

Final Survey - Cimarex West Grama Ridge 8-5 Federal Com 3H 0ft to 20640ft (Surcon Corrected)



(Def Survey)

Report Date: September 05, 2018 - 08:26 PM
Client: Cimarex
Field: NM Lea County (NAD 83)
Structure / Slot: Cimarex West Grama Ridge 8-5 Federal Com 3H / Cimarex West Grama Ridge 8-5 Federal Com 3H
Well: Cimarex West Grama Ridge 8-5 Federal Com 3H
Borehole: Original Borehole
UWI / API#: Unknown / Unknown
Survey Name: Final Survey - Cimarex West Grama Ridge 8-5 Federal Com 3H 0ft to 20640ft (Surcon Corrected)
Survey Date: July 27, 2018
Tort / AHD / DDI / ERD Ratio: 223.701 ° / 10550.282 ft / 6.648 / 0.962
Coordinate Reference System: NAD83 New Mexico State Plane, Eastern Zone, US Feet
Location Lat / Long: N 32° 24' 1.41258", W 103° 29' 55.83007"
Location Grid N/E Y/X: N 510399.160 ftUS, E 798893.410 ftUS
CRS Grid Convergence Angle: 0.4472 °
Grid Scale Factor: 0.99998506
Version / Patch: 2.10.720.0

Survey / DLS Computation: Minimum Curvature / Lubinski
Vertical Section Azimuth: 359.669 ° (Grid North)
Vertical Section Origin: 0.000 ft, 0.000 ft
TVD Reference Datum: RKB
TVD Reference Elevation: 3550.800 ft above MSL
Seabed / Ground Elevation: 3524.800 ft above MSL
Magnetic Declination: 6.728 °
Total Gravity Field Strength: 998.4755mgn (9.80665 Based)
Gravity Model: GARM
Total Magnetic Field Strength: 48114.289 nT
Magnetic Dip Angle: 60.236 °
Declination Date: August 22, 2018
Magnetic Declination Model: HDGM 2018
North Reference: Grid North
Grid Convergence Used: 0.4472 °
Total Corr Mag North->Grid North: 6.2809 °
Local Coord Referenced To: Structure Reference Point

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 ° ' ")
SHL [517' FSL, 540' FWL]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	510399.16	798893.41	N 32 24 1.41	W 103 29 55.83
	177.00	0.93	310.40	176.99	0.94	0.93	-1.09	0.53	510400.09	798892.32	N 32 24 1.42	W 103 29 55.84
	300.00	0.82	318.88	299.98	2.26	2.24	-2.43	0.14	510401.40	798890.98	N 32 24 1.43	W 103 29 55.86
	390.00	0.79	317.76	389.97	3.20	3.19	-3.27	0.04	510402.35	798890.14	N 32 24 1.44	W 103 29 55.87
	481.00	0.89	309.14	480.96	4.12	4.10	-4.24	0.18	510403.26	798889.17	N 32 24 1.45	W 103 29 55.88
	573.00	1.09	320.33	572.95	5.25	5.22	-5.36	0.30	510404.38	798888.05	N 32 24 1.46	W 103 29 55.89
	664.00	1.03	316.97	663.93	6.52	6.48	-6.47	0.09	510405.64	798886.94	N 32 24 1.48	W 103 29 55.90
	754.00	0.94	307.62	753.92	7.57	7.53	-7.60	0.20	510406.69	798885.81	N 32 24 1.49	W 103 29 55.92
	844.00	0.75	315.87	843.91	8.45	8.40	-8.60	0.25	510407.56	798884.81	N 32 24 1.50	W 103 29 55.93
	939.00	0.89	313.48	938.90	9.41	9.35	-9.57	0.15	510408.51	798883.84	N 32 24 1.51	W 103 29 55.94
	1033.00	0.75	330.62	1032.89	10.45	10.39	-10.40	0.30	510409.55	798883.01	N 32 24 1.52	W 103 29 55.95
	1127.00	0.94	313.46	1126.88	11.52	11.46	-11.26	0.33	510410.62	798882.15	N 32 24 1.53	W 103 29 55.96
	1221.00	0.69	319.19	1220.87	12.49	12.42	-12.19	0.28	510411.58	798881.22	N 32 24 1.54	W 103 29 55.97
	1316.00	0.76	310.33	1315.86	13.33	13.26	-13.04	0.14	510412.42	798880.37	N 32 24 1.54	W 103 29 55.98
	1410.00	0.83	317.15	1409.85	14.30	14.22	-14.04	0.21	510413.38	798879.37	N 32 24 1.55	W 103 29 55.99
	1505.00	0.70	332.55	1504.84	15.39	15.30	-14.83	0.33	510414.46	798878.58	N 32 24 1.57	W 103 29 56.00
	1543.00	0.76	333.97	1542.84	15.82	15.73	-15.05	0.16	510414.89	798878.36	N 32 24 1.57	W 103 29 56.00
	1697.00	0.97	43.43	1696.82	17.68	17.60	-14.60	0.65	510416.76	798878.81	N 32 24 1.59	W 103 29 56.00
	1792.00	0.99	331.04	1791.81	18.98	18.90	-14.44	1.22	510418.06	798878.97	N 32 24 1.60	W 103 29 56.00
	1886.00	1.00	351.68	1885.80	20.51	20.42	-14.96	0.38	510419.58	798878.45	N 32 24 1.62	W 103 29 56.00
	1980.00	0.99	354.17	1979.78	22.13	22.04	-15.16	0.05	510421.20	798878.25	N 32 24 1.63	W 103 29 56.00
	2074.00	0.97	341.17	2073.77	23.69	23.60	-15.50	0.24	510422.76	798877.91	N 32 24 1.65	W 103 29 56.01
	2168.00	1.08	347.14	2167.76	25.31	25.22	-15.95	0.16	510424.38	798877.46	N 32 24 1.66	W 103 29 56.01
	2263.00	0.39	350.03	2262.75	26.50	26.41	-16.21	0.73	510425.57	798877.21	N 32 24 1.68	W 103 29 56.02

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 ° ' ")
	2357.00	0.03	172.95	2356.75	26.80	26.70	-16.26	0.45	510425.86	798877.15	N 32 24 1.68	W 103 29 56.02
	2451.00	0.16	56.69	2450.75	26.84	26.75	-16.14	0.19	510425.91	798877.27	N 32 24 1.68	W 103 29 56.02
	2545.00	0.42	67.01	2544.75	27.05	26.96	-15.72	0.28	510426.12	798877.69	N 32 24 1.68	W 103 29 56.01
	2639.00	0.52	83.50	2638.74	27.22	27.14	-14.98	0.18	510426.30	798878.43	N 32 24 1.68	W 103 29 56.00
	2733.00	0.66	80.01	2732.74	27.36	27.28	-14.02	0.15	510426.44	798879.39	N 32 24 1.68	W 103 29 55.99
	2827.00	1.18	77.98	2826.73	27.65	27.58	-12.54	0.55	510426.74	798880.87	N 32 24 1.69	W 103 29 55.97
	2922.00	2.14	94.31	2921.68	27.70	27.65	-9.81	1.12	510426.81	798883.60	N 32 24 1.69	W 103 29 55.94
	3016.00	3.06	99.54	3015.59	27.13	27.10	-5.59	1.01	510426.26	798887.82	N 32 24 1.68	W 103 29 55.89
	3110.00	2.78	95.78	3109.47	26.46	26.45	-0.85	0.36	510425.61	798892.56	N 32 24 1.67	W 103 29 55.84
	3204.00	2.14	97.39	3203.38	25.98	26.00	3.16	0.68	510425.16	798896.57	N 32 24 1.67	W 103 29 55.79
	3299.00	1.62	103.83	3298.33	25.41	25.45	6.22	0.59	510424.61	798899.63	N 32 24 1.66	W 103 29 55.76
	3393.00	1.01	123.80	3392.30	24.62	24.67	8.20	0.80	510423.83	798901.61	N 32 24 1.66	W 103 29 55.73
	3487.00	1.63	116.24	3486.28	23.56	23.62	10.09	0.68	510422.78	798903.50	N 32 24 1.65	W 103 29 55.71
	3581.00	1.85	109.56	3580.23	22.45	22.52	12.72	0.32	510421.68	798906.13	N 32 24 1.63	W 103 29 55.68
	3675.00	1.80	135.58	3674.19	20.87	20.96	15.18	0.88	510420.12	798908.59	N 32 24 1.62	W 103 29 55.65
	3769.00	1.83	186.79	3768.15	18.32	18.41	16.04	1.67	510417.57	798909.45	N 32 24 1.59	W 103 29 55.64
	3864.00	1.81	194.32	3863.10	15.36	15.45	15.49	0.25	510414.61	798908.90	N 32 24 1.56	W 103 29 55.65
	3958.00	1.88	189.38	3957.05	12.41	12.49	14.87	0.18	510411.65	798908.28	N 32 24 1.54	W 103 29 55.66
	4052.00	1.89	189.74	4051.00	9.36	9.44	14.36	0.02	510408.60	798907.76	N 32 24 1.50	W 103 29 55.66
	4146.00	2.17	204.65	4144.94	6.22	6.30	13.35	0.63	510405.46	798906.76	N 32 24 1.47	W 103 29 55.67
	4240.00	2.23	223.77	4238.87	3.29	3.36	11.34	0.78	510402.52	798904.75	N 32 24 1.44	W 103 29 55.70
	4335.00	2.28	223.61	4333.80	0.61	0.66	8.76	0.05	510399.82	798902.17	N 32 24 1.42	W 103 29 55.73
	4429.00	2.33	224.86	4427.72	-2.09	-2.05	6.12	0.08	510397.11	798899.53	N 32 24 1.39	W 103 29 55.76
	4523.00	2.06	223.62	4521.65	-4.65	-4.63	3.61	0.29	510394.53	798897.02	N 32 24 1.37	W 103 29 55.79
	4618.00	2.11	226.35	4616.59	-7.08	-7.07	1.17	0.12	510392.09	798894.58	N 32 24 1.34	W 103 29 55.82
	4712.00	2.20	233.19	4710.52	-9.34	-9.35	-1.53	0.29	510389.81	798891.88	N 32 24 1.32	W 103 29 55.85
	4806.00	2.44	235.81	4804.45	-11.53	-11.55	-4.63	0.28	510387.61	798888.78	N 32 24 1.30	W 103 29 55.89
	4901.00	2.36	236.67	4899.36	-13.72	-13.76	-7.94	0.09	510385.40	798885.47	N 32 24 1.28	W 103 29 55.92
	4995.00	2.53	239.10	4993.28	-15.83	-15.89	-11.33	0.21	510383.27	798882.08	N 32 24 1.26	W 103 29 55.96
	5076.00	2.63	237.07	5074.20	-17.74	-17.82	-14.43	0.17	510381.34	798878.98	N 32 24 1.24	W 103 29 56.00
	5181.00	2.85	242.74	5179.08	-20.22	-20.33	-18.77	0.33	510378.83	798874.64	N 32 24 1.21	W 103 29 56.05
	5273.00	2.71	236.11	5270.97	-22.46	-22.59	-22.61	0.38	510376.57	798870.80	N 32 24 1.19	W 103 29 56.10
	5369.00	3.35	224.09	5366.83	-25.71	-25.87	-26.44	0.94	510373.29	798866.97	N 32 24 1.16	W 103 29 56.14
	5464.00	3.72	214.78	5461.65	-30.22	-30.39	-30.13	0.72	510368.77	798863.28	N 32 24 1.11	W 103 29 56.18
	5558.00	3.81	201.54	5555.45	-35.61	-35.80	-33.02	0.93	510363.36	798860.39	N 32 24 1.06	W 103 29 56.22
	5652.00	3.31	185.57	5649.27	-41.21	-41.41	-34.43	1.18	510357.75	798858.98	N 32 24 1.01	W 103 29 56.24
	5746.00	2.74	179.92	5743.14	-46.15	-46.35	-34.69	0.68	510352.81	798858.72	N 32 24 0.96	W 103 29 56.24
	5840.00	2.72	179.33	5837.04	-50.63	-50.83	-34.66	0.04	510348.33	798858.75	N 32 24 0.91	W 103 29 56.24
	5935.00	2.63	180.79	5931.93	-55.06	-55.27	-34.66	0.12	510343.90	798858.75	N 32 24 0.87	W 103 29 56.24
	6029.00	2.79	179.39	6025.83	-59.51	-59.71	-34.67	0.18	510339.45	798858.74	N 32 24 0.82	W 103 29 56.24
	6124.00	2.73	182.09	6120.72	-64.08	-64.28	-34.73	0.15	510334.88	798858.68	N 32 24 0.78	W 103 29 56.24
	6218.00	2.69	185.77	6214.61	-68.51	-68.71	-35.03	0.19	510330.45	798858.38	N 32 24 0.74	W 103 29 56.24
	6312.00	2.55	187.23	6308.51	-72.78	-72.98	-35.52	0.16	510326.18	798857.89	N 32 24 0.69	W 103 29 56.25
	6406.00	2.59	184.24	6402.42	-76.97	-77.18	-35.94	0.15	510321.99	798857.47	N 32 24 0.65	W 103 29 56.26
	6500.00	2.88	186.13	6496.31	-81.43	-81.64	-36.35	0.32	510317.52	798857.07	N 32 24 0.61	W 103 29 56.26
	6594.00	2.73	197.06	6590.20	-85.91	-86.13	-37.25	0.59	510313.03	798856.16	N 32 24 0.56	W 103 29 56.27
	6689.00	2.45	198.83	6685.10	-89.99	-90.21	-38.57	0.31	510308.95	798854.84	N 32 24 0.52	W 103 29 56.29
	6783.00	2.70	196.82	6779.01	-94.00	-94.24	-39.86	0.28	510304.93	798853.55	N 32 24 0.48	W 103 29 56.30
	6877.00	2.78	187.74	6872.90	-98.38	-98.61	-40.81	0.47	510300.55	798852.60	N 32 24 0.44	W 103 29 56.32
	6971.00	2.84	181.91	6966.79	-102.96	-103.20	-41.19	0.31	510295.96	798852.22	N 32 24 0.39	W 103 29 56.32
	7065.00	2.78	181.85	7060.68	-107.56	-107.81	-41.35	0.06	510291.36	798852.06	N 32 24 0.35	W 103 29 56.32
	7159.00	2.81	171.04	7154.56	-112.12	-112.36	-41.06	0.56	510286.80	798852.35	N 32 24 0.30	W 103 29 56.32
	7254.00	3.08	158.57	7249.44	-116.80	-117.04	-39.77	0.73	510282.13	798853.65	N 32 24 0.26	W 103 29 56.30
	7348.00	3.11	160.30	7343.30	-121.57	-121.79	-37.98	0.10	510277.38	798855.43	N 32 24 0.21	W 103 29 56.28
	7443.00	3.32	158.77	7438.15	-126.57	-126.78	-36.12	0.24	510272.38	798857.29	N 32 24 0.16	W 103 29 56.26
	7537.00	3.85	164.48	7531.97	-132.16	-132.36	-34.29	0.68	510266.81	798859.12	N 32 24 0.11	W 103 29 56.24
	7631.00	3.99	168.12	7625.75	-138.40	-138.60	-32.77	0.30	510260.57	798860.64	N 32 24 0.04	W 103 29 56.22
	7725.00	3.76	167.08	7719.53	-144.62	-144.80	-31.41	0.26	510254.36	798862.00	N 32 23 59.98	W 103 29 56.21

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 ° ' ")
	7820.00	3.57	170.51	7814.34	-150.58	-150.75	-30.22	0.31	510248.41	798863.19	N 32 23 59.92	W 103 29 56.20
	7914.00	3.46	174.14	7908.16	-156.29	-156.46	-29.45	0.26	510242.70	798863.96	N 32 23 59.87	W 103 29 56.19
	8008.00	3.06	169.74	8002.01	-161.58	-161.75	-28.72	0.50	510237.41	798864.69	N 32 23 59.81	W 103 29 56.18
	8103.00	2.97	175.41	8096.88	-166.54	-166.70	-28.07	0.33	510232.46	798865.34	N 32 23 59.77	W 103 29 56.17
	8197.00	2.96	184.72	8190.75	-171.38	-171.55	-28.07	0.51	510227.62	798865.34	N 32 23 59.72	W 103 29 56.17
	8291.00	2.84	188.69	8284.63	-176.10	-176.27	-28.62	0.25	510222.89	798864.79	N 32 23 59.67	W 103 29 56.18
	8385.00	2.71	184.73	8378.52	-180.61	-180.78	-29.16	0.25	510218.38	798864.25	N 32 23 59.63	W 103 29 56.19
	8480.00	3.04	178.60	8473.40	-185.37	-185.54	-29.28	0.47	510213.62	798864.13	N 32 23 59.58	W 103 29 56.19
	8574.00	2.82	168.69	8567.28	-190.13	-190.30	-28.77	0.59	510208.86	798864.64	N 32 23 59.53	W 103 29 56.18
	8668.00	2.36	163.73	8661.19	-194.26	-194.43	-27.77	0.54	510204.74	798865.64	N 32 23 59.49	W 103 29 56.17
	8762.00	2.37	135.01	8755.11	-197.51	-197.66	-25.86	1.25	510201.50	798867.55	N 32 23 59.46	W 103 29 56.15
	8856.00	2.23	122.20	8849.03	-199.87	-200.01	-22.93	0.57	510199.16	798870.48	N 32 23 59.44	W 103 29 56.12
	8951.00	2.16	124.56	8943.96	-201.89	-202.01	-19.90	0.12	510197.16	798873.51	N 32 23 59.42	W 103 29 56.08
	9045.00	2.59	135.52	9037.88	-204.43	-204.53	-16.95	0.66	510194.64	798876.46	N 32 23 59.39	W 103 29 56.05
	9139.00	2.28	119.44	9131.80	-206.88	-206.96	-13.83	0.79	510192.20	798879.58	N 32 23 59.37	W 103 29 56.01
	9233.00	3.01	112.36	9225.70	-208.76	-208.82	-9.92	0.85	510190.34	798883.49	N 32 23 59.35	W 103 29 55.96
	9327.00	3.16	113.22	9319.56	-210.75	-210.78	-5.26	0.17	510188.38	798888.15	N 32 23 59.33	W 103 29 55.91
	9422.00	2.80	109.14	9414.43	-212.57	-212.57	-0.66	0.44	510186.59	798892.75	N 32 23 59.31	W 103 29 55.86
	9516.00	2.51	103.99	9508.33	-213.84	-213.82	3.51	0.40	510185.34	798896.92	N 32 23 59.30	W 103 29 55.81
	9611.00	1.97	108.66	9603.26	-214.89	-214.85	7.07	0.60	510184.31	798900.48	N 32 23 59.29	W 103 29 55.77
	9705.00	1.37	100.91	9697.22	-215.63	-215.58	9.71	0.68	510183.58	798903.12	N 32 23 59.28	W 103 29 55.74
	9800.00	1.90	110.67	9792.18	-216.42	-216.35	12.30	0.63	510182.81	798905.71	N 32 23 59.27	W 103 29 55.71
	9894.00	2.19	110.01	9886.12	-217.60	-217.52	15.44	0.31	510181.65	798908.85	N 32 23 59.26	W 103 29 55.67
	9988.00	2.37	116.93	9980.05	-219.12	-219.01	18.86	0.35	510180.15	798912.27	N 32 23 59.24	W 103 29 55.63
	10030.00	2.68	117.74	10022.01	-219.98	-219.86	20.50	0.74	510179.30	798913.91	N 32 23 59.24	W 103 29 55.61
	10101.00	2.38	106.63	10092.94	-221.19	-221.05	23.39	0.81	510178.11	798916.80	N 32 23 59.22	W 103 29 55.58
	10132.00	2.40	26.42	10123.92	-220.79	-220.66	24.29	9.93	510178.51	798917.70	N 32 23 59.23	W 103 29 55.57
	10164.00	5.79	358.48	10155.83	-218.58	-218.44	24.55	11.99	510180.72	798917.96	N 32 23 59.25	W 103 29 55.56
	10195.00	9.03	356.71	10186.57	-214.59	-214.45	24.37	10.48	510184.71	798917.78	N 32 23 59.29	W 103 29 55.57
	10226.00	12.39	356.74	10217.03	-208.83	-208.70	24.04	10.84	510190.46	798917.45	N 32 23 59.35	W 103 29 55.57
	10258.00	15.30	0.98	10248.10	-201.18	-201.05	23.91	9.62	510198.11	798917.32	N 32 23 59.42	W 103 29 55.57
	10289.00	17.28	2.02	10277.85	-192.49	-192.36	24.15	6.46	510206.81	798917.56	N 32 23 59.51	W 103 29 55.57
	10336.00	19.71	1.56	10322.42	-177.60	-177.46	24.61	5.18	510221.71	798918.02	N 32 23 59.65	W 103 29 55.56
	10383.00	23.72	1.12	10366.07	-160.22	-160.07	25.01	8.54	510239.09	798918.42	N 32 23 59.83	W 103 29 55.55
	10430.00	32.58	355.15	10407.48	-138.10	-137.97	24.12	19.76	510261.20	798917.53	N 32 24 0.05	W 103 29 55.56
	10478.00	41.51	351.87	10445.76	-109.40	-109.28	20.77	19.05	510289.88	798914.18	N 32 24 0.33	W 103 29 55.60
	10525.00	49.47	351.87	10478.68	-76.22	-76.13	16.04	16.94	510323.03	798909.45	N 32 24 0.66	W 103 29 55.65
	10572.00	54.57	353.25	10507.60	-39.47	-39.41	11.26	11.09	510359.76	798904.67	N 32 24 1.02	W 103 29 55.70
	10619.00	55.61	352.92	10534.49	-1.18	-1.14	6.62	2.29	510398.02	798900.03	N 32 24 1.40	W 103 29 55.75
	10667.00	56.16	352.95	10561.41	38.28	38.29	1.73	1.15	510437.45	798895.14	N 32 24 1.79	W 103 29 55.81
	10713.00	56.73	353.98	10586.84	76.39	76.38	-2.63	2.24	510475.54	798890.78	N 32 24 2.17	W 103 29 55.85
	10760.00	56.94	353.06	10612.55	115.51	115.47	-7.07	1.70	510514.63	798886.34	N 32 24 2.56	W 103 29 55.90
	10807.00	57.63	353.11	10637.95	154.79	154.73	-11.83	1.47	510553.88	798881.58	N 32 24 2.94	W 103 29 55.95
	10854.00	61.27	354.35	10661.84	195.04	194.95	-16.25	8.07	510594.11	798877.16	N 32 24 3.34	W 103 29 56.00
	10901.00	63.33	356.62	10683.69	236.54	236.43	-19.51	6.12	510635.59	798873.90	N 32 24 3.75	W 103 29 56.04
	10948.00	68.65	357.21	10702.81	279.41	279.29	-21.82	11.38	510678.44	798871.59	N 32 24 4.18	W 103 29 56.06
	10995.00	73.42	359.02	10718.08	323.83	323.70	-23.27	10.78	510722.85	798870.14	N 32 24 4.62	W 103 29 56.07
	11043.00	75.95	358.68	10730.75	370.11	369.98	-24.20	5.31	510769.13	798869.21	N 32 24 5.08	W 103 29 56.08
	11086.00	78.34	357.69	10740.32	412.02	411.88	-25.53	5.99	510811.03	798867.88	N 32 24 5.49	W 103 29 56.09
	11191.00	86.30	355.06	10754.34	515.81	515.63	-32.13	7.98	510914.78	798861.29	N 32 24 6.52	W 103 29 56.16
	11285.00	87.53	356.67	10759.40	609.46	609.25	-38.89	2.15	511008.40	798854.52	N 32 24 7.44	W 103 29 56.23
	11379.00	89.16	358.59	10762.12	703.36	703.12	-42.78	2.68	511102.27	798850.63	N 32 24 8.37	W 103 29 56.26
	11473.00	88.38	359.70	10764.14	797.33	797.09	-44.18	1.44	511196.23	798849.23	N 32 24 9.30	W 103 29 56.27
	11567.00	89.33	2.06	10766.01	891.28	891.05	-42.74	2.71	511290.19	798850.67	N 32 24 10.23	W 103 29 56.25
	11662.00	90.73	2.28	10765.96	986.19	985.98	-39.14	1.49	511385.12	798854.27	N 32 24 11.17	W 103 29 56.20
	11756.00	91.57	0.90	10764.08	1080.11	1079.92	-36.53	1.72	511479.06	798856.88	N 32 24 12.10	W 103 29 56.16
	11850.00	91.57	0.03	10761.50	1174.07	1173.88	-35.77	0.93	511573.02	798857.64	N 32 24 13.03	W 103 29 56.14
	11944.00	89.72	358.77	10760.44	1268.05	1267.86	-36.75	2.38	511667.00	798856.66	N 32 24 13.96	W 103 29 56.14

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 ° ' ")
	12038.00	90.28	358.71	10760.44	1362.04	1361.84	-38.82	0.60	511760.98	798854.59	N 32 24 14.89	W 103 29 56.16
	12132.00	91.07	359.50	10759.34	1456.03	1455.82	-40.29	1.19	511854.96	798853.12	N 32 24 15.82	W 103 29 56.17
	12227.00	90.17	358.92	10758.31	1551.02	1550.80	-41.60	1.13	511949.94	798851.81	N 32 24 16.76	W 103 29 56.17
	12321.00	90.78	358.80	10757.53	1645.01	1644.78	-43.47	0.66	512043.91	798849.94	N 32 24 17.69	W 103 29 56.19
	12415.00	90.28	359.40	10756.66	1739.00	1738.77	-44.94	0.83	512137.90	798848.47	N 32 24 18.62	W 103 29 56.20
	12509.00	88.21	359.72	10757.90	1832.98	1832.75	-45.67	2.23	512231.88	798847.74	N 32 24 19.55	W 103 29 56.20
	12603.00	88.66	359.85	10760.47	1926.95	1926.71	-46.02	0.50	512325.84	798847.39	N 32 24 20.48	W 103 29 56.19
	12698.00	87.14	359.48	10763.95	2021.88	2021.65	-46.57	1.65	512420.77	798846.84	N 32 24 21.42	W 103 29 56.19
	12792.00	87.65	359.64	10768.22	2115.78	2115.55	-47.29	0.57	512514.67	798846.12	N 32 24 22.35	W 103 29 56.19
	12887.00	88.88	359.77	10771.10	2210.74	2210.50	-47.78	1.30	512609.62	798845.63	N 32 24 23.29	W 103 29 56.19
	12981.00	89.10	0.30	10772.75	2304.72	2304.48	-47.73	0.61	512703.60	798845.68	N 32 24 24.22	W 103 29 56.18
	13075.00	86.30	359.69	10776.52	2398.63	2398.40	-47.73	3.05	512797.52	798845.68	N 32 24 25.15	W 103 29 56.17
	13169.00	86.41	359.69	10782.50	2492.44	2492.21	-48.24	0.12	512891.32	798845.17	N 32 24 26.08	W 103 29 56.17
	13263.00	86.92	0.01	10787.97	2586.28	2586.05	-48.49	0.64	512985.16	798844.92	N 32 24 27.00	W 103 29 56.16
	13358.00	87.20	0.44	10792.84	2681.15	2680.92	-48.11	0.54	513080.04	798845.30	N 32 24 27.94	W 103 29 56.15
	13452.00	87.31	1.02	10797.34	2775.03	2774.80	-46.92	0.63	513173.92	798846.49	N 32 24 28.87	W 103 29 56.12
	13546.00	88.82	0.64	10800.52	2868.95	2868.74	-45.56	1.66	513267.85	798847.85	N 32 24 29.80	W 103 29 56.10
	13640.00	89.66	359.81	10801.76	2962.94	2962.73	-45.19	1.26	513361.84	798848.22	N 32 24 30.73	W 103 29 56.09
	13734.00	90.50	359.58	10801.63	3056.94	3056.73	-45.69	0.93	513455.83	798847.72	N 32 24 31.66	W 103 29 56.08
	13829.00	91.34	359.88	10800.11	3151.92	3151.71	-46.14	0.94	513550.82	798847.27	N 32 24 32.60	W 103 29 56.08
	13923.00	89.27	358.17	10799.61	3245.91	3245.69	-47.74	2.86	513644.79	798845.67	N 32 24 33.53	W 103 29 56.09
	14017.00	89.22	358.37	10800.85	3339.87	3339.64	-50.57	0.22	513738.74	798842.84	N 32 24 34.46	W 103 29 56.12
	14112.00	89.78	358.59	10801.67	3434.85	3434.60	-53.09	0.63	513833.70	798840.32	N 32 24 35.40	W 103 29 56.14
	14206.00	87.82	358.53	10803.64	3528.81	3528.54	-55.46	2.09	513927.64	798837.96	N 32 24 36.33	W 103 29 56.16
	14300.00	88.49	358.65	10806.67	3622.74	3622.47	-57.77	0.72	514021.56	798835.64	N 32 24 37.26	W 103 29 56.17
	14394.00	86.69	359.00	10810.62	3716.64	3716.36	-59.69	1.95	514115.46	798833.72	N 32 24 38.19	W 103 29 56.19
	14488.00	87.09	359.16	10815.72	3810.50	3810.21	-61.20	0.46	514209.30	798832.21	N 32 24 39.12	W 103 29 56.20
	14583.00	87.59	359.11	10820.13	3905.39	3905.10	-62.63	0.53	514304.19	798830.78	N 32 24 40.06	W 103 29 56.21
	14677.00	87.37	0.20	10824.26	3999.30	3999.00	-63.20	1.18	514398.09	798830.21	N 32 24 40.99	W 103 29 56.20
	14771.00	88.09	0.59	10827.99	4093.22	4092.92	-62.55	0.87	514492.01	798830.86	N 32 24 41.92	W 103 29 56.19
	14865.00	87.93	0.52	10831.25	4187.15	4186.86	-61.64	0.19	514585.95	798831.77	N 32 24 42.84	W 103 29 56.17
	14960.00	87.65	0.97	10834.91	4282.06	4281.78	-60.41	0.56	514680.87	798833.00	N 32 24 43.78	W 103 29 56.14
	15054.00	87.81	1.10	10838.64	4375.96	4375.69	-58.71	0.22	514774.78	798834.70	N 32 24 44.71	W 103 29 56.12
	15148.00	88.32	0.08	10841.81	4469.89	4469.63	-57.74	1.21	514868.72	798835.67	N 32 24 45.64	W 103 29 56.10
	15243.00	88.88	359.76	10844.13	4564.86	4564.61	-57.87	0.68	514963.69	798835.54	N 32 24 46.58	W 103 29 56.09
	15337.00	88.88	359.67	10845.97	4658.85	4658.59	-58.34	0.10	515057.67	798835.07	N 32 24 47.51	W 103 29 56.09
	15431.00	88.88	359.91	10847.81	4752.83	4752.57	-58.69	0.26	515151.65	798834.72	N 32 24 48.44	W 103 29 56.08
	15525.00	88.82	359.83	10849.69	4846.81	4846.55	-58.90	0.11	515245.63	798834.51	N 32 24 49.37	W 103 29 56.08
	15620.00	89.22	359.82	10851.32	4941.79	4941.53	-59.19	0.42	515340.61	798834.22	N 32 24 50.31	W 103 29 56.07
	15714.00	89.72	359.87	10852.19	5035.79	5035.53	-59.44	0.53	515434.60	798833.97	N 32 24 51.24	W 103 29 56.06
	15808.00	89.83	0.06	10852.56	5129.79	5129.53	-59.50	0.23	515528.60	798833.91	N 32 24 52.17	W 103 29 56.06
	15902.00	89.83	0.40	10852.84	5223.78	5223.53	-59.12	0.36	515622.60	798834.29	N 32 24 53.10	W 103 29 56.04
	15997.00	89.66	0.88	10853.26	5318.77	5318.52	-58.06	0.54	515717.59	798835.35	N 32 24 54.04	W 103 29 56.02
	16091.00	90.11	0.58	10853.45	5412.75	5412.51	-56.87	0.58	515811.58	798836.55	N 32 24 54.97	W 103 29 56.00
	16185.00	89.10	360.00	10854.10	5506.74	5506.51	-56.39	1.24	515905.57	798837.02	N 32 24 55.90	W 103 29 55.99
	16280.00	88.94	359.92	10855.72	5601.73	5601.49	-56.46	0.19	516000.56	798836.95	N 32 24 56.84	W 103 29 55.98
	16374.00	88.66	359.97	10857.69	5695.70	5695.47	-56.55	0.30	516094.54	798836.86	N 32 24 57.77	W 103 29 55.97
	16468.00	89.05	359.53	10859.57	5789.68	5789.45	-56.96	0.63	516188.51	798836.45	N 32 24 58.70	W 103 29 55.97
	16563.00	89.10	359.16	10861.10	5884.67	5884.43	-58.04	0.39	516283.49	798835.37	N 32 24 59.64	W 103 29 55.97
	16657.00	88.88	359.38	10862.76	5978.65	5978.41	-59.24	0.33	516377.47	798834.17	N 32 25 0.57	W 103 29 55.98
	16752.00	89.78	359.29	10863.87	6073.64	6073.40	-60.34	0.95	516472.45	798833.07	N 32 25 1.51	W 103 29 55.98
	16846.00	89.50	359.38	10864.46	6167.64	6167.39	-61.43	0.31	516566.44	798831.98	N 32 25 2.44	W 103 29 55.99
	16940.00	89.22	358.76	10865.51	6261.63	6261.37	-62.96	0.72	516660.42	798830.45	N 32 25 3.37	W 103 29 55.99
	17035.00	88.88	358.61	10867.08	6356.60	6356.33	-65.14	0.39	516755.38	798828.27	N 32 25 4.31	W 103 29 56.01
	17129.00	88.71	358.40	10869.06	6450.56	6450.28	-67.59	0.29	516849.33	798825.82	N 32 25 5.24	W 103 29 56.03
	17223.00	88.60	358.29	10871.27	6544.51	6544.21	-70.30	0.17	516943.26	798823.11	N 32 25 6.17	W 103 29 56.05
	17318.00	87.98	358.19	10874.10	6639.44	6639.13	-73.22	0.66	517038.17	798820.19	N 32 25 7.11	W 103 29 56.08
	17412.00	87.87	358.58	10877.51	6733.35	6733.03	-75.87	0.43	517132.07	798817.54	N 32 25 8.04	W 103 29 56.10

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 ° ' ")
	17506.00	88.26	359.03	10880.68	6827.29	6826.95	-77.83	0.63	517226.00	798815.58	N 32 25 8.97	W 103 29 56.12
	17601.00	88.26	0.25	10883.56	6922.24	6921.91	-78.42	1.28	517320.95	798814.99	N 32 25 9.91	W 103 29 56.11
	17695.00	88.10	0.25	10886.55	7016.19	7015.86	-78.01	0.17	517414.90	798815.40	N 32 25 10.84	W 103 29 56.10
	17789.00	87.70	0.31	10889.99	7110.12	7109.79	-77.56	0.43	517508.83	798815.86	N 32 25 11.77	W 103 29 56.09
	17884.00	88.43	1.25	10893.20	7205.05	7204.73	-76.26	1.25	517603.77	798817.15	N 32 25 12.71	W 103 29 56.06
	17978.00	88.49	0.93	10895.73	7298.99	7298.68	-74.48	0.35	517697.71	798818.94	N 32 25 13.64	W 103 29 56.03
	18072.00	88.32	1.35	10898.35	7392.92	7392.62	-72.61	0.48	517791.66	798820.81	N 32 25 14.56	W 103 29 56.00
	18167.00	88.10	1.41	10901.31	7487.83	7487.55	-70.32	0.24	517886.58	798823.09	N 32 25 15.50	W 103 29 55.97
	18261.00	87.93	0.57	10904.57	7581.75	7581.48	-68.70	0.91	517980.51	798824.72	N 32 25 16.43	W 103 29 55.94
	18355.00	88.94	359.73	10907.14	7675.71	7675.44	-68.45	1.40	518074.47	798824.96	N 32 25 17.36	W 103 29 55.93
	18450.00	88.66	359.09	10909.13	7770.68	7770.41	-69.43	0.74	518169.44	798823.98	N 32 25 18.30	W 103 29 55.93
	18544.00	88.71	359.37	10911.28	7864.66	7864.38	-70.69	0.30	518263.41	798822.72	N 32 25 19.23	W 103 29 55.94
	18638.00	87.87	359.67	10914.09	7958.61	7958.33	-71.48	0.95	518357.36	798821.93	N 32 25 20.16	W 103 29 55.94
	18733.00	87.76	359.04	10917.71	8053.54	8053.26	-72.55	0.67	518452.28	798820.86	N 32 25 21.10	W 103 29 55.94
	18827.00	88.04	359.60	10921.15	8147.48	8147.19	-73.66	0.67	518546.21	798819.75	N 32 25 22.03	W 103 29 55.95
	18921.00	88.99	0.64	10923.59	8241.44	8241.15	-73.46	1.50	518640.17	798819.95	N 32 25 22.96	W 103 29 55.94
	19015.00	88.99	0.63	10925.25	8335.41	8335.13	-72.42	0.01	518734.15	798820.99	N 32 25 23.89	W 103 29 55.92
	19113.00	90.17	0.52	10925.97	8433.40	8433.12	-71.44	1.21	518832.14	798821.97	N 32 25 24.86	W 103 29 55.90
	19207.00	91.40	0.96	10924.68	8527.37	8527.10	-70.23	1.39	518926.12	798823.19	N 32 25 25.79	W 103 29 55.87
	19301.00	91.29	0.51	10922.47	8621.33	8621.07	-69.02	0.49	519020.08	798824.39	N 32 25 26.72	W 103 29 55.85
	19395.00	91.34	359.67	10920.31	8715.30	8715.05	-68.87	0.89	519114.06	798824.54	N 32 25 27.65	W 103 29 55.84
	19490.00	91.12	359.47	10918.27	8810.28	8810.02	-69.59	0.31	519209.03	798823.83	N 32 25 28.59	W 103 29 55.84
	19584.00	88.71	0.01	10918.41	8904.27	8904.01	-70.01	2.63	519303.02	798823.40	N 32 25 29.52	W 103 29 55.84
	19679.00	88.71	0.14	10920.55	8999.24	8998.99	-69.89	0.14	519398.00	798823.52	N 32 25 30.46	W 103 29 55.83
	19773.00	87.09	359.78	10924.00	9093.17	9092.92	-69.95	1.77	519491.93	798823.46	N 32 25 31.39	W 103 29 55.82
	19867.00	88.15	0.35	10927.90	9187.09	9186.84	-69.85	1.28	519585.84	798823.56	N 32 25 32.32	W 103 29 55.81
	19962.00	85.29	358.54	10933.34	9281.92	9281.66	-70.76	3.56	519680.67	798822.65	N 32 25 33.26	W 103 29 55.81
	20056.00	86.13	358.28	10940.37	9375.63	9375.36	-73.36	0.94	519774.37	798820.05	N 32 25 34.18	W 103 29 55.83
	20150.00	87.14	358.73	10945.89	9469.45	9469.17	-75.81	1.18	519868.17	798817.60	N 32 25 35.11	W 103 29 55.85
	20244.00	85.63	358.79	10951.81	9563.25	9562.96	-77.84	1.61	519961.96	798815.57	N 32 25 36.04	W 103 29 55.87
	20339.00	86.81	359.08	10958.07	9658.03	9657.73	-79.60	1.28	520056.73	798813.81	N 32 25 36.98	W 103 29 55.88
	20433.00	87.70	359.39	10962.58	9751.92	9751.62	-80.86	1.00	520150.61	798812.55	N 32 25 37.91	W 103 29 55.89
	20527.00	89.16	0.03	10965.15	9845.88	9845.58	-81.33	1.70	520244.57	798812.08	N 32 25 38.84	W 103 29 55.88
	20588.00	89.10	0.64	10966.08	9906.87	9906.57	-80.98	1.00	520305.56	798812.44	N 32 25 39.44	W 103 29 55.87
TD, Projection to Bit	20640.00	89.10	0.64	10966.89	9958.86	9958.56	-80.40	0.00	520357.55	798813.02	N 32 25 39.95	W 103 29 55.86

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
	1	0.000	26.000	1/98.425	17.500	13.375	NAL_MWD_IFR1+MS-Depth Only	Original Borehole / Final Survey - Cimarex West Grama Ridge 8-5 Federal Com 3H 0ft to 20640ft
	1	26.000	26.000	Act Stns	17.500	13.375	NAL_MWD_IFR1+MS-Depth Only	Original Borehole / Final Survey - Cimarex West Grama Ridge 8-5 Federal Com 3H 0ft to 20640ft
	1	26.000	1635.000	Act Stns	17.500	13.375	NAL_MWD_IFR1+MS	Original Borehole / Final Survey - Cimarex West Grama Ridge 8-5
	1	1635.000	5160.000	Act Stns	12.250	9.625	NAL_MWD_IFR1+MS	Original Borehole / Final Survey - Cimarex West Grama Ridge 8-5

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 ° ' ")
		1	5160.000	20640.000	Act Strs	8.750	7.000	NAL_MWD_IFR1+MS	Original Borehole / Final Survey - Cimarex West Grama Ridge 8-5			-

EW (ft) Scale = 1:487.41(ft)

Oilfield Services, Central U.S. Land
Schlumberger Drilling and Measurements
Drilling Group
Geo Market Area: South West Texas Basin
7220 W I-H 20
Midland, Texas 79706
Phone : (432) 742-5400 (Main)
Fax : (432) 742-5606 (Shared)

Schlumberger

September 20, 2018

Cimarex Energy Co.

HOBBS OCD

JAN 22 2019

RECEIVED

Re:

8, 22S, 34E, Lea NM
32.40039 103.49884

CLIENT: Cimarex Energy Co.
WELL: West Grama Ridge 8 5 Federal com 3H
FIELD: Grama Ridge; Bone Spring, West

RIG: H&P 380
COUNTY: LEA
API NO: 30-025-44840
JOB NO: 18MLD3634

Enclosed, please find the original copy of the survey performed on the referenced well by Drilling & Measurements, a division of Schlumberger Technology Corporation (P-5 No. 754900).
Other information required by your office is as follows.

<u>Name & Title of Surveyor</u>	<u>Drainhole Number</u>	<u>Surveyed Depths</u>	<u>Dates Performed</u>	<u>Type of Survey</u>
David Bucklaew FS	West Grama Ridge 8 5 Federal com 3H Original Hole	177.00 Ft to 20588.00 Ft	August 6, 2018 to September 2, 2018	TelePacer/SlimPuls- hird Party Correcte

If any other information is required, please contact the undersigned at the above letterhead and phone number.
Sincerely,

Heath Beck
Field Service Manager

Schlumberger-Private

Oilfield Services, Central U.S. Land
Schlumberger Drilling and Measurements
Drilling Group
Geo Market Area: South West Texas Basin
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Schlumberger

Well Reference:
8, 22S, 34E, Lea NM
32.40039 103.49884

I, David Bucklaew certify that; I am employed by Drilling & Measurements, a division of Schlumberger Technology Corporation; that I did on the day(s) of August 06, 2018 through September 02, 2018, conduct or supervise the taking of the TelePacer/SlimPulse & Third Party Corrected surveys from a depth of 177.00 feet to a depth of 20588.00 feet referenced to driller's depth; that the data is true, correct, complete and within the limitations of the tool as set forth by Drilling & Measurements, a division of Schlumberger Technology Corporation; that I am authorized and qualified to make this report; that this survey was conducted at the request of Cimarex Energy Co. for the West Grama Ridge 8 5 Federal com 3H Well (Original Hole) API No. 30-025-44840 in New Mexico; and that I have reviewed this report and find that it conforms to the principals and procedures as set forth by Drilling & Measurements, a division of Schlumberger Technology Corporation.

By
David Bucklaew
FS

David Bucklaew

Subscribed and Sworn to before me this 20th day of September (month) 2018 (yr)

My Commission expires:

2-16-2022

D. Adams
Notary Public

Adams County Colorado
(County State)

(signature)

