

Final Surveys - Cimarex Vaca Draw 20-17 Federal #3H MWD 0ft-22454'
(Surcon Corrected) Survey Geodetic Report
 (Def Survey)



Report Date: March 01, 2019 - 09:12 AM
 Client: Cimarex
 Field: NM Lea County (NAD 83)
 Structure / Slot: Cimarex Vaca Draw 20-17 Federal #3H / Cimarex Vaca Draw 20-17 Federal #3H
 Well: Cimarex Vaca Draw 20-17 Federal #3H
 Borehole: Original Borehole
 UWI / API#: Unknown / Unknown
 Survey Name: Final Surveys - Cimarex Vaca Draw 20-17 Federal #3H MWD 0ft-22454' (Surcon Corrected)
 Survey Date: January 14, 2019
 Tort / AHD / DDI / ERD Ratio: 273.905' / 10737.819 ft / 6.720 / 0.853
 Coordinate Reference System: NAD83 New Mexico State Plane, Eastern Zone, US Feet
 Location Lat / Long: N 32° 6' 35.65906", W 103° 35' 47.81518"
 Location Grid N/E Y/X: N 404499.450 ftUS, E 769441.210 ftUS
 CRS Grid Convergence Angle: 0.3916°
 Grid Scale Factor: 0.99996868
 Version / Patch: 2.10.753.0

Survey / DLS Computation: Minimum Curvature / Lubinski
 Vertical Section Azimuth: 359.630° (Grid North)
 Vertical Section Origin: 0.000 ft, 0.000 ft
 TVD Reference Datum: RKB
 TVD Reference Elevation: 3441.000 ft above MSL
 Seabed / Ground Elevation: 3418.000 ft above MSL
 Magnetic Declination: 6.677°
 Total Gravity Field Strength: 998.4304mgm (9.80665 Based)
 Gravity Model: GARM
 Total Magnetic Field Strength: 47808.396 nT
 Magnetic Dip Angle: 59.733°
 Declination Date: February 14, 2019
 Magnetic Declination Model: HDGM 2019
 North Reference: Grid North
 Grid Convergence Used: 0.3916°
 Total Corr Mag North->Grid North: 6.2855°
 Local Coord Referenced To: Structure Reference Point

HOBBS OCD
SEP 05 2019
RECEIVED

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 [390' FSL, 1930' FWL]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	404499.45	769441.21	N 32 6 35.66	W 103 35 47.82
	199.00	0.98	42.01	198.99	1.26	1.26	1.14	0.49	404500.71	769442.35	N 32 6 35.67	W 103 35 47.80
	301.00	0.97	43.70	300.98	2.52	2.54	2.32	0.03	404501.99	769443.53	N 32 6 35.68	W 103 35 47.79
	392.00	1.40	262.27	391.97	2.93	2.94	1.75	2.46	404502.39	769442.96	N 32 6 35.69	W 103 35 47.79
	484.00	2.12	254.13	483.92	2.33	2.33	-1.00	0.83	404501.78	769440.21	N 32 6 35.68	W 103 35 47.83
	575.00	0.68	262.39	574.89	1.82	1.80	-3.16	1.59	404501.25	769438.06	N 32 6 35.68	W 103 35 47.85
	665.00	0.42	32.06	664.89	2.03	2.00	-3.51	1.11	404501.45	769437.70	N 32 6 35.68	W 103 35 47.86
	760.00	0.67	37.33	759.89	2.76	2.74	-2.99	0.27	404502.19	769438.22	N 32 6 35.69	W 103 35 47.85
	850.00	0.64	34.07	849.88	3.59	3.58	-2.39	0.05	404503.03	769438.82	N 32 6 35.69	W 103 35 47.84
	945.00	0.60	33.23	944.88	4.44	4.43	-1.82	0.04	404503.88	769439.39	N 32 6 35.70	W 103 35 47.84
	956.00	0.53	31.75	955.88	4.53	4.52	-1.76	0.65	404503.97	769439.45	N 32 6 35.70	W 103 35 47.84
	1134.00	0.74	62.37	1133.86	5.76	5.76	-0.31	0.22	404505.21	769440.90	N 32 6 35.72	W 103 35 47.82
	1229.00	0.82	49.30	1228.86	6.48	6.48	0.75	0.20	404505.93	769441.96	N 32 6 35.72	W 103 35 47.81
	1324.00	0.85	74.51	1323.85	7.10	7.12	1.95	0.38	404506.57	769443.16	N 32 6 35.73	W 103 35 47.79
	1512.00	0.08	192.46	1511.84	7.34	7.36	3.26	0.47	404506.81	769444.47	N 32 6 35.73	W 103 35 47.78
	1606.00	0.15	248.08	1605.84	7.23	7.25	3.13	0.13	404506.70	769444.34	N 32 6 35.73	W 103 35 47.78
	1796.00	0.86	102.45	1795.83	6.82	6.85	4.29	0.52	404506.30	769445.50	N 32 6 35.73	W 103 35 47.76
	1890.00	1.06	92.66	1889.82	6.62	6.66	5.85	0.27	404506.11	769447.06	N 32 6 35.72	W 103 35 47.75
	1985.00	0.92	89.79	1984.81	6.57	6.62	7.49	0.16	404506.07	769448.70	N 32 6 35.72	W 103 35 47.73
	2174.00	3.45	83.57	2173.65	7.17	7.26	14.66	1.34	404506.71	769455.87	N 32 6 35.73	W 103 35 47.64
	2269.00	5.06	83.12	2268.39	7.94	8.08	21.66	1.70	404507.53	769462.87	N 32 6 35.74	W 103 35 47.56
	2363.00	5.49	85.29	2361.99	8.75	8.95	30.26	0.50	404508.40	769471.47	N 32 6 35.75	W 103 35 47.46
	2457.00	5.26	95.72	2455.58	8.64	8.89	39.03	1.07	404508.34	769480.24	N 32 6 35.74	W 103 35 47.36
	2551.00	5.67	93.19	2549.15	7.89	8.20	47.85	0.51	404507.65	769489.16	N 32 6 35.74	W 103 35 47.26

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 ° ' '')
	2646.00	5.75	100.94	2643.68	6.67	7.04	57.31	0.82	404506.49	769498.52	N 32 6 35.72	W 103 35 47.15
	2741.00	5.97	99.44	2738.19	4.89	5.32	66.86	0.28	404504.77	769508.06	N 32 6 35.71	W 103 35 47.04
	2836.00	5.93	105.66	2832.67	2.70	3.19	76.45	0.68	404502.64	769517.66	N 32 6 35.69	W 103 35 46.93
	2930.00	5.05	108.64	2926.24	0.01	0.56	85.05	0.98	404500.01	769526.26	N 32 6 35.66	W 103 35 46.83
	3120.00	5.21	106.55	3115.48	-5.23	-4.57	101.24	0.13	404494.88	769542.45	N 32 6 35.61	W 103 35 46.64
	3215.00	4.26	110.43	3210.16	-7.74	-7.03	108.68	1.05	404492.42	769549.89	N 32 6 35.58	W 103 35 46.55
	3310.00	3.23	114.97	3304.95	-10.13	-9.40	114.42	1.13	404490.05	769555.62	N 32 6 35.56	W 103 35 46.49
	3405.00	2.16	103.51	3399.85	-11.71	-10.94	118.58	1.26	404488.51	769559.79	N 32 6 35.54	W 103 35 46.44
	3499.00	1.96	93.95	3493.79	-12.26	-11.47	121.91	0.42	404487.98	769563.12	N 32 6 35.54	W 103 35 46.40
	3595.00	3.18	83.00	3589.69	-12.07	-11.26	126.19	1.36	404488.19	769567.40	N 32 6 35.54	W 103 35 46.35
	3785.00	4.87	75.13	3779.21	-9.44	-8.55	139.22	0.93	404490.90	769580.42	N 32 6 35.57	W 103 35 46.20
	3879.00	4.90	73.43	3872.87	-7.33	-6.38	146.92	0.16	404493.07	769588.13	N 32 6 35.59	W 103 35 46.11
	3974.00	4.99	77.55	3967.52	-5.33	-4.33	154.85	0.39	404495.12	769596.05	N 32 6 35.61	W 103 35 46.02
	4069.00	5.05	75.20	4062.16	-3.42	-2.37	162.92	0.23	404497.08	769604.13	N 32 6 35.62	W 103 35 45.92
	4164.00	5.24	80.12	4156.78	-2.42	-1.31	171.30	1.42	404498.14	769612.51	N 32 6 35.63	W 103 35 45.82
	4258.00	6.00	95.59	4250.32	-2.96	-1.80	180.49	0.99	404497.65	769621.69	N 32 6 35.63	W 103 35 45.72
	4352.00	4.86	98.37	4343.90	-4.08	-2.86	189.32	1.24	404496.59	769630.52	N 32 6 35.62	W 103 35 45.61
	4446.00	4.70	101.05	4437.57	-5.45	-4.17	197.03	0.29	404495.28	769638.24	N 32 6 35.60	W 103 35 45.52
	4541.00	5.60	102.64	4532.19	-7.26	-5.93	205.38	0.96	404493.52	769646.58	N 32 6 35.59	W 103 35 45.43
	4637.00	4.63	104.11	4627.81	-9.28	-7.90	213.71	1.02	404491.55	769654.91	N 32 6 35.57	W 103 35 45.33
	4731.00	4.03	102.52	4721.54	-10.97	-9.55	220.61	0.65	404489.91	769661.81	N 32 6 35.55	W 103 35 45.25
	4826.00	2.93	78.32	4816.37	-11.24	-9.78	226.25	1.91	404489.67	769667.45	N 32 6 35.55	W 103 35 45.19
	4921.00	2.90	70.89	4911.24	-9.99	-8.50	230.90	0.40	404490.95	769672.10	N 32 6 35.56	W 103 35 45.13
	5016.00	2.91	78.81	5006.12	-8.77	-7.24	235.53	0.42	404492.21	769676.73	N 32 6 35.57	W 103 35 45.08
	5111.00	3.17	76.69	5100.99	-7.72	-6.17	240.45	0.30	404493.28	769681.66	N 32 6 35.58	W 103 35 45.02
	5206.00	3.19	78.11	5195.84	-6.61	-5.02	245.60	0.09	404494.43	769686.80	N 32 6 35.59	W 103 35 44.96
	5301.00	3.05	76.30	5290.70	-5.50	-3.88	250.64	0.18	404495.57	769691.84	N 32 6 35.60	W 103 35 44.90
	5395.00	3.73	77.42	5384.54	-4.27	-2.62	256.05	0.73	404496.83	769697.25	N 32 6 35.62	W 103 35 44.84
	5490.00	3.86	78.98	5479.33	-3.03	-1.34	262.21	0.17	404498.11	769703.41	N 32 6 35.63	W 103 35 44.77
	5585.00	4.40	78.67	5574.08	-1.75	-0.01	268.92	0.57	404499.44	769710.12	N 32 6 35.64	W 103 35 44.69
	5680.00	4.28	80.55	5668.81	-0.49	1.29	275.99	0.20	404500.74	769717.19	N 32 6 35.65	W 103 35 44.61
	5775.00	4.61	81.69	5763.52	0.59	2.42	283.26	0.36	404501.87	769724.46	N 32 6 35.66	W 103 35 44.52
	5870.00	4.67	79.73	5858.21	1.79	3.66	290.85	0.18	404503.11	769732.05	N 32 6 35.68	W 103 35 44.43
	5965.00	4.46	78.89	5952.91	3.14	5.06	298.28	0.23	404504.51	769739.48	N 32 6 35.69	W 103 35 44.35
	6060.00	4.68	81.03	6047.61	4.41	6.38	305.73	0.29	404505.83	769746.93	N 32 6 35.70	W 103 35 44.26
	6155.00	4.74	88.12	6142.29	5.09	7.11	313.48	0.62	404506.56	769754.68	N 32 6 35.71	W 103 35 44.17
	6249.00	4.84	93.01	6235.96	4.96	7.03	321.32	0.45	404506.48	769762.52	N 32 6 35.71	W 103 35 44.08
	6343.00	4.92	89.85	6329.62	4.71	6.84	329.31	0.30	404506.29	769770.51	N 32 6 35.70	W 103 35 43.99
	6438.00	4.89	89.82	6424.27	4.68	6.86	337.44	0.03	404506.31	769778.63	N 32 6 35.70	W 103 35 43.89
	6532.00	5.07	92.21	6517.92	4.48	6.71	345.59	0.29	404506.16	769786.79	N 32 6 35.70	W 103 35 43.80
	6625.00	5.15	93.35	6610.55	4.02	6.31	353.87	0.14	404505.76	769795.06	N 32 6 35.70	W 103 35 43.70
	6719.00	5.20	95.29	6704.16	3.33	5.67	362.32	0.19	404505.12	769803.52	N 32 6 35.69	W 103 35 43.60
	6814.00	5.19	95.37	6798.77	2.48	4.87	370.88	0.01	404504.32	769812.08	N 32 6 35.68	W 103 35 43.50
	6909.00	5.01	92.19	6893.40	1.86	4.31	379.31	0.35	404503.76	769820.50	N 32 6 35.68	W 103 35 43.41
	7004.00	4.96	92.98	6988.04	1.44	3.94	387.55	0.09	404503.39	769828.75	N 32 6 35.67	W 103 35 43.31
	7099.00	4.87	95.52	7082.69	0.78	3.34	395.67	0.25	404502.79	769836.86	N 32 6 35.67	W 103 35 43.21
	7194.00	4.82	96.16	7177.35	-0.09	2.52	403.65	0.08	404501.97	769844.85	N 32 6 35.66	W 103 35 43.12
	7384.00	5.06	96.79	7366.64	-2.04	0.67	419.91	0.13	404500.12	769861.10	N 32 6 35.64	W 103 35 42.93
	7479.00	4.91	96.46	7461.28	-3.04	-0.28	428.11	0.16	404499.17	769869.30	N 32 6 35.63	W 103 35 42.84
	7573.00	4.52	99.39	7554.97	-4.15	-1.34	435.76	0.49	404498.11	769876.95	N 32 6 35.62	W 103 35 42.75
	7668.00	4.63	101.11	7649.66	-5.55	-2.69	443.21	0.19	404496.76	769884.41	N 32 6 35.60	W 103 35 42.66
	7856.00	4.35	98.10	7837.09	-8.11	-5.15	457.72	0.19	404494.30	769898.91	N 32 6 35.58	W 103 35 42.49
	8044.00	4.06	102.64	8024.58	-10.66	-7.61	471.27	0.23	404491.84	769912.46	N 32 6 35.55	W 103 35 42.34
	8233.00	4.16	105.79	8213.10	-14.07	-10.94	484.40	0.13	404488.51	769925.59	N 32 6 35.52	W 103 35 42.18
	8328.00	4.02	98.07	8307.85	-15.52	-12.35	491.01	0.60	404487.10	769932.20	N 32 6 35.50	W 103 35 42.11
	8422.00	3.82	100.73	8401.63	-16.61	-13.39	497.35	0.29	404486.06	769938.54	N 32 6 35.49	W 103 35 42.03
	8517.00	3.97	87.96	8496.42	-17.12	-13.87	503.74	0.92	404485.58	769944.94	N 32 6 35.49	W 103 35 41.96

...Final Surveys - Cimarex Vaca Draw 20-17 Federal #3H MWD Off-22454' (Surcon Corrected)

Comments	MD (ft)	Incl (°)	Azlm Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
	8707.00	3.66	89.05	8686.00	-16.87	-13.53	516.38	0.17	404485.92	769957.57	N 32 6 35.49	W 103 35 41.81
	8802.00	3.44	93.70	8780.81	-17.04	-13.67	522.26	0.38	404485.79	769963.45	N 32 6 35.49	W 103 35 41.74
	8896.00	2.00	103.76	8874.71	-17.64	-14.24	526.66	1.61	404485.21	769967.86	N 32 6 35.48	W 103 35 41.69
	8991.00	0.61	101.83	8969.68	-18.15	-14.74	528.77	1.46	404484.72	769969.96	N 32 6 35.48	W 103 35 41.67
	9085.00	0.36	123.25	9063.68	-18.42	-15.00	529.51	0.32	404484.45	769970.70	N 32 6 35.47	W 103 35 41.66
	9179.00	0.22	138.66	9157.67	-18.72	-15.30	529.87	0.17	404484.15	769971.06	N 32 6 35.47	W 103 35 41.66
	9274.00	0.09	225.91	9252.67	-18.91	-15.49	529.94	0.25	404483.96	769971.13	N 32 6 35.47	W 103 35 41.66
	9369.00	0.36	273.32	9347.67	-18.94	-15.52	529.59	0.32	404483.93	769970.78	N 32 6 35.47	W 103 35 41.66
	9464.00	0.35	254.14	9442.67	-19.00	-15.58	529.01	0.12	404483.87	769970.20	N 32 6 35.47	W 103 35 41.67
	9559.00	0.85	267.40	9537.67	-19.10	-15.69	528.03	0.54	404483.76	769969.22	N 32 6 35.47	W 103 35 41.68
	9653.00	1.22	293.64	9631.65	-18.72	-15.32	526.41	0.63	404484.13	769967.61	N 32 6 35.47	W 103 35 41.70
	9748.00	1.56	284.65	9726.62	-17.98	-14.59	524.24	0.42	404484.86	769965.43	N 32 6 35.48	W 103 35 41.72
	9841.00	1.53	301.76	9819.59	-16.99	-13.62	521.96	0.50	404485.83	769963.15	N 32 6 35.49	W 103 35 41.75
	9936.00	1.41	298.39	9914.56	-15.75	-12.39	519.85	0.16	404487.06	769961.04	N 32 6 35.50	W 103 35 41.77
	10126.00	1.40	297.94	10104.50	-13.53	-10.20	515.74	0.01	404489.25	769956.93	N 32 6 35.52	W 103 35 41.82
	10221.00	1.01	309.41	10199.48	-12.44	-9.12	514.07	0.48	404490.33	769955.26	N 32 6 35.53	W 103 35 41.84
	10253.00	1.04	314.89	10231.47	-12.05	-8.74	513.65	0.32	404490.71	769954.84	N 32 6 35.54	W 103 35 41.84
	10317.00	1.01	307.33	10295.46	-11.30	-7.98	512.79	0.22	404491.47	769953.98	N 32 6 35.55	W 103 35 41.85
	10411.00	0.73	347.29	10389.45	-10.20	-6.90	512.00	0.69	404492.55	769953.19	N 32 6 35.56	W 103 35 41.86
	10507.00	0.99	62.48	10485.45	-9.23	-5.92	512.60	1.11	404493.53	769953.79	N 32 6 35.57	W 103 35 41.86
	10697.00	1.11	81.47	10675.41	-8.22	-4.89	515.87	0.19	404494.56	769957.07	N 32 6 35.58	W 103 35 41.82
	10792.00	0.98	80.57	10770.40	-7.96	-4.62	517.58	0.14	404494.83	769958.78	N 32 6 35.58	W 103 35 41.80
	10887.00	0.69	73.53	10865.39	-7.67	-4.32	518.93	0.32	404495.13	769960.13	N 32 6 35.58	W 103 35 41.78
	10982.00	0.84	60.32	10960.38	-7.17	-3.81	520.09	0.24	404495.64	769961.28	N 32 6 35.59	W 103 35 41.77
	11171.00	0.77	92.96	11149.36	-6.57	-3.19	522.56	0.24	404496.26	769963.75	N 32 6 35.59	W 103 35 41.74
	11265.00	0.85	161.85	11243.36	-7.27	-3.89	523.41	0.98	404495.56	769964.60	N 32 6 35.59	W 103 35 41.73
	11454.00	1.04	195.71	11432.33	-10.25	-6.87	523.38	0.31	404492.58	769964.57	N 32 6 35.56	W 103 35 41.73
	11548.00	1.05	200.67	11526.32	-11.88	-8.50	522.84	0.10	404490.95	769964.04	N 32 6 35.54	W 103 35 41.74
	11644.00	1.12	209.46	11622.30	-13.51	-10.14	522.07	0.19	404489.31	769963.27	N 32 6 35.52	W 103 35 41.75
	11738.00	0.78	237.36	11716.29	-14.65	-11.28	521.08	0.60	404488.17	769962.27	N 32 6 35.51	W 103 35 41.76
	11832.00	0.78	242.58	11810.28	-15.28	-11.92	519.98	0.08	404487.53	769961.17	N 32 6 35.51	W 103 35 41.77
	11938.00	0.89	236.41	11916.27	-16.06	-12.71	518.65	0.13	404486.74	769959.84	N 32 6 35.50	W 103 35 41.79
	11977.00	0.93	244.01	11955.26	-16.36	-13.02	518.11	0.33	404486.43	769959.30	N 32 6 35.50	W 103 35 41.79
	12009.00	1.80	323.69	11987.25	-16.07	-12.73	517.58	5.85	404486.72	769958.77	N 32 6 35.50	W 103 35 41.80
	12041.00	5.24	344.90	12019.19	-14.25	-10.91	516.90	11.32	404488.54	769958.10	N 32 6 35.52	W 103 35 41.81
	12072.00	8.74	348.66	12049.95	-10.57	-7.23	516.07	11.38	404492.22	769957.26	N 32 6 35.55	W 103 35 41.82
	12104.00	11.34	354.88	12081.46	-5.04	-1.72	515.31	8.79	404497.73	769956.50	N 32 6 35.61	W 103 35 41.82
	12135.00	13.83	356.25	12111.72	1.69	5.02	514.80	8.09	404504.47	769955.99	N 32 6 35.67	W 103 35 41.83
	12166.00	17.19	357.66	12141.58	9.97	13.30	514.37	10.91	404512.74	769955.56	N 32 6 35.76	W 103 35 41.83
	12197.00	20.49	356.37	12170.92	19.97	23.29	513.84	10.73	404522.74	769955.03	N 32 6 35.85	W 103 35 41.84
	12229.00	22.07	355.65	12200.74	31.56	34.87	513.03	5.00	404534.32	769954.22	N 32 6 35.97	W 103 35 41.85
	12261.00	23.70	358.33	12230.22	43.99	47.30	512.38	6.04	404546.75	769953.58	N 32 6 36.09	W 103 35 41.85
	12292.00	26.51	0.10	12258.29	57.14	60.45	512.21	9.38	404559.90	769953.41	N 32 6 36.22	W 103 35 41.86
	12323.00	30.13	0.29	12285.57	71.84	75.15	512.26	11.68	404574.60	769953.46	N 32 6 36.37	W 103 35 41.85
	12355.00	32.96	359.00	12312.84	88.58	91.89	512.15	9.09	404591.34	769953.35	N 32 6 36.53	W 103 35 41.85
	12387.00	36.91	359.23	12339.07	106.90	110.21	511.87	12.35	404609.65	769953.07	N 32 6 36.71	W 103 35 41.86
	12418.00	41.32	359.66	12363.11	126.45	129.76	511.69	14.25	404629.21	769952.88	N 32 6 36.91	W 103 35 41.86
	12450.00	46.06	359.22	12386.25	148.55	151.86	511.47	14.84	404651.30	769952.66	N 32 6 37.13	W 103 35 41.86
	12482.00	50.68	358.56	12407.50	172.46	175.76	511.00	14.52	404675.21	769952.19	N 32 6 37.36	W 103 35 41.86
	12513.00	55.54	357.39	12426.10	197.24	200.53	510.11	15.96	404699.98	769951.31	N 32 6 37.61	W 103 35 41.87
	12545.00	61.08	356.30	12442.91	224.42	227.71	508.61	17.55	404727.15	769949.80	N 32 6 37.88	W 103 35 41.88
	12576.00	65.17	356.33	12456.92	252.02	255.30	506.83	13.19	404754.74	769948.03	N 32 6 38.15	W 103 35 41.90
	12651.00	72.78	359.36	12483.81	321.93	325.20	504.25	10.82	404824.63	769945.44	N 32 6 38.84	W 103 35 41.93
	12683.00	75.93	1.14	12492.44	352.74	356.00	504.39	11.21	404855.44	769945.58	N 32 6 39.15	W 103 35 41.92
	12715.00	78.65	2.01	12499.48	383.93	387.21	505.25	8.90	404886.64	769946.44	N 32 6 39.46	W 103 35 41.91
	12746.00	81.48	3.54	12504.83	414.42	417.70	506.73	10.34	404917.14	769947.92	N 32 6 39.76	W 103 35 41.89
	12778.00	83.84	4.18	12508.92	446.07	449.36	508.86	7.64	404948.80	769950.06	N 32 6 40.07	W 103 35 41.86

...Final Surveys - Cimarex Vaca Draw 20-17 Federal #3H MWD 0ft-22454' (Surcon Corrected)

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (ft/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' '')	Longitude (E/W ° ' '')
	12810.00	85.39	4.83	12511.92	477.81	481.12	511.37	5.25	404980.56	769952.56	N 32 6 40.39	W 103 35 41.83
	12841.00	86.46	4.78	12514.12	508.61	511.94	513.96	3.46	405011.37	769955.15	N 32 6 40.69	W 103 35 41.80
	12873.00	87.49	4.94	12515.81	540.43	543.78	516.66	3.26	405043.21	769957.86	N 32 6 41.00	W 103 35 41.77
	12904.00	89.93	4.83	12516.51	571.29	574.65	519.30	7.88	405074.08	769960.49	N 32 6 41.31	W 103 35 41.73
	12936.00	91.44	4.86	12516.13	603.15	606.54	522.00	4.72	405105.96	769963.20	N 32 6 41.63	W 103 35 41.70
	12968.00	89.31	3.38	12515.92	635.05	638.45	524.30	8.11	405137.88	769965.50	N 32 6 41.94	W 103 35 41.67
	12999.00	87.32	2.34	12516.83	665.99	669.40	525.85	7.24	405168.82	769967.04	N 32 6 42.25	W 103 35 41.65
	13031.00	86.29	2.09	12518.61	697.90	701.32	527.08	3.31	405200.75	769968.28	N 32 6 42.56	W 103 35 41.63
	13063.00	87.66	1.10	12520.30	729.84	733.26	527.97	5.28	405232.89	769969.17	N 32 6 42.88	W 103 35 41.62
	13094.00	88.76	359.17	12521.27	760.82	764.25	528.05	7.16	405263.67	769969.24	N 32 6 43.19	W 103 35 41.62
	13126.00	88.83	358.44	12521.94	792.81	796.23	527.38	2.29	405295.65	769968.57	N 32 6 43.50	W 103 35 41.62
	13157.00	87.90	359.03	12522.83	823.79	827.21	526.70	3.55	405326.63	769967.89	N 32 6 43.81	W 103 35 41.63
	13189.00	88.38	359.57	12523.86	855.77	859.19	526.30	2.26	405358.61	769967.50	N 32 6 44.13	W 103 35 41.63
	13284.00	86.18	359.36	12528.37	950.66	954.07	525.42	2.33	405453.49	769966.61	N 32 6 45.06	W 103 35 41.63
	13379.00	88.49	359.92	12532.79	1045.55	1048.96	524.82	2.50	405548.38	769966.02	N 32 6 46.00	W 103 35 41.63
	13474.00	88.69	359.14	12535.13	1140.52	1143.93	524.04	0.85	405643.34	769965.24	N 32 6 46.94	W 103 35 41.63
	13569.00	89.62	359.32	12536.53	1235.51	1238.91	522.77	1.00	405738.32	769963.96	N 32 6 47.88	W 103 35 41.64
	13664.00	88.56	358.96	12538.04	1330.49	1333.89	521.34	1.18	405833.29	769962.53	N 32 6 48.82	W 103 35 41.65
	13758.00	89.00	359.56	12540.04	1424.47	1427.86	520.13	0.79	405927.26	769961.32	N 32 6 49.75	W 103 35 41.65
	13853.00	87.35	0.22	12543.06	1519.41	1522.80	519.95	1.87	406022.20	769961.14	N 32 6 50.69	W 103 35 41.65
	13948.00	89.86	1.23	12545.38	1614.36	1617.76	521.15	2.85	406117.16	769962.34	N 32 6 51.63	W 103 35 41.63
	14043.00	89.07	1.26	12546.26	1709.32	1712.73	523.21	0.83	406212.13	769964.40	N 32 6 52.57	W 103 35 41.60
	14133.00	89.07	358.98	12547.72	1799.30	1802.71	523.40	2.53	406302.10	769964.59	N 32 6 53.46	W 103 35 41.59
	14228.00	89.11	357.58	12549.23	1894.26	1897.66	520.55	1.47	406397.04	769961.74	N 32 6 54.40	W 103 35 41.61
	14323.00	89.14	359.57	12550.68	1989.22	1992.61	518.19	2.09	406492.00	769959.38	N 32 6 55.34	W 103 35 41.63
	14418.00	89.04	359.92	12552.19	2084.21	2087.60	517.76	0.38	406586.98	769958.96	N 32 6 56.28	W 103 35 41.63
	14513.00	89.86	359.65	12553.11	2179.21	2182.59	517.41	0.91	406681.97	769958.60	N 32 6 57.22	W 103 35 41.63
	14608.00	90.07	358.53	12553.16	2274.20	2277.58	515.90	1.20	406776.95	769957.09	N 32 6 58.16	W 103 35 41.64
	14703.00	89.69	357.26	12553.36	2369.15	2372.51	512.41	1.40	406871.88	769953.60	N 32 6 59.10	W 103 35 41.67
	14798.00	90.86	359.66	12552.91	2464.12	2467.47	509.86	2.81	406966.84	769951.05	N 32 7 0.04	W 103 35 41.69
	14892.00	90.93	359.65	12551.44	2558.11	2561.46	509.29	0.08	407060.82	769950.48	N 32 7 0.97	W 103 35 41.69
	14987.00	89.48	358.99	12551.10	2653.11	2656.45	508.16	1.68	407155.81	769949.36	N 32 7 1.91	W 103 35 41.70
	15082.00	88.11	359.28	12553.10	2748.08	2751.41	506.73	1.47	407250.77	769947.92	N 32 7 2.85	W 103 35 41.70
	15177.00	88.04	359.78	12556.29	2843.03	2846.35	505.95	0.53	407345.71	769947.14	N 32 7 3.79	W 103 35 41.71
	15272.00	88.11	0.25	12559.48	2937.97	2941.30	505.98	0.50	407440.65	769947.17	N 32 7 4.73	W 103 35 41.70
	15367.00	89.45	0.61	12561.50	3032.94	3036.27	506.69	1.46	407535.62	769947.88	N 32 7 5.67	W 103 35 41.68
	15462.00	88.90	359.92	12562.87	3127.92	3131.26	507.13	0.93	407630.61	769948.32	N 32 7 6.61	W 103 35 41.67
	15557.00	89.04	358.92	12564.58	3222.90	3226.24	506.17	1.06	407725.58	769947.36	N 32 7 7.55	W 103 35 41.67
	15652.00	89.24	359.24	12566.00	3317.89	3321.22	504.64	0.40	407820.56	769945.83	N 32 7 8.49	W 103 35 41.68
	15747.00	88.21	358.64	12568.12	3412.86	3416.18	502.88	1.25	407915.51	769944.08	N 32 7 9.43	W 103 35 41.70
	15842.00	90.41	359.97	12569.26	3507.84	3511.15	501.73	2.71	408010.49	769942.93	N 32 7 10.37	W 103 35 41.70
	15937.00	89.28	359.38	12569.52	3602.84	3606.15	501.19	1.34	408105.48	769942.39	N 32 7 11.31	W 103 35 41.70
	16031.00	89.76	359.27	12570.30	3696.83	3700.14	500.09	0.52	408199.47	769941.28	N 32 7 12.24	W 103 35 41.71
	16126.00	87.76	359.81	12572.36	3791.81	3795.11	499.32	2.18	408294.43	769940.52	N 32 7 13.18	W 103 35 41.71
	16221.00	88.52	0.19	12575.44	3886.75	3890.06	499.32	0.89	408389.38	769940.52	N 32 7 14.12	W 103 35 41.70
	16316.00	88.38	0.71	12578.01	3981.71	3985.02	500.07	0.57	408484.34	769941.26	N 32 7 15.06	W 103 35 41.68
	16411.00	88.56	359.40	12580.55	4076.67	4079.98	500.16	1.39	408579.30	769941.35	N 32 7 16.00	W 103 35 41.68
	16506.00	89.76	0.48	12581.94	4171.65	4174.97	500.06	1.70	408674.28	769941.25	N 32 7 16.94	W 103 35 41.67
	16601.00	89.83	0.17	12582.28	4266.65	4269.97	500.60	0.33	408769.28	769941.79	N 32 7 17.88	W 103 35 41.66
	16696.00	89.38	0.95	12582.94	4361.63	4364.96	501.53	0.95	408864.27	769942.72	N 32 7 18.82	W 103 35 41.64
	16791.00	90.00	359.36	12583.45	4456.62	4459.96	501.79	1.80	408959.26	769942.98	N 32 7 19.76	W 103 35 41.63
	16886.00	90.34	359.03	12583.17	4551.62	4554.95	500.45	0.50	409054.24	769941.64	N 32 7 20.70	W 103 35 41.63
	16981.00	91.24	359.78	12581.86	4646.61	4649.93	499.46	1.23	409149.22	769940.66	N 32 7 21.64	W 103 35 41.64
	17076.00	91.93	359.24	12579.23	4741.57	4744.89	498.65	0.92	409244.18	769939.85	N 32 7 22.58	W 103 35 41.64
	17171.00	91.68	0.59	12576.24	4836.52	4839.84	498.51	1.44	409339.13	769939.70	N 32 7 23.52	W 103 35 41.63
Section Line Crossing [2460' FWL]	17222.50	90.77	359.78	12575.14	4888.00	4891.33	498.68	2.36	409390.61	769939.87	N 32 7 24.03	W 103 35 41.63

...Final Surveys - Cimarex Vaca Draw 20-17 Federal #3H MWD 0ft-22454' (Surcon Corrected)

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 ° ' '')
	17266.00	90.00	359.10	12574.85	4931.50	4934.82	498.25	2.36	409434.11	769939.45	N 32 7 24.46	W 103 35 41.63
	17361.00	89.72	359.03	12575.08	5026.50	5029.81	496.70	0.30	409529.09	769937.90	N 32 7 25.40	W 103 35 41.64
	17456.00	91.00	0.37	12574.48	5121.49	5124.80	496.21	1.95	409624.08	769937.40	N 32 7 26.34	W 103 35 41.64
	17551.00	90.72	359.23	12573.06	5216.48	5219.79	495.87	1.24	409719.07	769937.07	N 32 7 27.28	W 103 35 41.63
	17645.00	91.13	359.58	12571.54	5310.47	5313.77	494.90	0.57	409813.04	769936.09	N 32 7 28.21	W 103 35 41.64
	17740.00	91.65	0.14	12569.23	5405.44	5408.74	494.67	0.80	409908.01	769935.86	N 32 7 29.15	W 103 35 41.63
	17836.00	90.38	359.47	12567.53	5501.42	5504.72	494.34	1.50	410003.99	769935.53	N 32 7 30.10	W 103 35 41.63
	17931.00	89.69	359.84	12567.48	5596.42	5599.72	493.77	0.82	410098.99	769934.96	N 32 7 31.04	W 103 35 41.63
	18026.00	88.31	358.43	12569.13	5691.39	5694.69	492.33	2.08	410193.95	769933.53	N 32 7 31.98	W 103 35 41.64
	18121.00	90.10	359.67	12570.45	5786.37	5789.66	490.76	2.29	410288.92	769931.95	N 32 7 32.92	W 103 35 41.65
	18216.00	90.52	359.83	12569.94	5881.37	5884.66	490.35	0.47	410383.92	769931.54	N 32 7 33.86	W 103 35 41.65
	18311.00	92.79	1.88	12567.19	5976.30	5979.60	491.76	3.22	410478.85	769932.95	N 32 7 34.79	W 103 35 41.62
	18405.00	90.07	359.44	12564.85	6070.24	6073.55	492.84	3.89	410572.80	769934.04	N 32 7 35.72	W 103 35 41.60
	18500.00	88.80	359.17	12565.78	6165.23	6168.54	491.69	1.37	410667.78	769932.88	N 32 7 36.66	W 103 35 41.61
	18595.00	90.38	0.21	12566.46	6260.22	6263.53	491.18	1.99	410762.77	769932.37	N 32 7 37.60	W 103 35 41.61
	18686.00	89.97	359.52	12566.19	6351.22	6354.53	490.96	0.88	410853.76	769932.16	N 32 7 38.50	W 103 35 41.60
	18781.00	89.45	359.48	12566.67	6446.22	6449.52	490.13	0.55	410948.76	769931.33	N 32 7 39.44	W 103 35 41.60
	18877.00	89.93	359.57	12567.19	6542.22	6545.52	489.34	0.51	411044.75	769930.53	N 32 7 40.39	W 103 35 41.60
	18972.00	90.10	0.46	12567.16	6637.22	6640.51	489.36	0.95	411139.74	769930.56	N 32 7 41.33	W 103 35 41.60
	19067.00	89.90	359.90	12567.16	6732.21	6735.51	489.66	0.63	411234.74	769930.85	N 32 7 42.27	W 103 35 41.59
	19162.00	89.79	359.79	12567.42	6827.21	6830.51	489.40	0.16	411329.74	769930.60	N 32 7 43.21	W 103 35 41.58
	19257.00	89.79	359.86	12567.77	6922.21	6925.51	489.11	0.07	411424.73	769930.31	N 32 7 44.15	W 103 35 41.58
	19352.00	89.59	359.57	12568.28	7017.21	7020.51	488.64	0.37	411519.73	769929.83	N 32 7 45.09	W 103 35 41.57
	19447.00	89.72	359.68	12568.85	7112.21	7115.51	488.02	0.18	411614.72	769929.21	N 32 7 46.03	W 103 35 41.57
	19542.00	89.55	359.31	12569.46	7207.20	7210.50	487.18	0.43	411709.71	769928.37	N 32 7 46.97	W 103 35 41.58
	19637.00	89.66	359.60	12570.11	7302.20	7305.49	486.28	0.33	411804.70	769927.47	N 32 7 47.91	W 103 35 41.58
	19732.00	89.79	359.72	12570.57	7397.20	7400.49	485.71	0.19	411899.69	769926.91	N 32 7 48.85	W 103 35 41.58
	19827.00	89.76	359.69	12570.94	7492.20	7495.49	485.22	0.04	411994.69	769926.42	N 32 7 49.79	W 103 35 41.58
	19922.00	89.90	359.72	12571.22	7587.20	7590.49	484.74	0.15	412089.68	769925.93	N 32 7 50.73	W 103 35 41.57
	20017.00	90.24	0.34	12571.11	7682.19	7685.49	484.79	0.74	412184.68	769925.98	N 32 7 51.67	W 103 35 41.57
	20111.00	89.93	359.76	12570.97	7776.19	7779.49	484.87	0.70	412278.68	769926.06	N 32 7 52.60	W 103 35 41.56
	20207.00	89.83	359.76	12571.17	7872.19	7875.48	484.47	0.10	412374.67	769925.66	N 32 7 53.55	W 103 35 41.56
	20302.00	89.59	358.62	12571.65	7967.19	7970.47	483.12	1.23	412469.66	769924.32	N 32 7 54.49	W 103 35 41.56
	20396.00	89.76	357.44	12572.18	8061.15	8064.41	479.89	1.27	412563.59	769921.09	N 32 7 55.42	W 103 35 41.59
	20491.00	88.76	357.73	12573.41	8156.08	8159.32	475.89	1.10	412658.50	769917.08	N 32 7 56.36	W 103 35 41.63
	20586.00	89.93	357.53	12574.50	8251.01	8254.23	471.96	1.25	412753.41	769913.15	N 32 7 57.30	W 103 35 41.67
	20681.00	89.52	357.11	12574.95	8345.93	8349.12	467.52	0.62	412848.30	769908.71	N 32 7 58.24	W 103 35 41.71
	20776.00	91.24	359.93	12574.32	8440.90	8444.08	465.06	3.48	412943.25	769906.26	N 32 7 59.18	W 103 35 41.74
	20871.00	90.89	2.04	12572.56	8535.85	8539.04	466.70	2.25	413038.21	769907.89	N 32 8 0.12	W 103 35 41.71
	20966.00	91.10	2.47	12570.91	8630.74	8633.95	470.43	0.50	413133.12	769911.63	N 32 8 1.06	W 103 35 41.66
	21061.00	91.41	1.26	12568.83	8725.64	8728.88	473.53	1.31	413228.04	769914.72	N 32 8 2.00	W 103 35 41.61
	21156.00	89.90	359.74	12567.74	8820.62	8823.86	474.35	2.26	413323.02	769915.55	N 32 8 2.94	W 103 35 41.60
	21251.00	89.48	359.93	12568.25	8915.61	8918.86	474.08	0.49	413418.01	769915.28	N 32 8 3.88	W 103 35 41.59
	21346.00	89.83	359.24	12568.83	9010.61	9013.86	473.39	0.81	413513.01	769914.59	N 32 8 4.82	W 103 35 41.59
	21441.00	90.34	0.44	12568.69	9105.61	9108.85	473.13	1.37	413608.00	769914.32	N 32 8 5.76	W 103 35 41.59
	21536.00	89.79	359.90	12568.58	9200.60	9203.85	473.41	0.81	413703.00	769914.60	N 32 8 6.70	W 103 35 41.58
	21631.00	89.62	359.94	12569.07	9295.60	9298.85	473.28	0.18	413797.99	769914.47	N 32 8 7.64	W 103 35 41.57
	21726.00	90.14	0.46	12569.27	9390.60	9393.85	473.61	0.77	413892.99	769914.80	N 32 8 8.58	W 103 35 41.56
	21821.00	89.83	0.58	12569.29	9485.58	9488.85	474.47	0.35	413987.98	769915.66	N 32 8 9.52	W 103 35 41.54
	21916.00	89.42	359.40	12569.91	9580.58	9583.84	474.45	1.31	414082.97	769915.65	N 32 8 10.46	W 103 35 41.54
	22011.00	90.00	357.57	12570.39	9675.55	9678.80	471.94	2.02	414177.93	769913.14	N 32 8 11.40	W 103 35 41.56
	22106.00	90.58	358.63	12569.91	9770.52	9773.75	468.79	1.27	414272.87	769909.99	N 32 8 12.34	W 103 35 41.59
	22201.00	90.14	357.93	12569.32	9865.49	9868.70	465.94	0.87	414367.82	769907.14	N 32 8 13.28	W 103 35 41.61
	22296.00	89.48	357.79	12569.63	9960.44	9963.63	462.39	0.71	414462.75	769903.59	N 32 8 14.22	W 103 35 41.65
	22390.00	90.86	357.19	12569.35	10054.37	10057.54	458.28	1.60	414556.66	769899.47	N 32 8 15.15	W 103 35 41.69
Last Legal Take Point [100' FNL, 2453' FWL]	22404.00	90.79	357.16	12569.15	10068.36	10071.52	457.59	0.57	414570.64	769898.78	N 32 8 15.29	W 103 35 41.69

...Final Surveys - Cimarex Vaca Draw 20-17 Federal #3H MWD 0ft-22454' (Surcon Corrected)

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 ° ' '')
Final Survey	22409.00	90.76	357.15	12569.08	10073.35	10076.52	457.34	0.57	414575.63	769898.53	N 32 8 15.34	W 103 35 41.70
TD, PTB [50' FNL, 2451' FWL]	22454.00	90.76	357.15	12568.49	10118.31	10121.46	455.10	0.00	414620.57	769896.30	N 32 8 15.78	W 103 35 41.72

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	23.000	1/98.425	12.250	9.625	NAL_MWD_IFR1+MS-Depth Only	Original Borehole / Final Surveys - Cimarex Vaca Draw 20-17 Federal #3H MWD 0ft-22454' (Surcon
	1	23.000	23.000	Act Stns	12.250	9.625	NAL_MWD_IFR1+MS-Depth Only	Original Borehole / Final Surveys - Cimarex Vaca Draw 20-17 Federal #3H MWD 0ft-22454' (Surcon
	1	23.000	199.000	Act Stns	12.250	9.625	NAL_MWD_IFR1+MS	Original Borehole / Final Surveys - Cimarex Vaca Draw 20-17 Federal
	1	199.000	12683.000	Act Stns	8.750	7.000	NAL_MWD_IFR1+MS	Original Borehole / Final Surveys - Cimarex Vaca Draw 20-17 Federal
	1	12683.000	22454.000	Act Stns	6.750	4.500	NAL_MWD_IFR1+MS	Original Borehole / Final Surveys - Cimarex Vaca Draw 20-17 Federal

...Final Surveys - Cimarex Vaca Draw 20-17 Federal #3H MWD 0ft-22454' (Surcon Corrected)

Critical Points

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12 ☐ CONTROLLED	
Plan no. Drawing no. Copy number Date	Plant Name/ Location (also under plant code) Job No. and Job Name/Character of 3 11-11-2018
1 ☐ Check 2 ☐ Check 3 ☐ Check 4 ☐ Check	
5 ☐ Check	

