Intent [ ] As Drilled [x]

API #
30-015-45147

Operator Name:	Property Name:	Well Number
Cimarex Energy Co.	Cottonberry 20 Federal	001H

Kick Off Point (KOP)

UL	Section	Township	Range	Lot	Feet	From N/S	Feet	From E/W	County
D	20	25S	27E		176	North	619	West	Eddy

Latitude	Longitude	NAD
32.122264	-104.218894	83

First Take Point (FTP)

UL	Section	Township	Range	Lot	Feet	From N/S	Feet	From E/W	County
D	20	25S	27E		580	North	642	West	Eddy

Latitude	Longitude	NAD
32.12115	-104.218794	83

Last Take Point (LTP)

UL	Section	Township	Range	Lot	Feet	From N/S	Feet	From E/W	County
M	20	25S	27E		151	South	674	West	Eddy

Latitude	Longitude	NAD
32.108606	-104.218397	83

Is this well the defining well for the Horizontal Spacing Unit? [Yes]

Is this well an infill well? [No]

If infill is yes please provide API if available, Operator Name and well number for Defining well for Horizontal Spacing Unit.

API #

Operator Name:	Property Name:	Well Number

KZ 06/29/2018

Schlumberger

Cimarex Cottonberry 20 Federal 1H MWD 0ft-12196ft MD Final Survey
Geodetic Report [Surcon Corrected]
(Def Survey)

Report Date:	January 08, 2019 - 09.04 AM	**Survey / DLS Computation:**	Minimum Curvature / Lubinski
Client:	Cimarex	**Vertical Section Azimuth:**	178.805 ° (Grid North)
Field:	NM Eddy County (NAD 83)	**Vertical Section Origin:**	0.000 ft, 0.000 ft
Structure / Slot:	Cimarex Cottonberry 20 Federal 1H / Cimarex Cottonberry 20 Federal 1H	**TVD Reference Datum:**	RKB
Well:	Cimarex Cottonberry 20 Federal 1H	**TVD Reference Elevation:**	3175.300 ft above MSL
Borehole:	Original Borehole	**Seabed / Ground Elevation:**	3149.300 ft above MSL
UWI / API#:	Unknown / Unknown	**Magnetic Declination:**	7.313 °
Survey Name:	Cimarex Cottonberry 20 Federal 1H MWD 0ft-12196ft MD [Surcon Corrected]	**Total Gravity Field Strength:**	998.4466mgn (9.80665 Based)
Survey Date:	December 04, 2018	**Gravity Model:**	GARM
Tort / AHD / DDI / ERD Ratio:	221.642 ° / 5872.073 ft / 6.333 / 0.796	**Total Magnetic Field Strength:**	47848.939 nT
Coordinate Reference System:	NAD83 New Mexico State Plane, Eastern Zone, US Feet	**Magnetic Dip Angle:**	59.789 °
Location Lat / Long:	N 32° 7' 12.48867", W 104° 13' 7.95904"	**Declination Date:**	December 14, 2018
Location Grid N/E Y/X:	N 407460.310 ftUS, E 576771.110 ftUS	**Magnetic Declination Model:**	HDGM 2018
CRS Grid Convergence Angle:	0.0609 °	**North Reference:**	Grid North
Grid Scale Factor:	0.99991053	**Grid Convergence Used:**	0.0609 °
Version / Patch:	2.10.753.0	**Total Corr Mag North->Grid North:**	7.2523 °
		Local Coord Referenced To:	Structure Reference Point

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Closure (ft)	Closure Azimuth (°)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
SHL 950' FNL, 609' FWL]	0.00	0.00	0.00	0.00	-3175.30	0.00	0.00	0.00	N/A	0.00	0.00	407460.31	576771.11	N 32 7 12.49	W 104 13 7.96
Begin SLB MWD Survey	199.00	1.02	187.00	198.99	-2976.31	1.75	-1.76	-0.22	0.51	1.77	187.00	407458.55	576770.89	N 32 7 12.47	W 104 13 7.96
	297.00	0.62	188.20	296.98	-2878.32	3.14	-3.15	-0.40	0.41	3.17	187.20	407457.16	576770.71	N 32 7 12.46	W 104 13 7.96
	375.00	0.49	225.40	374.98	-2800.32	3.79	-3.80	-0.70	0.48	3.86	190.37	407456.51	576770.41	N 32 7 12.45	W 104 13 7.97
	445.00	0.72	227.69	444.97	-2730.33	4.28	-4.31	-1.23	0.33	4.48	195.99	407456.00	576769.88	N 32 7 12.45	W 104 13 7.97
	476.00	0.90	233.50	475.97	-2699.33	4.55	-4.58	-1.57	0.64	4.85	198.95	407455.73	576769.54	N 32 7 12.44	W 104 13 7.98
	565.00	0.89	71.75	564.96	-2610.34	4.75	-4.78	-1.48	1.99	5.01	197.19	407455.53	576769.63	N 32 7 12.44	W 104 13 7.98
	657.00	2.09	63.84	656.93	-2518.37	3.63	-3.82	0.71	1.32	3.88	169.53	407456.49	576771.82	N 32 7 12.45	W 104 13 7.95
	749.00	2.76	56.02	748.85	-2426.45	1.93	-1.84	4.05	0.81	4.45	114.46	407458.47	576775.16	N 32 7 12.47	W 104 13 7.91
	840.00	2.60	14.95	839.76	-2335.54	-1.24	1.38	6.40	2.07	6.54	77.84	407461.69	576777.51	N 32 7 12.50	W 104 13 7.88
	935.00	3.28	347.71	934.64	-2240.66	-5.98	6.12	6.37	1.61	8.83	46.19	407466.42	576777.48	N 32 7 12.55	W 104 13 7.88
	1029.00	2.90	346.85	1028.50	-2146.80	-10.95	11.06	5.26	0.41	12.25	25.44	407471.37	576776.37	N 32 7 12.60	W 104 13 7.90
	1123.00	2.55	353.54	1122.39	-2052.91	-15.36	15.45	4.49	0.50	16.09	16.19	407475.76	576775.59	N 32 7 12.64	W 104 13 7.91
	1217.00	2.32	8.93	1216.31	-1958.99	-19.31	19.41	4.55	0.73	19.93	13.18	407479.72	576775.65	N 32 7 12.68	W 104 13 7.91
	1311.00	2.62	37.68	1310.23	-1865.07	-22.86	22.99	6.15	1.34	23.80	14.99	407483.30	576777.26	N 32 7 12.72	W 104 13 7.89
	1406.00	2.46	43.46	1405.13	-1770.17	-26.00	26.19	8.88	0.32	27.65	18.74	407486.50	576779.99	N 32 7 12.75	W 104 13 7.86
	1501.00	2.89	22.87	1500.03	-1675.27	-29.63	29.87	11.22	1.10	31.91	20.58	407490.18	576782.33	N 32 7 12.78	W 104 13 7.83
	1595.00	3.26	44.55	1593.90	-1581.40	-33.66	33.96	14.01	1.29	36.74	22.42	407494.27	576785.12	N 32 7 12.82	W 104 13 7.80
	1689.00	4.14	58.05	1687.70	-1487.60	-37.26	37.66	18.77	1.31	42.08	26.49	407497.97	576789.88	N 32 7 12.86	W 104 13 7.74
	1784.00	4.87	64.74	1782.41	-1392.89	-40.66	41.20	25.32	0.95	48.36	31.58	407501.50	576796.43	N 32 7 12.90	W 104 13 7.66
	1817.00	4.82	63.82	1815.29	-1360.01	-41.82	42.41	27.83	0.28	50.73	33.28	407502.71	576798.94	N 32 7 12.91	W 104 13 7.63
	1973.00	4.43	62.64	1970.78	-1204.52	-47.24	48.07	39.07	0.26	61.94	39.10	407508.37	576810.17	N 32 7 12.96	W 104 13 7.50
	2068.00	5.00	57.06	2065.46	-1109.84	-51.04	52.01	45.80	0.77	69.30	41.37	407512.31	576816.91	N 32 7 13.00	W 104 13 7.43
	2162.00	5.91	51.63	2159.04	-1016.26	-56.12	57.24	53.03	1.11	78.03	42.82	407517.54	576824.14	N 32 7 13.05	W 104 13 7.34
	2257.00	6.86	37.41	2253.45	-921.85	-63.51	64.78	60.31	1.93	88.51	42.96	407525.08	576831.42	N 32 7 13.13	W 104 13 7.26
	2351.00	8.00	28.78	2346.66	-828.64	-73.56	74.97	66.87	1.69	100.47	41.73	407535.28	576837.98	N 32 7 13.23	W 104 13 7.18
	2445.00	9.69	19.82	2439.55	-735.75	-86.61	88.15	72.71	2.31	114.27	39.52	407548.45	576843.81	N 32 7 13.36	W 104 13 7.11
	2540.00	10.43	6.11	2533.10	-642.20	-102.61	104.22	76.33	2.63	129.19	36.22	407564.53	576847.44	N 32 7 13.52	W 104 13 7.07
	2634.00	12.19	355.36	2625.28	-550.02	-120.96	122.58	76.44	2.91	144.46	31.95	407582.88	576847.54	N 32 7 13.70	W 104 13 7.07
	2729.00	12.43	351.26	2718.10	-457.20	-141.11	142.68	74.07	0.95	160.76	27.44	407602.98	576845.17	N 32 7 13.90	W 104 13 7.10
	2823.00	12.11	349.19	2809.95	-365.35	-160.86	162.37	70.68	0.58	177.09	23.53	407622.66	576841.79	N 32 7 14.09	W 104 13 7.14
	2918.00	11.02	351.38	2903.02	-272.28	-179.69	181.13	67.45	1.24	193.29	20.43	407641.43	576838.56	N 32 7 14.28	W 104 13 7.17
	3012.00	11.49	358.15	2995.22	-180.08	-197.96	199.37	65.81	1.49	209.95	18.27	407659.67	576836.91	N 32 7 14.46	W 104 13 7.19
	3106.00	11.66	356.87	3087.31	-87.99	-216.81	218.22	64.99	0.33	227.69	16.58	407678.51	576836.09	N 32 7 14.65	W 104 13 7.20
	3201.00	11.93	355.97	3180.30	5.00	-236.22	237.60	63.77	0.34	246.01	15.02	407697.89	576834.88	N 32 7 14.84	W 104 13 7.21
	3295.00	11.41	353.70	3272.36	97.06	-255.18	256.53	62.07	0.74	263.93	13.60	407716.82	576833.17	N 32 7 15.03	W 104 13 7.23
	3390.00	11.54	350.75	3365.46	190.16	-273.95	275.25	59.51	0.63	281.61	12.20	407735.53	576830.61	N 32 7 15.21	W 104 13 7.26
	3484.00	11.40	348.58	3457.58	282.28	-292.40	293.64	56.16	0.48	298.96	10.83	407753.92	576827.26	N 32 7 15.39	W 104 13 7.30
	3578.00	11.09	351.33	3549.78	374.48	-310.51	311.68	52.96	0.66	316.15	9.64	407771.96	576824.06	N 32 7 15.57	W 104 13 7.34
	3673.00	11.03	349.74	3643.01	467.71	-328.54	329.65	49.96	0.33	333.42	8.62	407789.93	576821.07	N 32 7 15.75	W 104 13 7.37
	3767.00	11.01	352.19	3735.28	559.98	-346.34	347.40	47.14	0.50	350.58	7.73	407807.67	576818.24	N 32 7 15.93	W 104 13 7.41
	3862.00	11.14	359.58	3828.52	653.22	-364.53	365.56	45.84	1.50	368.42	7.15	407825.84	576816.94	N 32 7 16.11	W 104 13 7.42
	3956.00	10.56	356.96	3920.84	745.54	-382.21	383.24	45.32	0.81	385.91	6.74	407843.52	576816.42	N 32 7 16.28	W 104 13 7.43
	4050.00	10.11	355.39	4013.31	838.01	-399.06	400.07	44.20	0.56	402.50	6.30	407860.34	576815.30	N 32 7 16.45	W 104 13 7.44
	4144.00	9.33	352.60	4105.96	930.66	-414.87	415.85	42.55	0.97	418.02	5.84	407876.12	576813.66	N 32 7 16.60	W 104 13 7.46
	4239.00	9.90	352.27	4199.63	1024.33	-430.64	431.58	40.46	0.60	433.47	5.36	407891.85	576811.57	N 32 7 16.76	W 104 13 7.48
	4334.00	10.31	355.67	4293.15	1117.85	-447.24	448.15	38.72	0.76	449.82	4.94	407908.42	576809.83	N 32 7 16.92	W 104 13 7.50
	4428.00	11.36	353.84	4385.48	1210.18	-464.86	465.74	37.09	1.18	467.21	4.55	407926.01	576808.20	N 32 7 17.10	W 104 13 7.52
	4523.00	11.59	358.64	4478.58	1303.28	-483.73	484.58	35.86	1.03	485.91	4.23	407944.85	576806.97	N 32 7 17.28	W 104 13 7.54
	4617.00	11.30	358.65	4570.71	1395.41	-502.38	503.23	35.42	0.31	504.47	4.03	407963.49	576806.53	N 32 7 17.47	W 104 13 7.54
	4710.00	10.95	355.93	4661.96	1486.66	-520.31	521.15	34.58	0.68	522.29	3.80	407981.41	576805.69	N 32 7 17.65	W 104 13 7.55
	4805.00	11.00	356.80	4755.23	1579.93	-538.38	539.20	33.43	0.18	540.23	3.55	407999.46	576804.54	N 32 7 17.82	W 104 13 7.56
	4899.00	10.76	355.52	4847.54	1672.24	-556.11	556.90	32.25	0.36	557.83	3.31	408017.16	576803.35	N 32 7 18.00	W 104 13 7.58
	4994.00	11.39	0.73	4940.77	1765.47	-574.34	575.12	31.67	1.24	575.99	3.15	408035.38	576802.78	N 32 7 18.18	W 104 13 7.58
	5088.00	10.97	356.78	5032.99	1857.69	-592.56	593.34	31.60	0.60	594.19	3.05	408053.60	576802.71	N 32 7 18.36	W 104 13 7.58
	5182.00	10.56	358.08	5125.33	1950.03	-610.11	610.90	31.12	0.46	611.69	2.92	408071.15	576802.23	N 32 7 18.53	W 104 13 7.59
	5277.00	11.42	359.48	5218.59	2043.29	-628.22	629.00	30.74	0.95	629.75	2.80	408089.25	576801.85	N 32 7 18.71	W 104 13 7.59
	5371.00	11.12	359.62	5310.78	2135.48	-646.59	647.37	30.60	0.32	648.09	2.71	408107.62	576801.71	N 32 7 18.89	W 104 13 7.60
	5465.00	10.17	357.46	5403.16	2227.86	-663.95	664.73	30.17	1.10	665.41	2.60	408124.98	576801.28	N 32 7 19.07	W 104 13 7.60
	5560.00	9.29	356.93	5496.79	2321.49	-680.00	680.76	29.39	0.93	681.40	2.47	408141.01	576800.50	N 32 7 19.22	W 104 13 7.61
	5655.00	8.58	353.62	5590.64	2415.34	-694.72	695.46	28.19	0.92	696.03	2.32	408155.71	576799.30	N 32 7 19.37	W 104 13 7.62
	5750.00	7.76	350.73	5684.67	2509.37	-708.13	708.83	26.37	0.97	709.33	2.13	408169.08	576797.48	N 32 7 19.50	W 104 13 7.64
	5844.00	6.71	343.78	5777.93	2602.63	-719.72	720.37	23.81	1.45	720.77	1.89	408180.62	576794.92	N 32 7 19.62	W 104 13 7.67
	5939.00	5.48	334.93	5872.39	2697.09	-729.23	729.81	20.34	1.63	730.09	1.60	408190.05	576791.45	N 32 7 19.71	W 104 13 7.71
	6033.00	3.92	337.38	5966.07	2790.77	-736.32	736.84	17.20	1.67	737.04	1.34	408197.08	576788.31	N 32 7 19.78	W 104 13 7.75
	6127.00	3.13	341.66	6059.89	2884.59	-741.77	742.24	15.16	0.89	742.40	1.17	408202.49	576786.27	N 32 7 19.83	W 104 13 7.77
	6222.00	3.05	335.21	6154.75	2979.45	-746.56	747.00	13.29	0.38	747.12	1.02	408207.24	576784.39	N 32 7 19.88	W 104 13 7.80
	6316.00	3.32	331.72	6248.61	3073.31	-751.28	751.67	10.95	0.35	751.75	0.83	408211.91	576782.06	N 32 7 19.93	W 104 13 7.82
	6410.00	3.32	330.25	6342.45	3167.15	-756.09	756.43	8.31	0.09	756.47	0.63	408216.67	576779.42	N 32 7 19.97	W 104 13 7.85
	6505.00	2.80	327.80	6437.31	3262.01	-760.50	760.78	5.71	0.56	760.80	0.43	408221.02	576776.81	N 32 7 20.02	W 104 13 7.88
	6599.00	2.85	324.08	6531.20	3355.90	-764.38	764.62	3.11	0.20	764.62	0.23	408224.86	576774.22	N 32 7 20.05	W 104 13 7.91
	6693.00	2.84	325.32	6625.08	3449.78	-768.25	768.42	0.41	0.07	768.42	0.03	408228.66	576771.52	N 32 7 20.09	W 104 13 7.94
	6793.00	3.08	317.01	6724.95	3549.65	-772.32	772.43	-2.83	0.49	772.43	359.79	408232.66	576768.28	N 32 7 20.13	W 104 13 7.98
	6811.00	3.28	315.25	6742.92	3567.62	-773.05	773.14	-3.52	1.24	773.15	359.74	408233.38	576767.59	N 32 7 20.14	W 104 13 7.99
	6874.00	2.93	268.06	6805.84	3630.54	-774.34	774.37	-6.40	3.98	774.40	359.53	408234.61	576764.71	N 32 7 20.15	W 104 13 8.02
	6906.00	5.32	255.86	6837.76	3662.46	-773.99	773.98	-8.65	7.91	774.03	359.36	408234.22	576762.46	N 32 7 20.15	W 104 13 8.05
	6937.00	9.33	206.21	6868.52	3693.22	-771.44	771.37	-11.16	23.02	771.45	359.17	408231.61	576759.95	N 32 7 20.12	W 104 13 8.08
	6969.00	13.35	196.34	6899.90	3724.60	-765.61	765.50	-13.35	13.91	765.61	359.00	408225.74	576757.76	N 32 7 20.06	W 104 13 8.10
	7000.00	17.06	191.86	6929.81	3754.51	-757.76	757.61	-15.29	12.55	757.76	358.84	408217.85	576755.82	N 32 7 19.99	W 104 13 8.13
	7032.00	22.10	190.95	6959.95	3784.65	-747.30	747.10	-17.40	15.78	747.30	358.67	408207.34	576753.71	N 32 7 19.88	W 104 13 8.15
	7063.00	26.43	187.89	6988.20	3812.90	-734.78	734.53	-19.45	14.54	734.79	358.48	408194.77	576751.66	N 32 7 19.76	W 104 13 8.18
	7095.00	29.06	181.65	7016.53	3841.23	-719.98	719.70	-20.66	12.24	720.00	358.36	408179.95	576750.46	N 32 7 19.61	W 104 13 8.19
	7126.00	31.35	173.22	7043.33	3868.03	-704.42	704.16	-19.92	15.53	704.44	358.38	408164.41	576751.19	N 32 7 19.46	W 104 13 8.18
	7158.00	34.62	167.77	7070.17	3894.87	-687.21	687.00	-17.01	13.79	687.21	358.58	408147.25	576754.10	N 32 7 19.29	W 104 13 8.15
	7190.00	38.30	164.13	7095.91	3920.61	-668.68	668.57	-12.37	13.34	668.69	358.94	408128.82	576758.74	N 32 7 19.10	W 104 13 8.09
	7221.00	41.53	163.47	7119.68	3944.38	-649.48	649.47	-6.82	10.51	649.51	359.40	408109.73	576764.29	N 32 7 18.92	W 104 13 8.03
	7252.00	44.64	163.43	7142.32	3967.02	-629.06	629.18	-0.79	10.03	629.18	359.93	408089.43	576770.32	N 32 7 18.71	W 104 13 7.96

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Closure (ft)	Closure Azimuth (°)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")
	7284.00	47.30	164.85	7164.56	3989.26	-606.80	607.05	5.49	8.90	607.07	0.52	408067.30	576776.60	N 32 7 18.50	W 104 13 7.89
	7331.00	50.15	168.59	7195.57	4020.27	-572.27	572.68	13.58	8.52	572.84	1.36	408032.94	576784.69	N 32 7 18.16	W 104 13 7.79
	7378.00	53.57	172.25	7224.60	4049.30	-535.71	536.24	19.70	9.51	536.60	2.10	407996.50	576790.81	N 32 7 17.79	W 104 13 7.72
	7425.00	58.69	176.44	7250.79	4075.49	-496.83	497.43	23.50	13.17	497.98	2.70	407957.69	576794.61	N 32 7 17.41	W 104 13 7.68
	7473.00	62.75	179.27	7274.26	4098.96	-454.98	455.61	25.05	9.90	456.29	3.15	407915.87	576796.16	N 32 7 17.00	W 104 13 7.66
	7519.00	66.66	180.42	7293.91	4118.61	-413.41	414.03	25.15	8.80	414.79	3.48	407874.30	576796.26	N 32 7 16.59	W 104 13 7.66
	7567.00	71.64	179.58	7310.99	4135.69	-368.58	369.18	25.16	10.50	370.04	3.90	407829.46	576796.27	N 32 7 16.14	W 104 13 7.66
	7614.00	77.11	176.67	7323.65	4148.35	-323.34	323.97	26.65	13.08	325.06	4.70	407784.25	576797.76	N 32 7 15.69	W 104 13 7.65
	7662.00	81.16	176.06	7332.70	4157.40	-276.25	276.93	29.64	8.53	278.51	6.11	407737.22	576800.75	N 32 7 15.23	W 104 13 7.61
	7709.00	82.75	176.14	7339.27	4163.97	-229.77	230.50	32.81	3.39	232.83	8.10	407690.79	576803.92	N 32 7 14.77	W 104 13 7.57
	7756.00	87.20	176.71	7343.39	4168.09	-183.00	183.79	35.73	9.54	187.23	11.00	407644.08	576806.83	N 32 7 14.31	W 104 13 7.54
	7817.00	91.46	176.99	7344.10	4168.80	-122.06	122.90	39.08	7.00	128.96	17.64	407583.20	576810.18	N 32 7 13.70	W 104 13 7.50
	7912.00	92.63	177.63	7340.71	4165.41	-27.15	28.07	43.53	1.40	51.80	57.19	407488.37	576814.64	N 32 7 12.77	W 104 13 7.45
	8006.00	90.95	177.68	7337.78	4162.48	66.78	-65.81	47.38	1.79	81.09	144.25	407394.51	576818.48	N 32 7 11.84	W 104 13 7.41
	8100.00	91.40	178.63	7335.85	4160.55	160.75	-159.74	50.40	1.12	167.50	162.49	407300.59	576821.51	N 32 7 10.91	W 104 13 7.37
	8195.00	90.50	179.02	7334.27	4158.97	255.74	-254.70	52.35	1.03	260.03	168.39	407205.63	576823.46	N 32 7 9.97	W 104 13 7.35
	8289.00	90.84	178.99	7333.18	4157.88	349.73	-348.68	53.98	0.36	352.84	171.20	407111.66	576825.09	N 32 7 9.04	W 104 13 7.34
	8384.00	89.10	178.98	7333.22	4157.92	444.73	-443.66	55.67	1.83	447.14	172.85	407016.69	576826.77	N 32 7 8.10	W 104 13 7.32
	8478.00	88.99	178.96	7334.79	4159.49	538.71	-537.63	57.36	0.12	540.69	173.91	406922.72	576828.46	N 32 7 7.17	W 104 13 7.30
	8573.00	90.22	179.65	7335.45	4160.15	633.71	-632.62	58.51	1.48	635.32	174.72	406827.74	576829.61	N 32 7 6.23	W 104 13 7.29
	8667.00	90.73	179.93	7334.67	4159.37	727.69	-726.62	58.85	0.62	729.00	175.37	406733.76	576829.96	N 32 7 5.30	W 104 13 7.28
	8762.00	91.34	180.19	7332.95	4157.65	822.65	-821.60	58.75	0.70	823.70	175.91	406638.78	576829.86	N 32 7 4.36	W 104 13 7.29
	8856.00	90.06	179.39	7331.80	4156.50	916.63	-915.59	59.10	1.61	917.50	176.31	406544.80	576830.20	N 32 7 3.43	W 104 13 7.28
	8951.00	90.45	179.38	7331.38	4156.08	1011.62	-1010.59	60.12	0.41	1012.37	176.60	406449.82	576831.22	N 32 7 2.49	W 104 13 7.27
	9046.00	91.23	179.90	7329.99	4154.69	1106.60	-1105.57	60.71	0.99	1107.24	176.86	406354.84	576831.82	N 32 7 1.55	W 104 13 7.27
	9140.00	91.12	179.07	7328.06	4152.76	1200.57	-1199.55	61.56	0.89	1201.13	177.06	406260.87	576832.66	N 32 7 0.62	W 104 13 7.26
	9235.00	91.79	178.90	7325.65	4150.35	1295.54	-1294.50	63.24	0.73	1296.05	177.20	406165.93	576834.35	N 32 6 59.68	W 104 13 7.24
	9329.00	90.84	177.92	7323.49	4148.19	1389.51	-1388.44	65.85	1.45	1390.00	177.28	406072.00	576836.95	N 32 6 58.75	W 104 13 7.21
	9424.00	91.46	177.90	7321.58	4146.28	1484.48	-1483.36	69.31	0.65	1484.97	177.32	405977.09	576840.42	N 32 6 57.81	W 104 13 7.17
	9518.00	92.07	178.55	7318.69	4143.39	1578.43	-1577.27	72.22	0.95	1578.92	177.38	405883.19	576843.33	N 32 6 56.88	W 104 13 7.14
	9613.00	90.58	178.44	7316.51	4141.21	1673.40	-1672.20	74.72	1.59	1673.87	177.44	405788.26	576845.82	N 32 6 55.94	W 104 13 7.11
	9707.00	88.88	178.37	7316.97	4141.67	1767.39	-1766.16	77.33	1.79	1767.86	177.49	405694.31	576848.44	N 32 6 55.01	W 104 13 7.08
	9802.00	89.55	178.25	7318.27	4142.97	1862.38	-1861.11	80.14	0.72	1862.84	177.53	405599.37	576851.24	N 32 6 54.07	W 104 13 7.05
	9896.00	90.90	178.91	7317.90	4142.60	1956.38	-1955.08	82.46	1.60	1956.82	177.58	405505.41	576853.57	N 32 6 53.14	W 104 13 7.02
	9990.00	88.88	178.81	7318.08	4142.78	2050.37	-2049.06	84.33	2.15	2050.79	177.64	405411.44	576855.44	N 32 6 52.21	W 104 13 7.00
	10085.00	86.47	177.15	7321.93	4146.63	2145.27	-2143.91	87.68	3.08	2145.70	177.66	405316.60	576858.78	N 32 6 51.27	W 104 13 6.97
	10179.00	87.03	175.86	7327.26	4151.96	2239.04	-2237.58	93.40	1.49	2239.53	177.61	405222.93	576864.50	N 32 6 50.35	W 104 13 6.90
	10273.00	87.31	175.94	7331.90	4156.60	2332.81	-2331.23	100.11	0.31	2333.38	177.54	405129.30	576871.21	N 32 6 49.42	W 104 13 6.82
	10368.00	87.70	175.91	7336.04	4160.74	2427.60	-2425.90	106.86	0.41	2428.25	177.48	405034.64	576877.96	N 32 6 48.48	W 104 13 6.75
	10462.00	88.38	176.28	7339.26	4163.96	2521.44	-2519.62	113.26	0.82	2522.17	177.43	404940.92	576884.35	N 32 6 47.56	W 104 13 6.67
	10557.00	88.26	178.07	7342.04	4166.74	2616.35	-2614.46	117.94	1.89	2617.12	177.42	404846.09	576889.03	N 32 6 46.62	W 104 13 6.62
	10651.00	88.99	178.97	7344.30	4169.00	2710.32	-2708.40	120.36	1.23	2711.08	177.46	404752.16	576891.46	N 32 6 45.69	W 104 13 6.59
	10745.00	89.36	179.19	7345.63	4170.33	2804.31	-2802.38	121.87	0.46	2805.03	177.51	404658.19	576892.97	N 32 6 44.76	W 104 13 6.58
	10840.00	90.90	179.76	7345.40	4170.10	2899.30	-2897.37	122.74	1.71	2899.97	177.57	404563.20	576893.84	N 32 6 43.82	W 104 13 6.57
	10934.00	90.17	179.27	7344.52	4169.22	2993.29	-2991.36	123.54	0.94	2993.91	177.64	404469.22	576894.64	N 32 6 42.89	W 104 13 6.56
	11029.00	88.04	179.09	7346.01	4170.71	3088.27	-3086.34	124.90	2.25	3088.86	177.68	404374.25	576896.00	N 32 6 41.95	W 104 13 6.55
	11123.00	87.93	179.22	7349.31	4174.01	3182.21	-3180.27	126.28	0.18	3182.78	177.73	404280.33	576897.38	N 32 6 41.02	W 104 13 6.53
	11218.00	89.10	180.02	7351.77	4176.47	3277.17	-3275.23	126.91	1.49	3277.69	177.78	404185.38	576898.01	N 32 6 40.08	W 104 13 6.52
	11312.00	90.17	180.47	7352.37	4177.07	3371.13	-3369.23	126.51	1.23	3371.60	177.85	404091.39	576897.61	N 32 6 39.15	W 104 13 6.53
	11407.00	89.44	179.27	7352.70	4177.40	3466.12	-3464.23	126.73	1.48	3466.54	177.90	403996.40	576897.82	N 32 6 38.21	W 104 13 6.53
	11501.00	90.00	179.29	7353.16	4177.86	3560.11	-3558.22	127.91	0.60	3560.51	177.94	403902.42	576899.00	N 32 6 37.28	W 104 13 6.52
	11596.00	89.33	177.69	7353.71	4178.41	3655.10	-3653.18	130.41	1.83	3655.51	177.96	403807.47	576901.51	N 32 6 36.34	W 104 13 6.49
	11691.00	86.47	176.14	7357.19	4181.89	3749.98	-3747.96	135.52	3.42	3750.41	177.93	403712.69	576906.61	N 32 6 35.40	W 104 13 6.43
	11785.00	85.18	176.83	7364.04	4188.74	3843.65	-3841.54	141.27	1.56	3844.13	177.89	403619.13	576912.36	N 32 6 34.47	W 104 13 6.36
	11879.00	86.92	177.16	7370.51	4195.21	3937.37	-3935.18	146.18	1.88	3937.89	177.87	403525.49	576917.28	N 32 6 33.55	W 104 13 6.31
	11974.00	88.49	178.50	7374.32	4199.02	4032.28	-4030.03	149.77	2.17	4032.81	177.87	403430.65	576920.87	N 32 6 32.61	W 104 13 6.27
	12068.00	89.38	179.02	7376.06	4200.76	4126.26	-4123.99	151.81	1.10	4126.78	177.89	403336.70	576922.90	N 32 6 31.68	W 104 13 6.25
Final SLB MWD Survey	12139.00	89.83	179.35	7376.55	4201.25	4197.26	-4194.98	152.82	0.79	4197.76	177.91	403265.71	576923.91	N 32 6 30.98	W 104 13 6.23
TD, PTB [101' FSL, 673' FWL]	12196.00	89.83	179.35	7376.72	4201.42	4254.25	-4251.98	153.46	0.00	4254.75	177.93	403208.72	576924.56	N 32 6 30.41	W 104 13 6.23

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	12.250	9.625	NAL_MWD_IFR1+MS-Depth Only	Original Borehole / Cimarex Cottonberry 20 Federal 1H MWD 0ft-12196ft MD
	1	26.000	26.000	Act Stns	12.250	9.625	NAL_MWD_IFR1+MS-Depth Only	Original Borehole / Cimarex Cottonberry 20 Federal 1H MWD 0ft-12196ft MD
	1	26.000	12196.000	Act Stns	12.250	9.625	NAL_MWD_IFR1+MS	Original Borehole / Cimarex Cottonberry 20 Federal 1H MWD 0ft-

Schlumberger **Cimarex** Final PvA

Borehole:	Well:	Field:	Structure:
Original Borehole	Cimarex Cottonberry 20 Federal 1H	NM Eddy County (NAD 83)	Cimarex Cottonberry 20 Federal 1H

Gravity & Magnetic Parameters — Model: HDGM 2018 | Dip: 59.789° | Date: 14-Dec-2018 | MagDec: 7.313° | FS: 47648.839nT | Gravity FS: 998.447mgn (9.80665 Based)

Surface Location — NAD83 New Mexico State Plane, Eastern Zone, US Feet — Lat: N 32° 7' 12.48 | Long: W 104° 13' 7.98 | Northing: 402685.519US | Easting: 578771.116US | Grid Conv: 0.0000° | Scale Fact: 0.9999153

Miscellaneous — Slot: Cimarex Cottonberry 20 Federal 1H | Plan: Cimarex Cottonberry 20 Federal 1H MWD 08-121988 MD (Survon Corrected) | TVD Ref: RKB(3175.26 above MSL)

Critical Points

Critical Point	MD	INCL	AZIM	TVD	VSEC	N(+)/S(-)	E(+)/W(-)	DLS
SHL 950' FNL, 609' FWL]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Begin SLB MWD Survey	199.00	1.02	187.00	198.99	1.75	-1.78	-0.22	0.51
Final SLB MWD Survey	12139.00	89.83	179.35	7376.55	4197.26	-4194.98	152.62	0.79
TD: PTB [101' FSL, 673' FWL]	12198.00	89.83	179.35	7376.72	4254.25	-4251.96	153.46	0.00

Grid / True / Mag — Grid North — Tot Corr (M->G 7.252°) — Mag Dec (7.313°) — Grid Conv (0.061°)

CONTROLLED