

Federal - Cimarex Vaca Draw 20-17 Federal #13H MWD 0ft-22542ft (Surcon Corrected) Survey Geodetic Report (Def Survey)



Report Date:	March 25, 2019 - 10:49 AM	Survey / DLS Computation:	Minimum Curvature / Lubinski
Client:	Cimarex	Vertical Section Azimuth:	359.630 ° (Grid North)
Field:	NM Lea County (NAD 83)	Vertical Section Origin:	0.000 ft, 0.000 ft
Structure / Slot:	Cimarex Vaca Draw 20-17 Federal #13H / Cimarex Vaca Draw 20-17 Federal #13H	TVD Reference Datum:	RKB
Well:	Cimarex Vaca Draw 20-17 Federal #13H	TVD Reference Elevation:	3448.000 ft above MSL
Borehole:	Original Borehole	Seabed / Ground Elevation:	3423.000 ft above MSL
UWI / API#:	Unknown / Unknown	Magnetic Declination:	6.671 °
Survey Name:	Final Surveys - Cimarex Vaca Draw 20-17 Federal #13H MWD 0ft-22542ft (Surcon Corrected)	Total Gravity Field Strength:	998.4295mgn (9.80665 Based)
Survey Date:	January 09, 2019	Gravity Model:	GARM
Tort / AHD / DDI / ERD Ratio:	320.269 ° / 11202.955 ft / 6.809 / 0.892	Total Magnetic Field Strength:	47801.059 nT
Coordinate Reference System:	NAD83 New Mexico State Plane, Eastern Zone, US Feet	Magnetic Dip Angle:	58.730 °
Location Lat / Long:	N 32° 6' 35.06113", W 103° 38' 1.78448"	Declination Date:	March 11, 2019
Location Grid N/E Y/X:	N 404430.650 NUS, E 768241.870 NUS	Magnetic Declination Model:	HDGM 2019
CRS Grid Convergence Angle:	0.3896 °	North Reference:	Grid North
Grid Scale Factor:	0.99998806	Grid Convergence Used:	0.3896 °
Version / Patch:	2.10.753.0	Total Corr Mag North->Grid North:	8.2814 °

Local Coord Referenced To: Structure Reference Point

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 ° ' ")	Closure Azimuth (°)	Closure (ft)
SHL [330° FSL, 730° FWL]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	404430.85	768241.87	N 32 8 35.06 W 103 38 1.78		0.00	0.00
	196.00	0.21	235.78	196.00	-0.20	-0.20	-0.30	0.11	404430.65	768241.57	N 32 8 35.06 W 103 38 1.77		235.78	0.38
	294.00	0.16	242.94	294.00	-0.36	-0.37	-0.57	0.06	404430.48	768241.30	N 32 8 35.06 W 103 38 1.77		237.23	0.67
	388.00	0.23	253.94	388.00	-0.47	-0.48	-0.87	0.08	404430.37	768241.00	N 32 8 35.06 W 103 38 1.77		241.13	0.89
	478.00	0.26	260.12	478.00	-0.71	-0.72	-1.11	0.25	404430.13	768240.78	N 32 8 35.05 W 103 38 1.78		237.02	1.33
	570.00	0.51	148.57	570.00	-1.25	-1.25	-0.98	0.45	404429.60	768240.91	N 32 8 35.05 W 103 38 1.78		217.45	1.58
	662.00	1.05	133.18	661.99	-2.17	-2.17	-0.12	0.62	404428.68	768241.75	N 32 8 35.04 W 103 38 1.77		183.18	2.18
	752.00	0.99	127.02	751.97	-3.21	-3.20	1.10	0.14	404427.65	768242.97	N 32 8 35.03 W 103 38 1.75		181.02	3.39
	839.00	1.03	134.68	838.96	-4.22	-4.21	2.26	0.17	404426.94	768244.13	N 32 8 35.02 W 103 38 1.74		151.80	4.78
	938.00	1.20	129.89	937.94	-5.53	-5.50	3.68	0.20	404425.35	768245.55	N 32 8 35.01 W 103 38 1.72		148.20	6.62
	953.00	1.25	140.08	952.94	-5.75	-5.73	3.91	1.49	404425.12	768245.78	N 32 8 35.00 W 103 38 1.72		145.69	6.93
	1125.00	1.48	129.45	1124.89	-8.62	-8.58	6.83	0.20	404422.27	768248.70	N 32 8 34.98 W 103 38 1.69		141.48	10.96
	1220.00	1.52	129.17	1219.68	-10.21	-10.15	8.75	0.04	404420.70	768250.62	N 32 8 34.98 W 103 38 1.68		139.24	13.40
	1304.00	1.55	121.15	1303.83	-11.51	-11.44	10.59	0.28	404419.41	768252.48	N 32 8 34.95 W 103 38 1.64		137.23	15.59
	1311.00	1.54	122.01	1310.82	-11.61	-11.54	10.75	0.36	404419.31	768252.62	N 32 8 34.95 W 103 38 1.64		137.04	15.77
	1406.00	2.26	106.54	1405.77	-12.84	-12.75	13.63	0.92	404418.10	768255.50	N 32 8 34.93 W 103 38 1.61		133.10	18.66
	1598.00	5.64	88.22	1597.29	-13.71	-13.54	26.89	1.86	404417.31	768268.56	N 32 8 34.93 W 103 38 1.48		116.90	29.63
	1691.00	7.24	85.98	1689.70	-13.22	-12.98	37.10	1.74	404417.87	768278.87	N 32 8 34.93 W 103 38 1.33		109.29	39.31
	1786.00	7.70	81.18	1783.90	-11.91	-11.59	49.38	0.82	404419.26	768291.23	N 32 8 34.94 W 103 38 1.19		103.21	50.71
	1882.00	8.74	80.65	1878.91	-8.82	-8.42	62.92	1.09	404421.43	768304.79	N 32 8 34.96 W 103 38 1.03		98.51	63.82
	1978.00	9.04	77.89	1971.78	-7.22	-6.72	77.19	0.54	404424.13	768318.05	N 32 8 34.99 W 103 38 0.87		94.98	77.48
	2071.00	9.49	81.88	2065.54	-4.66	-4.06	92.24	0.81	404426.79	768334.11	N 32 8 35.01 W 103 38 0.69		92.52	92.33
	2165.00	10.42	83.85	2158.13	-2.76	-2.06	108.36	1.05	404428.79	768350.23	N 32 8 35.03 W 103 38 0.50		91.09	108.38
	2259.00	10.31	88.02	2250.59	-1.86	-0.86	125.22	0.81	404429.99	768367.09	N 32 8 35.04 W 103 38 0.31		90.39	125.23
	2353.00	9.83	93.64	2343.18	-1.98	-1.06	141.48	1.26	404429.79	768383.34	N 32 8 35.04 W 103 38 0.12		90.43	141.48
	2447.00	9.45	95.20	2435.88	-3.28	-2.26	157.01	0.34	404428.59	768398.67	N 32 8 35.03 W 103 35 59.84		90.83	157.02
	2542.00	7.82	99.38	2529.80	-5.13	-4.02	171.15	1.84	404428.83	768413.02	N 32 8 35.01 W 103 35 59.77		91.35	171.20
	2636.00	6.72	101.80	2623.04	-7.37	-6.19	182.85	1.21	404424.96	768424.71	N 32 8 34.99 W 103 35 59.64		91.84	182.95
	2731.00	5.29	103.82	2717.52	-8.62	-8.37	192.54	1.52	404422.48	768434.40	N 32 8 34.97 W 103 35 59.53		92.49	192.72
	2921.00	5.31	103.48	2906.70	-13.87	-12.51	209.59	0.02	404418.34	768451.48	N 32 8 34.92 W 103 35 59.33		93.42	209.97
	3016.00	5.03	108.04	3001.32	-16.24	-14.83	217.83	0.52	404418.02	768459.69	N 32 8 34.90 W 103 35 59.23		93.89	218.33
	3110.00	5.19	104.98	3094.95	-18.66	-17.20	225.85	0.34	404413.85	768467.72	N 32 8 34.88 W 103 35 59.14		94.36	226.51
	3204.00	5.23	97.91	3188.56	-20.40	-18.89	234.21	0.88	404411.96	768476.07	N 32 8 34.86 W 103 35 59.04		94.61	234.97
	3298.00	5.14	93.59	3282.17	-21.31	-19.75	242.65	0.43	404411.10	768484.51	N 32 8 34.85 W 103 35 58.94		94.85	243.45
	3392.00	4.75	88.49	3375.82	-21.39	-19.77	250.74	0.77	404411.08	768492.60	N 32 8 34.85 W 103 35 58.85		94.51	251.52
	3486.00	4.88	78.20	3469.50	-20.25	-18.58	258.49	0.92	404412.27	768500.35	N 32 8 34.86 W 103 35 58.76		94.11	259.18
	3581.00	6.93	78.49	3563.99	-18.01	-16.28	267.87	2.18	404414.57	768509.83	N 32 8 34.88 W 103 35 58.65		93.48	268.47
	3675.00	7.29	74.32	3657.27	-15.15	-13.35	279.23	0.48	404411.50	768521.09	N 32 8 34.91 W 103 35 58.52		92.74	279.55
	3769.00	7.22	78.04	3750.51	-11.96	-10.08	290.64	0.11	404420.77	768532.50	N 32 8 34.94 W 103 35 58.39		91.99	290.62
	3863.00	7.67	80.04	3843.72	-9.30	-7.34	302.49	0.99	404423.51	768544.35	N 32 8 34.97 W 103 35 58.25		91.39	302.58
	3957.00	7.71	86.47	3936.86	-7.90	-5.87	314.96	0.82	404424.88	768558.82	N 32 8 34.98 W 103 35 58.10		91.07	315.02
	4052.00	7.32	83.89	4031.06	-6.96	-4.94	327.34	0.53	404426.01	768569.20	N 32 8 34.99 W 103 35 57.96		90.85	327.38
	4146.00	7.19	84.57	4124.31	-5.85	-3.86	339.15	0.16	404427.19	768581.01	N 32 8 35.00 W 103 35 57.82		90.82	339.17
	4241.00	7.35	82.87	4218.55	-4.81	-2.34	351.10	0.28	404428.51	768592.98	N 32 8 35.01 W 103 35 57.68		90.38	351.11
	4335.00	7.51	84.04	4311.78	-3.30	-0.96	363.18	0.23	404429.89	768605.03	N 32 8 35.03 W 103 35 57.54		90.15	363.18
	4429.00	7.90	82.69	4404.91	-3.05	-0.62	375.74	1.30	404430.23	768617.80	N 32 8 35.03 W 103 35 57.40		90.10	375.74
	4524.00	8.09	97.46	4498.99	-4.31	-1.80	388.89	0.73	404429.05	768630.75	N 32 8 35.02 W 103 35 57.24		90.26	388.89
	4618.00	8.72	97.14	4591.88	-6.14	-3.54	402.52	0.67	404427.31	768644.37	N 32 8 35.00 W 103 35 57.09		90.50	402.53
	4712.00	8.43	105.21	4684.93	-8.92	-6.24	416.24	1.32	404424.61	768658.09	N 32 8 34.97 W 103 35 56.93		90.88	416.28
	4806.00	7.59	112.60	4778.02	-13.20	-10.43	428.62	1.41	404420.42	768670.47	N 32 8 34.93 W 103 35 56.78		91.99	428.75
	4901.00	7.51	119.23	4872.19	-18.71	-15.87	439.83	0.92	404414.98	768681.68	N 32 8 34.87 W 103 35 56.65		92.07	440.11
	4996.00	6.73	130.18	4966.47	-25.40	-22.50	449.50	1.64	404408.35	768691.35	N 32 8 34.81 W 103 35 56.54		92.87	450.06
	5090.00	6.45	124.15	5059.85	-31.97	-29.01	458.08	0.79	404401.84	768699.93	N 32 8 34.74 W 103 35 56.44		93.82	459.00
	5185.00	5.65	115.28	5154.32	-37.02	-34.00	466.72	1.29	404396.85	768708.58	N 32 8 34.69 W 103 35 56.34		94.17	467.96
	5275.00	5.49	109.47	5184.18	-38.14	-35.11	469.41	1.95	404395.74	768711.27	N 32 8 34.68 W 103 35 56.31		94.28	470.72
	5279.00	5.30	79.47	5247.90	-38.66	-35.59	475.21	4.37	404395.26	768717.06	N 32 8 34.68 W 103 35 56.24		94.28	476.54
	5373.00	5.30	77.96	5341.50	-37.02	-33.89	483.72	0.15	404396.96	768725.57	N 32 8 34.69 W 103 35 56.14		94.01	484.91
	5464.00	6.20	69.93	5432.05	-34.51	-31.33	492.45	1.32	404399.52	768734.30	N 32 8 34.72 W 103 35 56.04		93.64	493.44
	5468.00	6.20	73.02	5436.02	-34.38	-31.19	492.66	8.34	404399.66	768734.71	N 32 8 34.72 W 103 35 56.04		93.62	493.84
	5562.00	5.89	73.38	5528.50	-31.57	-28.33	502.33	0.33	404402.52	768744.18	N 32 8 34.75 W 103 35 55.93		93.23	503.13
	5656.00	5.88	72.06	5623.02	-28.62	-25.52	511.38	0.29	404405.33	768753.23	N 32 8 34.77 W 103 35 55.82		92.66	512.01
	5751.00	6.39	69.83	5717.50	-25.62	-22.25	520.79	0.78	404408.60	768762.64	N 32 8 34.81 W 103 35 55.71		92.45	521.27
	5845.00	6.99	71.59	5810.86	-22.08	-18.65	531.10	0.70	404412.20	768772.96	N 32 8 34.84 W 103 35 55.59		92.01	531.43
	5940.00	6.54	71.44	5905.20	-18.60	-15.10	541.72	0.64	404416.75	768783.75	N 32 8 34.85 W 103 35 55.47		91.60	541.93
	6034.00	6.22	76.04	6005.62	-15.73	-12.77	551.73	0.87	404418.18	768793.58	N 32 8 34.90 W 103 35 55.35		91.26	551.87
	6129.00	6.93	80.31	6095.05	-14.02	-9.23	561.92	0.93	404420.48	768803.77	N 32 8 34.92 W 103 35 55.23		91.06	562.02
	6224.00	7.23	84.51	6187.31	-12.93	-8.39	573.64	1.71	404421.62	768815.49				

Comments	MD (ft)	Incl (°)	Azim Grd (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (ft/100ft)	Northing (ft)	Easting (ft)	Latitude (N/S ° ° ')	Longitude (E/W ° ° ')	Closure Azimuth (°)	Closure (ft)
	7827.00	6.06	91.58	7775.98	4.56	9.63	784.35	0.22	404440.48	789026.19	N 32 8 35.10 W	103 35 52.84	89.30	784.41
	7922.00	5.91	89.84	7870.44	4.37	9.50	794.26	0.25	404440.35	789036.10	N 32 8 35.10 W	103 35 52.83	89.31	794.31
	8016.00	5.65	90.30	7963.96	4.30	9.49	803.72	0.28	404440.34	789045.56	N 32 8 35.10 W	103 35 52.82	89.32	803.78
	8205.00	6.11	92.27	8151.97	3.73	9.05	823.08	0.27	404439.90	789064.92	N 32 8 35.10 W	103 35 52.19	89.37	823.13
	8299.00	5.67	94.76	8245.47	3.08	8.48	832.70	0.54	404439.31	789074.54	N 32 8 35.09 W	103 35 52.08	89.42	832.74
	8393.00	5.43	95.82	8339.03	2.19	7.63	841.75	0.28	404438.48	789083.80	N 32 8 35.08 W	103 35 51.88	89.48	841.79
	8488.00	5.30	98.19	8433.02	1.20	6.70	850.59	0.14	404437.55	789092.43	N 32 8 35.07 W	103 35 51.88	89.55	850.61
	8582.00	5.11	96.59	8527.23	0.20	5.75	859.08	0.21	404436.60	789100.90	N 32 8 35.06 W	103 35 51.78	89.62	859.08
	8676.00	4.91	98.73	8620.87	-0.94	4.66	867.20	0.29	404435.51	789109.04	N 32 8 35.05 W	103 35 51.68	89.69	867.21
	8771.00	4.45	100.26	8715.55	-2.27	3.38	874.84	0.50	404434.23	789116.88	N 32 8 35.04 W	103 35 51.59	89.78	874.85
	8865.00	4.14	103.43	8809.29	-3.75	1.95	881.73	0.42	404432.80	789123.57	N 32 8 35.02 W	103 35 51.51	89.87	881.73
	8960.00	3.71	105.59	8904.07	-5.41	0.32	888.03	0.48	404431.17	789129.87	N 32 8 35.00 W	103 35 51.44	89.88	888.03
	9055.00	3.14	105.19	8998.90	-8.95	-1.18	893.50	0.60	404429.67	789135.34	N 32 8 34.99 W	103 35 51.38	90.08	893.50
	9149.00	2.51	107.58	9092.78	-8.28	-2.48	897.95	0.68	404428.37	789139.78	N 32 8 34.98 W	103 35 51.33	90.16	897.95
	9244.00	1.81	126.12	9187.71	-9.81	-3.99	901.14	1.03	404426.88	789142.98	N 32 8 34.96 W	103 35 51.28	90.25	901.15
	9338.00	1.36	130.68	9281.68	-11.43	-5.60	903.19	0.50	404425.25	789145.02	N 32 8 34.94 W	103 35 51.26	90.35	903.20
	9431.00	1.11	132.16	9374.66	-12.95	-7.11	904.44	0.56	404423.74	789146.28	N 32 8 34.93 W	103 35 51.25	90.45	904.47
	9526.00	1.31	162.83	9469.64	-14.81	-8.96	905.19	0.32	404421.89	789147.03	N 32 8 34.91 W	103 35 51.24	90.57	905.24
	9620.00	0.83	182.54	9563.62	-16.52	-10.67	905.48	0.64	404420.18	789147.32	N 32 8 34.89 W	103 35 51.24	90.68	905.54
	9714.00	1.08	201.99	9657.61	-18.00	-12.16	905.12	0.42	404418.69	789148.98	N 32 8 34.88 W	103 35 51.24	90.77	905.21
	9809.00	0.99	217.32	9752.59	-19.48	-13.82	904.30	0.30	404417.23	789149.14	N 32 8 34.87 W	103 35 51.25	90.88	904.40
	9903.00	1.24	249.11	9846.57	-20.48	-14.83	902.88	0.70	404416.22	789149.69	N 32 8 34.86 W	103 35 51.27	90.93	902.97
	9997.00	1.65	258.24	9940.54	-21.06	-15.25	900.58	0.51	404415.80	789149.42	N 32 8 34.85 W	103 35 51.30	90.97	900.70
	10091.00	1.54	261.20	10034.51	-21.49	-15.68	898.00	0.13	404415.16	789139.84	N 32 8 34.85 W	103 35 51.33	91.00	898.14
	10186.00	2.28	304.52	10128.46	-20.80	-14.82	895.18	1.85	404416.03	789137.02	N 32 8 34.85 W	103 35 51.38	90.95	895.30
	10281.00	2.36	300.79	10224.38	-18.50	-12.75	891.94	0.18	404418.11	789133.78	N 32 8 34.87 W	103 35 51.40	90.82	892.03
	10375.00	2.27	297.72	10318.30	-16.63	-10.89	888.63	0.18	404419.96	789130.47	N 32 8 34.89 W	103 35 51.43	90.70	888.70
	10469.00	1.88	301.52	10412.24	-14.94	-9.22	885.67	0.44	404421.83	789127.51	N 32 8 34.91 W	103 35 51.47	90.60	885.72
	10563.00	1.54	287.54	10506.20	-13.73	-8.03	883.15	0.57	404422.82	789124.99	N 32 8 34.92 W	103 35 51.50	90.52	883.19
	10657.00	1.50	292.19	10600.17	-12.87	-7.18	880.81	0.14	404423.87	789122.65	N 32 8 34.93 W	103 35 51.52	90.47	880.84
	10752.00	1.03	348.92	10695.15	-11.56	-5.88	879.48	1.30	404424.97	789121.30	N 32 8 34.94 W	103 35 51.54	90.38	879.48
	10847.00	0.65	324.81	10780.14	-10.29	-4.61	878.96	0.52	404426.24	789120.80	N 32 8 34.96 W	103 35 51.55	90.30	878.97
	11035.00	1.84	326.75	10878.09	-8.68	-3.22	876.68	0.63	404428.63	789118.52	N 32 8 34.99 W	103 35 51.57	90.08	876.69
	11130.00	1.78	319.78	11073.04	-4.48	-1.17	874.91	0.25	404432.02	789116.75	N 32 8 35.01 W	103 35 51.59	89.82	874.91
	11224.00	1.68	304.92	11167.00	-2.58	0.05	872.98	0.48	404433.00	789114.70	N 32 8 35.03 W	103 35 51.62	89.80	872.98
	11319.00	1.05	271.37	11261.93	-1.68	3.05	870.36	0.92	404434.79	789112.21	N 32 8 35.04 W	103 35 51.65	89.74	870.37
	11413.00	1.32	257.77	11355.93	-1.79	3.82	867.96	0.57	404434.67	789109.80	N 32 8 35.04 W	103 35 51.67	89.75	867.97
	11507.00	1.48	253.83	11449.80	-2.34	3.25	865.73	0.20	404434.10	789107.57	N 32 8 35.03 W	103 35 51.70	89.78	865.74
	11603.00	1.55	247.76	11545.87	-3.18	2.41	863.34	0.18	404433.28	789105.18	N 32 8 35.03 W	103 35 51.73	89.84	863.34
	11698.00	1.50	221.78	11638.84	-4.53	1.03	861.37	0.74	404431.89	789103.21	N 32 8 35.01 W	103 35 51.75	89.83	861.37
	11790.00	1.76	219.00	11732.80	-6.56	-1.01	859.64	0.29	404429.84	789101.48	N 32 8 34.99 W	103 35 51.77	90.07	859.64
	11884.00	1.95	207.85	11826.75	-8.09	-3.55	857.99	0.44	404427.30	789099.83	N 32 8 34.97 W	103 35 51.78	90.24	857.99
	11941.00	2.14	205.49	11883.72	-10.90	-5.37	857.08	0.36	404425.48	789098.92	N 32 8 34.95 W	103 35 51.80	90.38	857.10
	12003.00	2.25	205.92	11945.67	-13.04	-7.51	856.05	0.18	404423.34	789097.89	N 32 8 34.93 W	103 35 51.81	90.50	856.08
	12035.00	0.90	226.70	11977.68	-13.77	-8.24	855.59	4.51	404422.61	789097.43	N 32 8 34.92 W	103 35 51.82	90.55	855.63
	12067.00	3.96	5.24	12009.64	-12.64	-7.32	855.51	14.80	404423.53	789097.35	N 32 8 34.93 W	103 35 51.82	90.49	855.54
	12098.00	9.05	9.47	12040.43	-9.37	-3.64	856.01	16.48	404427.01	789097.85	N 32 8 34.97 W	103 35 51.81	90.26	856.02
	12129.00	14.40	11.84	12070.77	-3.20	2.34	857.20	17.32	404433.19	789099.04	N 32 8 35.03 W	103 35 51.80	89.84	857.20
	12161.00	16.71	9.81	12101.59	5.22	10.77	858.80	7.42	404441.62	789100.64	N 32 8 35.11 W	103 35 51.78	89.28	858.87
	12194.00	19.51	8.49	12132.96	15.34	20.89	860.42	8.57	404451.74	789102.26	N 32 8 35.21 W	103 35 51.76	88.61	860.48
	12225.00	22.76	7.94	12161.87	26.39	31.86	862.02	10.50	404462.81	789103.86	N 32 8 35.32 W	103 35 51.74	87.88	862.61
	12256.00	25.11	7.63	12190.20	38.84	44.42	863.72	7.59	404475.27	789105.56	N 32 8 35.44 W	103 35 51.72	87.06	864.88
	12288.00	27.55	8.21	12218.88	52.88	58.47	865.68	7.67	404489.32	789107.52	N 32 8 35.58 W	103 35 51.70	86.14	867.85
	12319.00	29.48	8.87	12246.12	67.53	73.14	867.61	6.50	404503.99	789109.45	N 32 8 35.73 W	103 35 51.67	85.18	870.89
	12350.00	31.75	7.62	12272.80	83.18	88.79	869.61	7.49	404519.64	789111.45	N 32 8 35.88 W	103 35 51.65	84.17	874.13
	12382.00	33.85	9.01	12299.70	100.31	105.94	872.12	6.97	404538.79	789113.96	N 32 8 36.05 W	103 35 51.62	83.07	878.53
	12413.00	37.26	8.90	12324.91	118.09	123.75	874.92	11.00	404554.59	789116.78	N 32 8 36.23 W	103 35 51.58	81.95	883.63
	12445.00	40.90	7.62	12349.75	138.04	143.71	877.81	11.65	404574.55	789119.65	N 32 8 36.42 W	103 35 51.55	80.70	889.50
	12476.00	44.33	6.09	12372.56	158.88	164.54	880.31	11.56	404595.39	789122.15	N 32 8 36.63 W	103 35 51.52	79.41	895.55
	12507.00	48.48	8.42	12393.93	181.15	186.88	882.76	13.41	404617.70	789124.80	N 32 8 36.85 W	103 35 51.48	78.05	902.32
	12538.00	52.22	5.28	12413.71	204.68	210.60	885.18	12.40	404641.44	789127.02	N 32 8 37.09 W	103 35 51.46	76.82	909.88
	12569.00	56.18	4.77	12431.84	229.90	235.64	887.37	12.84	404665.48	789129.21	N 32 8 37.33 W	103 35 51.43	75.13	918.13
	12601.00	60.55	4.72	12448.82	257.03	262.78	889.63	13.64	404693.62	789131.47	N 32 8 37.60 W	103 35 51.40	73.54	927.63
	12632.00	64.91	4.26	12462.82	284.48	290.25	891.78	14.13	404721.08	789133.82	N 32 8 37.87 W	103 35 51.37	71.87	937.82
	12664.00	68.34	3.77	12487.77	295.38	301.15	892.55	12.48	404731.99	789134.38	N 32 8 37.88 W	103 35 51.36	71.38	941.68
	12737.00	75.65	1.81	12498.03	383.08	388.68	896.78	10.21	404819.71	789138.62	N 32 8 38.85 W	103 35 51.31	68.56	977.98
	12789.00	78.26	0.60	12505.25	414.24	420.04	897.43	8.95	404850.88	789139.27	N 32 8 39.18 W	103 35 51.30	64.92	960.87
	12800.00	83.11	359.54	12510.27	444.82	450.62	897.47	16.00	404881.48	789139.31	N 32 8 39.48 W	103 35 51.29	63.34	1004.24
	12833.00	90.17	358.04	12513.37	497.69	503.48	896.35	13.62	404934.32	789138.19	N 32 8 39.98 W	103 35 51.30	60.68	1028.07

Comments	MD (ft)	Incl (°)	Azlm Grd (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (ft/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ° °)	Longitude (E/W ° ° °)	Closure Azimuth (°)	Closure (ft)
	17232.00	90.89	358.03	12557.58	4870.96	4878.53	847.71	1.53	409307.22	789088.55	N 32 7 23.26	W 103 35 51.52	9.68	4949.66
Section Line Crossing (1608' FWL)	17310.00	90.63	359.52	12556.84	4948.94	4954.50	848.04	1.94	409385.19	789087.88	N 32 7 24.03	W 103 35 51.54	9.69	5026.22
	17326.00	90.58	359.83	12556.87	4964.94	4970.50	845.95	1.94	409401.18	789087.79	N 32 7 24.19	W 103 35 51.54	9.68	5041.98
	17420.00	89.79	1.78	12556.37	5058.91	5064.49	847.28	2.22	409495.17	789089.10	N 32 7 25.12	W 103 35 51.51	9.50	5134.87
	17514.00	90.96	2.88	12555.75	5152.81	5158.41	850.80	1.58	409589.09	789092.74	N 32 7 26.05	W 103 35 51.48	9.37	5228.12
	17608.00	93.41	2.88	12552.17	5248.60	5252.24	855.27	2.61	409682.91	789097.11	N 32 7 26.97	W 103 35 51.40	9.25	5321.42
	17702.00	92.10	1.08	12547.85	5340.42	5346.07	858.34	2.18	409778.74	789100.18	N 32 7 27.90	W 103 35 51.38	9.12	5414.54
	17796.00	90.58	1.81	12545.45	5434.34	5440.01	860.71	1.79	409870.68	789102.55	N 32 7 28.83	W 103 35 51.33	8.99	5507.88
	17890.00	91.48	2.95	12543.78	5528.22	5533.91	864.61	1.54	409964.58	789106.45	N 32 7 29.76	W 103 35 51.27	8.88	5601.05
	17984.00	91.31	1.43	12541.48	5622.09	5627.81	868.20	1.63	410058.47	789110.04	N 32 7 30.69	W 103 35 51.22	8.77	5694.39
	18078.00	90.28	359.18	12540.17	5716.07	5721.80	868.70	2.63	410152.45	789110.54	N 32 7 31.62	W 103 35 51.21	8.63	5787.37
	18172.00	90.79	359.67	12539.20	5810.06	5815.79	867.76	0.75	410246.44	789109.60	N 32 7 32.55	W 103 35 51.21	8.49	5880.17
	18266.00	90.14	358.35	12538.53	5904.05	5909.77	866.13	1.57	410340.42	789107.97	N 32 7 33.48	W 103 35 51.23	8.34	5972.90
	18360.00	89.90	359.28	12538.50	5998.04	6003.75	864.17	1.00	410434.39	789108.01	N 32 7 34.41	W 103 35 51.24	8.19	6065.62
	18454.00	90.17	0.08	12538.44	6092.04	6097.74	863.63	0.92	410528.39	789105.47	N 32 7 35.34	W 103 35 51.24	8.06	6158.80
	18548.00	90.72	0.08	12537.71	6186.03	6191.74	863.74	0.59	410622.38	789105.59	N 32 7 36.27	W 103 35 51.23	7.94	6251.70
	18642.00	88.67	358.97	12538.05	6280.03	6285.73	862.95	2.28	410716.37	789104.79	N 32 7 37.20	W 103 35 51.23	7.82	6344.69
	18737.00	89.88	358.80	12539.10	6375.01	6380.71	861.10	1.06	410811.34	789102.94	N 32 7 38.14	W 103 35 51.25	7.69	6438.55
	18831.00	89.93	359.00	12539.27	6469.00	6474.69	859.30	0.23	410905.32	789101.14	N 32 7 39.07	W 103 35 51.26	7.56	6531.48
	18925.00	90.14	359.15	12539.21	6563.00	6568.68	857.78	0.27	410999.30	789099.62	N 32 7 40.00	W 103 35 51.27	7.44	6624.45
	19019.00	88.17	357.38	12539.78	6656.97	6662.63	854.92	2.17	411093.25	789096.76	N 32 7 40.93	W 103 35 51.30	7.31	6717.25
	19113.00	88.31	359.34	12541.85	6750.91	6756.56	852.21	2.30	411187.18	789094.05	N 32 7 41.86	W 103 35 51.32	7.19	6810.09
	19207.00	90.72	0.63	12542.64	6844.90	6850.55	852.19	2.91	411281.16	789094.03	N 32 7 42.79	W 103 35 51.31	7.09	6903.35
	19300.00	91.20	1.30	12541.08	6937.86	6943.52	853.75	0.89	411374.13	789095.59	N 32 7 43.71	W 103 35 51.29	7.01	6996.57
	19394.00	91.00	0.67	12539.28	7031.82	7037.49	855.37	0.70	411468.10	789097.21	N 32 7 44.64	W 103 35 51.26	6.93	7089.28
	19488.00	90.41	357.94	12538.11	7126.80	7132.46	854.22	2.94	411563.07	789096.06	N 32 7 45.58	W 103 35 51.27	6.83	7183.43
	19583.00	90.17	358.80	12537.84	7220.77	7226.42	851.54	0.95	411657.03	789095.38	N 32 7 46.51	W 103 35 51.29	6.72	7276.42
	19677.00	90.31	359.39	12537.24	7314.77	7320.41	850.08	0.85	411751.01	789091.90	N 32 7 47.44	W 103 35 51.30	6.62	7369.60
	19770.00	90.55	0.87	12536.54	7407.76	7413.41	850.27	1.61	411844.00	789092.11	N 32 7 48.38	W 103 35 51.29	6.54	7462.01
	19865.00	90.34	1.22	12535.81	7502.73	7508.39	852.00	0.43	411938.98	789093.84	N 32 7 49.30	W 103 35 51.28	6.47	7556.57
	19959.00	90.34	359.18	12535.25	7595.72	7601.38	852.33	2.19	412031.97	789094.17	N 32 7 50.22	W 103 35 51.25	6.40	7649.02
	20052.00	90.10	358.17	12534.89	7689.70	7695.35	850.15	1.10	412125.94	789091.99	N 32 7 51.15	W 103 35 51.27	6.30	7742.17
	20147.00	89.89	358.02	12535.07	7784.67	7790.30	848.99	0.46	412220.89	789088.83	N 32 7 52.09	W 103 35 51.30	6.21	7836.21
	20241.00	89.55	358.14	12535.69	7878.63	7884.24	843.84	0.20	412314.83	789085.69	N 32 7 53.02	W 103 35 51.33	6.11	7929.27
	20335.00	91.03	359.65	12535.21	7972.62	7978.22	842.03	2.25	412408.80	789083.87	N 32 7 53.95	W 103 35 51.34	6.02	8022.53
	20429.00	91.62	0.32	12533.04	8066.59	8072.19	842.01	0.85	412502.77	789083.85	N 32 7 54.88	W 103 35 51.33	5.95	8115.99
	20524.00	90.93	359.39	12530.93	8161.56	8167.17	841.77	1.22	412597.74	789083.61	N 32 7 55.82	W 103 35 51.33	5.88	8210.43
	20618.00	91.10	359.83	12529.28	8255.55	8261.15	841.13	0.50	412691.72	789082.97	N 32 7 56.75	W 103 35 51.33	5.81	8303.98
	20712.00	91.00	358.42	12527.54	8349.53	8355.13	840.51	0.45	412785.70	789082.35	N 32 7 57.68	W 103 35 51.33	5.74	8397.30
	20805.00	91.65	359.23	12525.39	8442.51	8448.10	839.42	0.73	412878.67	789081.28	N 32 7 58.60	W 103 35 51.33	5.67	8490.70
	20900.00	90.83	359.38	12523.33	8537.48	8543.07	838.25	0.67	412973.63	789080.09	N 32 7 59.54	W 103 35 51.34	5.60	8584.10
	20994.00	90.79	359.58	12522.00	8631.47	8637.06	837.36	0.22	413067.62	789078.20	N 32 8 0.47	W 103 35 51.34	5.54	8677.55
	21088.00	89.59	359.51	12521.69	8725.47	8731.05	836.60	1.28	413161.61	789078.44	N 32 8 1.40	W 103 35 51.35	5.47	8771.04
	21182.00	90.31	359.45	12521.77	8819.47	8825.05	835.75	0.77	413255.60	789077.59	N 32 8 2.33	W 103 35 51.35	5.41	8864.53
	21276.00	89.78	359.68	12521.72	8913.47	8919.05	835.02	0.63	413349.59	789076.88	N 32 8 3.26	W 103 35 51.35	5.35	8958.05
	21370.00	89.55	0.33	12522.28	9007.46	9013.04	835.01	0.75	413443.59	789076.85	N 32 8 4.19	W 103 35 51.34	5.29	9051.64
	21465.00	89.68	0.87	12522.94	9102.45	9108.04	836.00	0.58	413537.58	789077.84	N 32 8 5.13	W 103 35 51.32	5.24	9146.32
	21559.00	89.52	359.33	12523.81	9196.44	9202.03	836.17	1.65	413632.57	789078.01	N 32 8 6.06	W 103 35 51.31	5.19	9239.84
	21653.00	90.17	359.38	12523.87	9290.44	9296.02	835.09	0.69	413726.56	789076.93	N 32 8 6.99	W 103 35 51.32	5.13	9333.48
	21748.00	90.58	0.14	12523.24	9385.43	9391.02	834.68	0.93	413821.55	789076.52	N 32 8 7.93	W 103 35 51.32	5.08	9428.04
	21842.00	90.76	0.48	12522.14	9479.42	9485.01	835.19	0.41	413915.54	789077.03	N 32 8 8.86	W 103 35 51.30	5.03	9521.71
	21935.00	90.88	359.42	12520.83	9572.41	9578.00	835.10	1.14	414009.53	789076.95	N 32 8 9.78	W 103 35 51.30	4.98	9614.34
	22029.00	91.55	359.67	12518.85	9666.39	9671.98	834.38	0.78	414102.50	789076.20	N 32 8 10.71	W 103 35 51.30	4.93	9707.90
	22123.00	90.78	0.01	12518.96	9760.37	9765.96	834.10	0.91	414196.47	789075.94	N 32 8 11.64	W 103 35 51.29	4.88	9801.51
	22217.00	90.72	0.80	12515.74	9854.35	9859.94	834.76	0.84	414290.48	789076.60	N 32 8 12.57	W 103 35 51.28	4.84	9895.22
	22311.00	90.17	359.68	12515.01	9948.34	9953.94	835.15	1.33	414384.45	789077.00	N 32 8 13.50	W 103 35 51.28	4.80	9988.91
	22404.00	89.83	359.78	12515.01	10041.34	10046.94	834.72	0.38	414477.45	789076.56	N 32 8 14.42	W 103 35 51.28	4.75	10081.55
Last Legal Takepoint (100' FNL, 1630' FWL)	22492.00	90.53	359.03	12514.74	10129.34	10134.93	833.80	1.17	414565.44	789075.64	N 32 8 15.29	W 103 35 51.27	4.70	10169.17
Last Survey	22495.00	90.55	359.00	12514.71	10132.34	10137.93	833.75	1.17	414568.44	789075.59	N 32 8 15.32	W 103 35 51.27	4.70	10172.16
TD, PTB (50' FNL, 1620' FWL)	22542.00	90.55	359.00	12514.26	10179.33	10184.92	832.93	0.00	414615.43	789074.77	N 32 8 15.78	W 103 35 51.27	4.68	10218.92

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	30.000	30.000	NAL_MWD_IFR1+MS-Depth Only	Original Borehole / Final Surveys - Cimarex Vaca Draw 20-17 Federal #13H MWD 0ft-22542ft (Surcon)
	1	23.000	23.000	Act Strs	30.000	30.000	NAL_MWD_IFR1+MS-Depth Only	Original Borehole / Final Surveys - Cimarex Vaca Draw 20-17 Federal #13H MWD 0ft-22542ft (Surcon)
	1	23.000	196.000	Act Strs	30.000	30.000	NAL_MWD_IFR1+MS	Original Borehole / Final Surveys - Cimarex Vaca Draw 20-17 Federal #13H MWD 0ft-22542ft (Surcon)
	1	196.000	11941.000	Act Strs	12.250	9.625	NAL_MWD_IFR1+MS	Original Borehole / Final Surveys - Cimarex Vaca Draw 20-17 Federal #13H MWD 0ft-22542ft (Surcon)
	1	11941.000	12704.000	Act Strs	8.750	7.000	NAL_MWD_IFR1+MS	Original Borehole / Final Surveys - Cimarex Vaca Draw 20-17 Federal #13H MWD 0ft-22542ft (Surcon)
	1	12704.000	22542.000	Act Strs	6.750	4.500	NAL_MWD_IFR1+MS	Original Borehole / Final Surveys - Cimarex Vaca Draw 20-17 Federal #13H MWD 0ft-22542ft (Surcon)