58.92	188.71	0.24	199.7M
	4797.00	0.48	199.70	4796.39	-58.15	-58.63	-9.48	59.39	189.18	0.56	208.4M
	4888.00	0.79	208.40	4887.39	-59.05	-59.54	-9.90	60.36	189.44	0.36	213.81M
	4983.00	0.79	213.81	4982.38	-60.13	-60.66	-10.58	61.58	189.89	0.08	220.49M
	5173.00	0.88	220.49	5172.36	-62.26	-62.86	-12.25	64.04	191.03	0.07	218.99M
	5266.00	1.01	218.99	5265.34	-63.39	-64.04	-13.23	65.39	191.68	0.14	222.2M
	5362.00	1.01	222.20	5361.33	-64.63	-65.32	-14.34	66.88	192.38	0.06	220.4M

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	Closure (ft)	Closure Azimuth (°)	DLS (°/100ft)	TF (°)
	5456.00	1.19	220.40	5455.31	-65.93	-66.68	-15.52	68.46	193.11	0.19	246.11M
	5550.00	1.01	246.11	5549.30	-66.95	-67.76	-16.91	69.84	194.02	0.55	248.3M
	5643.00	1.19	248.30	5642.28	-67.56	-68.45	-18.56	70.92	195.17	0.20	266.67M
	5740.00	1.19	266.67	5739.26	-67.91	-68.88	-20.50	71.87	196.58	0.39	276.38M
	5833.00	1.01	276.38	5832.24	-67.79	-68.84	-22.28	72.36	197.93	0.28	226.77M
	5928.00	1.10	226.77	5927.23	-68.26	-69.38	-23.78	73.34	198.92	0.94	196.27M
	6022.00	1.71	196.27	6021.20	-70.17	-71.34	-24.83	75.54	199.19	1.01	146.7M
	6116.00	0.79	146.70	6115.18	-72.06	-73.23	-24.87	77.33	198.76	1.43	114.49M
	6209.00	0.70	114.49	6208.17	-72.87	-74.00	-24.00	77.79	197.97	0.45	119.81M
	6306.00	0.70	119.81	6305.16	-73.45	-74.54	-22.94	77.99	197.11	0.07	359.4M
	6403.00	0.31	359.40	6402.16	-73.51	-74.57	-22.43	77.87	196.74	0.93	350.21M
	6493.00	0.70	350.21	6492.16	-72.72	-73.79	-22.53	77.15	196.98	0.44	359.91M
	6567.00	2.92	359.91	6566.12	-70.39	-71.46	-22.61	74.95	197.56	3.02	359.49M
	6662.00	15.56	359.49	6659.69	-55.18	-56.23	-22.72	60.65	202.00	13.31	33.74L
	6757.00	25.52	345.13	6748.60	-22.35	-23.61	-28.11	36.71	229.97	11.68	67.06L
	6789.00	26.56	340.10	6777.35	-8.78	-10.22	-32.31	33.89	252.45	7.62	77.48L
	6821.00	27.14	335.21	6805.90	4.80	3.14	-37.81	37.94	274.74	7.13	54.52R
	6853.00	28.97	340.24	6834.15	18.96	17.06	-43.49	46.72	291.42	9.34	60.11R
	6884.00	32.13	349.48	6860.85	34.31	32.24	-47.54	57.44	304.15	18.23	64.04R
	6948.00	36.70	2.66	6913.71	70.27	68.15	-49.76	84.38	323.86	13.62	21.81R
	7042.00	43.09	6.36	6985.80	130.04	128.19	-44.89	135.82	340.70	7.25	31.91L
	7137.00	49.19	1.44	7051.62	198.05	196.46	-40.39	200.57	348.38	7.42	1.37R
	7232.00	64.43	1.84	7103.47	277.11	275.70	-38.10	278.32	352.13	16.05	1.71R
	7327.00	78.68	2.27	7133.45	366.71	365.53	-34.86	367.18	354.55	15.01	6.03L
	7421.00	86.07	1.49	7145.92	459.54	458.58	-31.81	459.68	356.03	7.90	23.35L
	7517.00	87.25	0.98	7151.51	555.16	554.39	-29.75	555.19	356.93	1.34	9.05R
	7612.00	89.07	1.27	7154.56	649.92	649.32	-27.88	649.92	357.54	1.94	53.13R
	7707.00	89.76	2.19	7155.53	744.65	744.27	-25.01	744.69	358.08	1.21	26.31R
	7800.00	91.62	3.11	7154.41	837.26	837.16	-20.71	837.42	358.58	2.23	93.22L
	7895.00	91.58	2.40	7151.76	931.82	932.01	-16.15	932.15	359.01	0.75	96.14L
	7990.00	91.51	1.75	7149.19	1026.48	1026.91	-12.71	1026.99	359.29	0.69	91.48L
	8085.00	91.48	0.60	7146.72	1121.24	1121.86	-10.76	1121.91	359.45	1.21	88.46L
	8179.00	91.51	359.47	7144.26	1215.12	1215.83	-10.71	1215.87	359.50	1.20	53.57L
	8273.00	92.10	358.67	7141.30	1309.03	1309.77	-12.23	1309.82	359.46	1.06	102.93R
	8368.00	91.93	359.41	7137.96	1403.94	1404.69	-13.82	1404.76	359.44	0.80	44.96R
	8463.00	92.86	0.34	7133.99	1498.77	1499.61	-14.03	1499.67	359.46	1.38	117.26L
	8558.00	91.58	357.86	7130.31	1593.65	1594.52	-15.52	1594.59	359.44	2.94	85.44L
	8652.00	91.82	354.82	7127.52	1687.58	1688.27	-21.52	1688.41	359.27	3.24	95.58R
	8747.00	91.27	0.37	7124.96	1782.51	1783.12	-25.50	1783.30	359.18	5.87	29.83R
	8842.00	97.21	3.80	7117.94	1876.88	1877.74	-22.07	1877.87	359.33	7.21	4.65L
	8856.00	98.91	3.66	7115.97	1890.66	1891.57	-21.17	1891.69	359.36	12.18	152.5R

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	Closure (ft)	Closure Azimuth (°)	DLS (°/100ft)	TF (°)
	8950.00	97.27	4.52	7102.75	1983.10	1984.39	-14.53	1984.45	359.58	1.97	178.03R
	9045.00	94.37	4.62	7093.11	2076.88	2078.59	-7.00	2078.60	359.81	3.05	178.31L
	9139.00	90.31	4.50	7089.28	2170.06	2172.20	0.47	2172.20	0.01	4.32	167.08L
	9234.00	87.87	3.94	7090.78	2264.38	2266.92	7.46	2266.93	0.19	2.64	66.97L
	9331.00	88.04	3.54	7094.25	2360.74	2363.65	13.78	2363.69	0.33	0.45	37.63L
	9426.00	89.00	2.80	7096.70	2455.24	2458.47	19.03	2458.55	0.44	1.28	85.25L
	9521.00	89.11	1.48	7098.27	2549.91	2553.39	22.58	2553.49	0.51	1.39	95.14L
	9614.00	89.04	0.70	7099.77	2642.71	2646.36	24.35	2646.47	0.53	0.84	99.47L
	9710.00	88.87	359.68	7101.52	2738.59	2742.34	24.67	2742.45	0.52	1.08	97.22L
	9805.00	88.76	358.81	7103.48	2833.52	2837.31	23.41	2837.41	0.47	0.92	106.9L
	9900.00	88.59	358.25	7105.68	2928.48	2932.26	20.98	2932.33	0.41	0.62	87.94L
	9995.00	88.62	357.42	7107.99	3023.45	3027.16	17.39	3027.21	0.33	0.87	94.84L
	10090.00	88.56	356.71	7110.33	3118.42	3122.01	12.53	3122.03	0.23	0.75	60.46L
	10184.00	88.90	356.11	7112.41	3212.38	3215.80	6.64	3215.81	0.12	0.73	15.02L
	10278.00	89.31	356.00	7113.88	3306.34	3309.56	0.18	3309.56	0.00	0.45	104.66L
	10373.00	89.14	355.35	7115.17	3401.28	3404.28	-6.99	3404.29	359.88	0.71	88.97L
	10471.00	89.17	353.70	7116.61	3499.14	3501.82	-16.34	3501.86	359.73	1.68	97.05L
	10560.00	88.97	352.08	7118.06	3587.84	3590.12	-27.35	3590.23	359.56	1.83	81.92L
	10654.00	89.28	349.90	7119.49	3681.22	3682.95	-42.07	3683.19	359.35	2.34	56.43L
	10749.00	90.03	348.77	7120.07	3775.26	3776.30	-59.65	3776.77	359.10	1.43	13.35L
	10843.00	90.62	348.63	7119.53	3868.16	3868.48	-78.07	3869.27	358.84	0.65	116.56R
	10937.00	90.31	349.25	7118.77	3961.11	3960.73	-96.10	3961.90	358.61	0.74	109.9R
	11032.00	89.72	350.88	7118.74	4055.32	4054.30	-112.49	4055.86	358.41	1.82	84.97R
	11127.00	89.86	352.47	7119.09	4149.83	4148.30	-126.24	4150.22	358.26	1.68	95.4R
	11222.00	89.79	353.21	7119.38	4244.52	4242.55	-138.08	4244.80	358.14	0.78	97R
	11316.00	89.72	353.78	7119.78	4338.29	4335.95	-148.73	4338.50	358.04	0.61	39.81L
	11417.00	90.14	353.43	7119.91	4439.06	4436.32	-159.98	4439.20	357.93	0.54	112.99L
	11509.00	90.00	353.10	7119.80	4530.81	4527.68	-170.77	4530.90	357.84	0.39	116.57R
	11603.00	89.97	353.16	7119.82	4624.54	4621.01	-182.02	4624.59	357.74	0.07	140.71R
	11699.00	89.86	353.25	7119.96	4720.27	4716.33	-193.37	4720.30	357.65	0.15	164.05R
Last Survey	11727.00	89.72	353.29	7120.07	4748.20	4744.14	-196.66	4748.22	357.63	0.52	HS
Projection to TD	11794.00	89.72	353.29	7120.39	4815.02	4810.68	-204.48	4815.03	357.57	0.00	

Survey Type: Def Survey

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

Survey Program:

Description	MD From (ft)	MD To (ft)	EOU Freq (ft)	Hole Size (in)	Casing Diameter (in)	Survey Tool Type	Borehole / Survey
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Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	Closure (ft)	Closure Azimuth (°)	DLS (°/100ft)	TF (°)
		0.000	18.000		Act Stns	30.000	30.000	SLB_MWD-POOR-Depth Only		Original Borehole / Cimarex Marquardt 1 Federal #13H MWD	
		18.000	6493.000		Act Stns	30.000	30.000	SLB_MWD-POOR		Original Borehole / Cimarex Marquardt 1 Federal #13H MWD	
		6493.000	11222.000		Act Stns	30.000	30.000	SLB_MWD-STD		Original Borehole / Cimarex Marquardt 1 Federal #13H MWD	
		11222.000	11794.000		Act Stns	30.000	30.000	SLB_BLIND+TREND		Original Borehole / Cimarex Marquardt 1 Federal #13H MWD	