

Results of Directional Survey

API number:	30-025-40559		
OGRID:		Operator:	CIMAREX ENERGY CO. OF COLORADO
		Property:	CUERVO FEDERAL # 20H

surface	ULSTR:	A	14	T	23S	R	32E
				330	FNL	375	FEL

BH Loc	ULSTR:	P	14	T	23S	R	32E
15212	MD	10927.6	TVD	363	FSL	349	FEL
				4917	FNL		

Top Perf/OH	ULSTR:	A	14	T	23S	R	32E
10910	MD	10843.1	TVD	631	FNL	333	FEL

Bot Perf/OH	ULSTR:	P	14	T	23S	R	32E
15183	MD	10927.4	TVD	392	FSL	349	FEL
				4888	FNL		

	MD	N/S	E/W	VD
	10887	-282.39	42.75	10829.78
TOP PERFS/OH	10910	-301.09	41.65	10843.12
	10918	-307.60	41.27	10847.76
	15112	-4487.05	25.05	10926.92
BOT PERFS/OH	15183	-4558.04	25.54	10927.42
	15212	-4587.04	25.74	10927.62

NEXT TO LAST	15112	-4487.05	25.05	10926.92
LAST READING	15212	-4587.04	25.74	10927.62
TD	15212	-4587.04	25.74	10927.62

Surface Location	330	FN	375	FE
Projected BHL	4917	FN	349	FE
Location of				
Top Perfs/OH	631	FN	333	FE
Bottom Perfs/OH	4888	FN	349	FE

SUMMARY of Subsurface Locations

Surface Location	A-14-23S-32E	330	FN	375	FE	Vert. Depth
Top Perfs/OH	A-14-23S-32E	631	FN	333	FE	10843.12
Bottom Perfs/OH	P-14-23S-32E	4888	FN	349	FE	10927.42
Projected TD	P-14-23S-32E	4917	FN	349	FE	10927.62

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Location: Lea County, NM
Field: (Cuervo) Sec 14, T23S, R32E
Facility: Cuervo Fed No.20

Slot: No. 20 SHL
Well: No. 20
Wellbore: No. 20 PWB

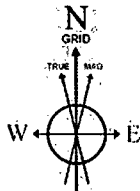
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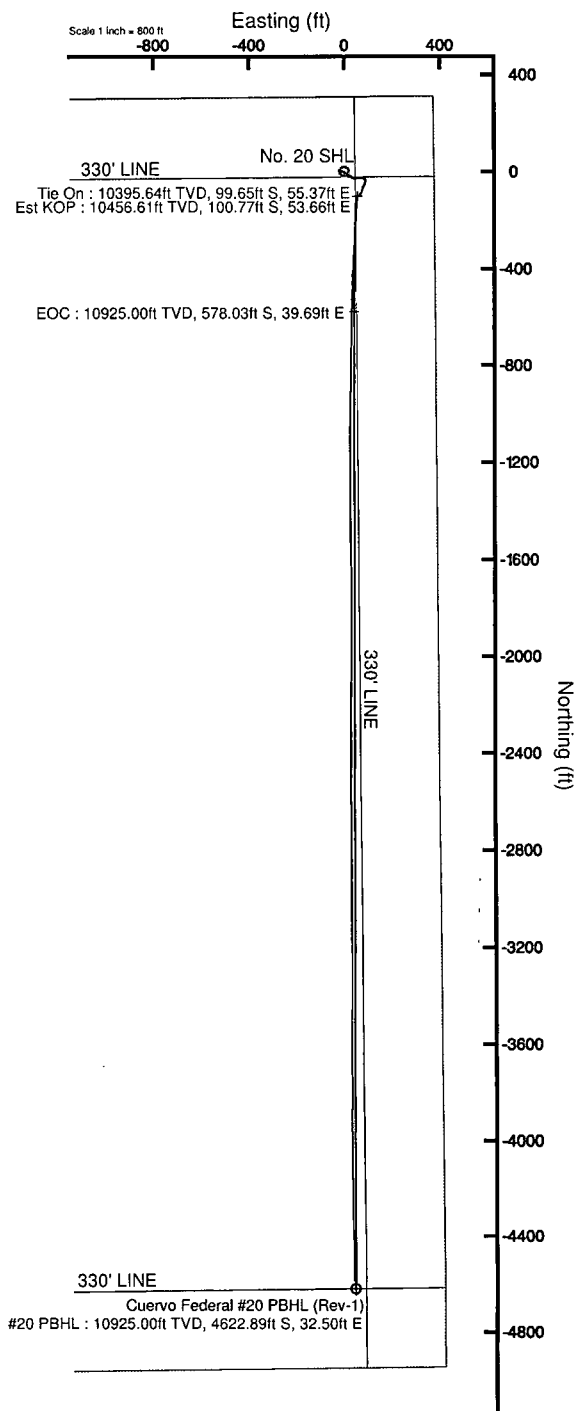
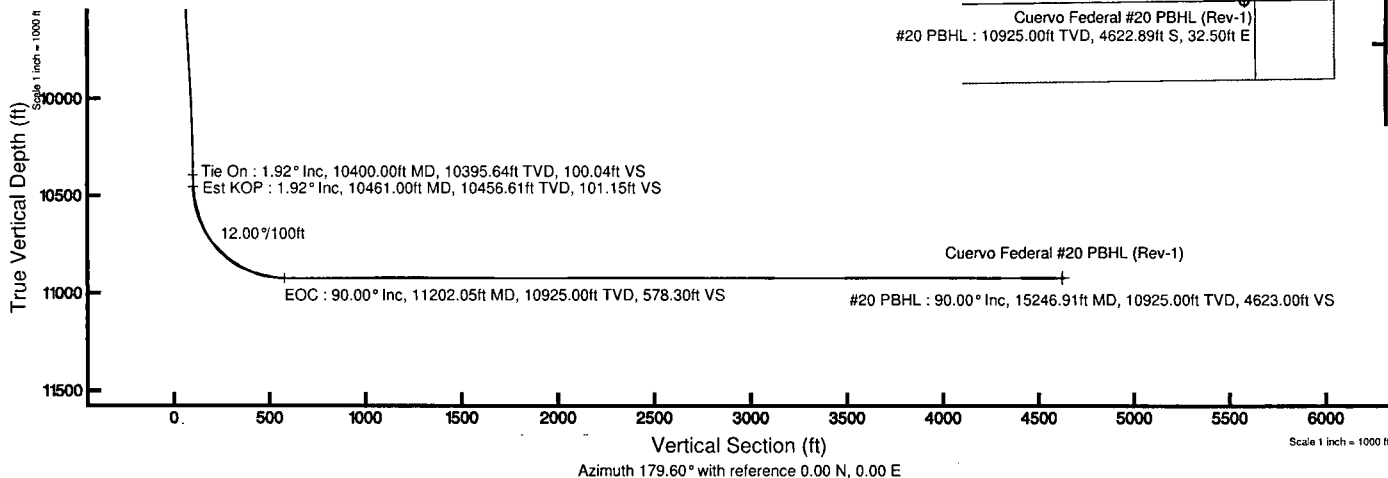
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Well Profile Data								
Design Comment	MD (ft)	Inc (°)	Az (°)	TVD (ft)	Local N (ft)	Local E (ft)	DLS (°/100ft)	VS (ft)
Tie On	10400.00	1.920	236.770	10395.64	-99.65	55.37	0.00	100.04
Est KOP	10461.00	1.920	236.770	10456.61	-100.77	53.66	0.00	101.15
EOC	11202.05	90.000	180.102	10925.00	-578.03	39.69	12.00	578.30
#20 PBHL	15246.91	90.000	180.102	10925.00	-4622.89	32.50	0.00	4623.00

Plot reference wellpath is Rev-B.0	
True vertical depths are referenced to Cactus 115 (RT)	Grid System: NAD83 / TM New Mexico SP, Eastern Zone (3001), US feet
Measured depths are referenced to Cactus 115 (RT)	North Reference: Grid north
Cactus 115 (RT) to Mean Sea Level: 3745 feet	Scale: True distance
Mean Sea Level to Mud line (At Slot: No. 20 SHL): 0 feet	Depths are in feet
Coordinates are in feet referenced to Slot	Created by: harrkot on 8/30/2012



BGGM (1945.0 to 2014.0) Dip: 60.19° Field: 48559.8 nT
Magnetic North is 7.58 degrees East of True North (at 8/27/2012)
Grid North is 0.37 degrees East of True North
To correct azimuth from True to Grid subtract 0.37 degrees
To correct azimuth from Magnetic to Grid add 7.21 degrees
For example: if the Magnetic North Azimuth = 90 degs, then the Grid North Azimuth = 90 + 7.21 = 97.21





Actual Wellpath Report

No. 20 AWP

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REFERENCE WELLPATH IDENTIFICATION			
Operator	Cimarex Energy Co. of Colorado	Slot	No. 20 SHL
Area	Lea County, NM	Well	No. 20
Field	(Cuervo) Sec 14,T23S,R32E	Wellbore	No. 20 AWB
Facility	Cuervo Fed No.20		

REPORT SETUP INFORMATION			
Projection System	NAD83 / TM New Mexico SP, Eastern Zone (3001), US feet	Software System	WellArchitect® 3.0.0
North Reference	Grid	User	Harrkol
Scale	0.999962	Report Generated	9/17/2012 at 10:22:33 AM
Convergence at slot	0.37° East	Database/Source file	WA Midland/No. 20_AWB.xml

WELLPATH LOCATION						
	Local coordinates		Grid coordinates		Geographic coordinates	
	North[ft]	East[ft]	Easting[US ft]	Northing[US ft]	Latitude	Longitude
Slot Location	0.00	0.00	756123.60	477614.20	32°18'40.030"N	103°38'17.152"W
Facility Reference Pt			756123.60	477614.20	32°18'40.030"N	103°38'17.152"W
Field Reference Pt			751577.10	474590.70	32°18'10.401"N	103°39'10.352"W

WELLPATH DATUM			
Calculation method	Minimum curvature	Cactus 115 (RT) to GL	3745.00ft
Horizontal Reference Pt	Slot	Cactus 115 (RT) to Mean Sea Level	3745.00ft
Vertical Reference Pt	Cactus 115 (RT)	Cactus 115 (RT) to Mud Line at Slot (No. 20 SHL)	3745.00ft
MD Reference Pt	Cactus 115 (RT)	Section Origin	N 0.00, E 0.00 ft
Field Vertical Reference	Mean Sea Level	Section Azimuth	179.60°



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Operator	Cimarex Energy Co. of Colorado	Slot	No. 20 SHL
Area	Lea County, NM	Well	No. 20
Field	(Cuervo) Sec 14,T23S,R32E	Wellbore	No. 20 AWP
Facility	Cuervo Fed No.20		

WELLPATH DATA (195 stations)

MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Grid East [US ft]	Grid North [US ft]	Latitude	Longitude	DLS [°/100ft]	Comments
0.00	0.000	231.970	0.00	0.00	0.00	0.00	756123.60	477614.20	32°18'40.030"N	103°38'17.152"W	0.00	
100.00	0.350	231.970	100.00	0.19	-0.19	-0.24	756123.36	477614.01	32°18'40.028"N	103°38'17.155"W	0.35	
200.00	0.230	265.070	200.00	0.39	-0.39	-0.68	756122.92	477613.81	32°18'40.026"N	103°38'17.160"W	0.20	
300.00	0.180	282.640	300.00	0.37	-0.38	-1.03	756122.57	477613.82	32°18'40.026"N	103°38'17.164"W	0.08	
400.00	0.060	281.210	400.00	0.32	-0.33	-1.24	756122.36	477613.87	32°18'40.027"N	103°38'17.166"W	0.12	
500.00	0.180	204.930	500.00	0.45	-0.46	-1.36	756122.24	477613.74	32°18'40.026"N	103°38'17.168"W	0.18	
600.00	0.280	218.690	600.00	0.79	-0.80	-1.58	756122.02	477613.40	32°18'40.022"N	103°38'17.170"W	0.11	
700.00	0.080	231.420	700.00	1.02	-1.03	-1.78	756121.82	477613.17	32°18'40.020"N	103°38'17.173"W	0.20	
800.00	0.240	190.710	800.00	1.27	-1.28	-1.88	756121.72	477612.92	32°18'40.017"N	103°38'17.174"W	0.19	
900.00	0.370	207.690	899.99	1.76	-1.77	-2.07	756121.53	477612.43	32°18'40.013"N	103°38'17.176"W	0.16	
1000.00	0.320	221.790	999.99	2.25	-2.27	-2.40	756121.20	477611.93	32°18'40.008"N	103°38'17.180"W	0.10	
1100.00	0.420	173.500	1099.99	2.82	-2.84	-2.55	756121.05	477611.36	32°18'40.002"N	103°38'17.182"W	0.32	
1200.00	0.600	190.920	1199.99	3.70	-3.72	-2.60	756121.00	477610.48	32°18'39.993"N	103°38'17.183"W	0.24	
1300.00	0.470	184.310	1299.98	4.62	-4.64	-2.73	756120.87	477609.56	32°18'39.984"N	103°38'17.184"W	0.14	
1400.00	0.960	215.560	1399.97	5.71	-5.73	-3.25	756120.35	477608.47	32°18'39.974"N	103°38'17.190"W	0.61	
1500.00	1.050	232.200	1499.96	6.94	-6.97	-4.46	756119.14	477607.23	32°18'39.961"N	103°38'17.204"W	0.30	
1600.00	1.070	228.170	1599.94	8.12	-8.16	-5.88	756117.72	477606.04	32°18'39.950"N	103°38'17.221"W	0.08	
1700.00	0.710	244.630	1699.93	9.00	-9.05	-7.14	756116.46	477605.15	32°18'39.941"N	103°38'17.236"W	0.44	
1800.00	0.790	252.430	1799.92	9.46	-9.52	-8.36	756115.25	477604.68	32°18'39.936"N	103°38'17.250"W	0.13	
1900.00	0.570	289.240	1899.91	9.50	-9.56	-9.48	756114.12	477604.64	32°18'39.936"N	103°38'17.263"W	0.48	
2000.00	0.720	293.570	1999.91	9.07	-9.15	-10.53	756113.07	477605.05	32°18'39.940"N	103°38'17.275"W	0.16	
2100.00	0.560	305.560	2099.90	8.53	-8.61	-11.50	756112.10	477605.59	32°18'39.946"N	103°38'17.287"W	0.21	
2200.00	0.790	303.610	2199.90	7.86	-7.95	-12.47	756111.13	477606.25	32°18'39.952"N	103°38'17.298"W	0.23	
2300.00	0.660	295.440	2299.89	7.22	-7.32	-13.57	756110.03	477606.88	32°18'39.958"N	103°38'17.311"W	0.17	
2400.00	0.650	314.260	2399.88	6.57	-6.68	-14.49	756109.11	477607.52	32°18'39.965"N	103°38'17.321"W	0.21	
2500.00	0.790	302.300	2499.87	5.80	-5.91	-15.48	756108.12	477608.29	32°18'39.973"N	103°38'17.333"W	0.20	
2600.00	0.630	309.860	2599.87	5.07	-5.19	-16.49	756107.11	477609.01	32°18'39.980"N	103°38'17.344"W	0.19	
2700.00	0.890	318.330	2699.86	4.14	-4.26	-17.43	756106.18	477609.94	32°18'39.989"N	103°38'17.355"W	0.28	
2800.00	0.860	308.500	2799.84	3.08	-3.21	-18.53	756105.07	477610.99	32°18'39.999"N	103°38'17.368"W	0.15	
2900.00	0.810	326.270	2899.83	2.02	-2.16	-19.51	756104.09	477612.04	32°18'40.010"N	103°38'17.379"W	0.26	



Actual Wellpath Report

No. 20 AWP

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REFERENCE WELLPATH IDENTIFICATION			
Operator	Cimarex Energy Co. of Colorado	Slot	No. 20 SHL
Area	Lea County, NM	Well	No. 20
Field	(Cuervo) Sec 14,T23S,R32E	Wellbore	No. 20 AWP
Facility	Cuervo Fed No.20		

WELLPATH DATA (195 stations)												
MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Grid East [US ft]	Grid North [US ft]	Latitude	Longitude	DLS [°/100ft]	Comments
3000.00	0.900	319.430	2999.82	0.83	-0.97	-20.41	756103.19	477613.23	32°18'40.022"N	103°38'17.390"W	0.14	
3100.00	0.740	334.940	3099.81	-0.36	0.21	-21.20	756102.40	477614.41	32°18'40.033"N	103°38'17.399"W	0.27	
3200.00	0.870	347.350	3199.80	-1.69	1.54	-21.64	756101.96	477615.74	32°18'40.047"N	103°38'17.404"W	0.22	
3300.00	0.660	1.990	3299.79	-3.01	2.85	-21.78	756101.82	477617.05	32°18'40.060"N	103°38'17.406"W	0.29	
3400.00	0.960	8.880	3399.78	-4.41	4.26	-21.63	756101.97	477618.46	32°18'40.074"N	103°38'17.404"W	0.31	
3500.00	0.930	359.500	3499.77	-6.05	5.89	-21.51	756102.09	477620.09	32°18'40.090"N	103°38'17.402"W	0.16	
3600.00	0.790	10.490	3599.76	-7.53	7.38	-21.39	756102.21	477621.58	32°18'40.104"N	103°38'17.401"W	0.22	
3700.00	0.720	13.700	3699.75	-8.82	8.67	-21.12	756102.48	477622.87	32°18'40.117"N	103°38'17.397"W	0.08	
3800.00	0.270	359.900	3799.75	-9.67	9.52	-20.97	756102.63	477623.72	32°18'40.126"N	103°38'17.396"W	0.46	
3900.00	0.220	47.430	3899.75	-10.03	9.88	-20.83	756102.77	477624.08	32°18'40.129"N	103°38'17.394"W	0.20	
4000.00	0.280	342.500	3999.75	-10.39	10.25	-20.76	756102.84	477624.45	32°18'40.133"N	103°38'17.393"W	0.27	
4100.00	1.500	120.590	4099.73	-9.95	9.81	-19.71	756103.89	477624.01	32°18'40.128"N	103°38'17.381"W	1.72	
4200.00	3.750	119.770	4199.62	-7.63	7.52	-15.74	756107.86	477621.72	32°18'40.105"N	103°38'17.335"W	2.25	
4300.00	4.050	119.350	4299.39	-4.24	4.17	-9.83	756113.78	477618.37	32°18'40.072"N	103°38'17.266"W	0.30	
4400.00	3.570	123.420	4399.17	-0.75	0.72	-4.15	756119.45	477614.92	32°18'40.037"N	103°38'17.200"W	0.55	
4500.00	4.530	121.220	4498.92	3.05	-3.04	1.83	756125.43	477611.16	32°18'40.000"N	103°38'17.131"W	0.97	
4600.00	4.880	122.390	4598.58	7.43	-7.36	8.80	756132.40	477606.84	32°18'39.957"N	103°38'17.050"W	0.36	
4700.00	4.790	119.190	4698.23	11.79	-11.68	16.03	756139.63	477602.52	32°18'39.913"N	103°38'16.966"W	0.28	
4800.00	3.320	119.930	4797.97	15.32	-15.16	22.19	756145.79	477599.04	32°18'39.879"N	103°38'16.895"W	1.47	
4900.00	2.420	122.700	4897.85	17.93	-17.74	26.47	756150.07	477596.46	32°18'39.853"N	103°38'16.845"W	0.91	
5000.00	1.750	124.600	4997.78	19.96	-19.75	29.51	756153.11	477594.45	32°18'39.833"N	103°38'16.810"W	0.67	
5100.00	1.740	125.920	5097.73	21.73	-21.51	31.99	756155.59	477592.69	32°18'39.815"N	103°38'16.781"W	0.04	
5200.00	1.510	119.270	5197.69	23.29	-23.05	34.37	756157.97	477591.16	32°18'39.800"N	103°38'16.753"W	0.30	
5300.00	1.370	120.770	5297.66	24.56	-24.30	36.55	756160.15	477589.90	32°18'39.787"N	103°38'16.728"W	0.14	
5400.00	1.460	105.050	5397.63	25.52	-25.24	38.81	756162.41	477588.96	32°18'39.778"N	103°38'16.702"W	0.40	
5500.00	1.360	91.070	5497.60	25.89	-25.60	41.22	756164.82	477588.60	32°18'39.774"N	103°38'16.674"W	0.36	
5600.00	1.670	83.470	5597.57	25.76	-25.45	43.86	756167.46	477588.75	32°18'39.775"N	103°38'16.643"W	0.37	
5700.00	1.500	80.230	5697.53	25.39	-25.06	46.60	756170.19	477589.14	32°18'39.779"N	103°38'16.611"W	0.19	
5800.00	1.620	85.190	5797.49	25.07	-24.72	49.29	756172.89	477589.48	32°18'39.782"N	103°38'16.579"W	0.18	
5900.00	1.340	77.600	5897.46	24.72	-24.35	51.84	756175.44	477589.85	32°18'39.786"N	103°38'16.550"W	0.34	



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Area	Lea County, NM	Well	No. 20
Field	(Cuervo) Sec 14,T23S,R32E	Wellbore	No. 20 AWP
Facility	Cuervo Fed No.20		

WELLPATH DATA (195 stations)												
MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Grid East [US ft]	Grid North [US ft]	Latitude	Longitude	DLS [°/100ft]	Comments
6000.00	1.140	82.610	5997.44	24.35	-23.98	53.97	756177.57	477590.23	32°18'39.789"N	103°38'16.525"W	0.23	
6100.00	1.160	83.680	6097.42	24.13	-23.74	55.97	756179.56	477590.46	32°18'39.792"N	103°38'16.502"W	0.03	
6200.00	0.950	72.840	6197.40	23.79	-23.38	57.76	756181.36	477590.82	32°18'39.795"N	103°38'16.481"W	0.29	
6300.00	1.050	85.010	6297.38	23.47	-23.06	59.47	756183.07	477591.14	32°18'39.798"N	103°38'16.461"W	0.23	
6400.00	1.050	76.750	6397.37	23.20	-22.77	61.27	756184.87	477591.43	32°18'39.801"N	103°38'16.440"W	0.15	
6500.00	0.790	86.290	6497.35	22.95	-22.51	62.85	756186.45	477591.69	32°18'39.803"N	103°38'16.421"W	0.30	
6600.00	1.020	82.130	6597.34	22.80	-22.35	64.42	756188.02	477591.86	32°18'39.805"N	103°38'16.403"W	0.24	
6700.00	0.800	76.420	6697.33	22.52	-22.06	65.98	756189.58	477592.14	32°18'39.808"N	103°38'16.385"W	0.24	
6800.00	0.830	88.250	6797.32	22.35	-21.87	67.39	756190.98	477592.33	32°18'39.809"N	103°38'16.368"W	0.17	
6900.00	1.160	100.110	6897.30	22.51	-22.03	69.11	756192.70	477592.17	32°18'39.808"N	103°38'16.348"W	0.39	
7000.00	1.000	97.050	6997.29	22.81	-22.31	70.97	756194.57	477591.89	32°18'39.805"N	103°38'16.327"W	0.17	
7100.00	1.090	112.700	7097.27	23.30	-22.79	72.71	756196.31	477591.41	32°18'39.800"N	103°38'16.306"W	0.30	
7200.00	1.090	107.140	7197.25	23.96	-23.44	74.50	756198.10	477590.77	32°18'39.793"N	103°38'16.286"W	0.11	
7300.00	0.990	117.530	7297.23	24.65	-24.11	76.17	756199.77	477590.09	32°18'39.787"N	103°38'16.266"W	0.21	
7400.00	1.190	118.190	7397.22	25.55	-25.00	77.85	756201.45	477589.20	32°18'39.778"N	103°38'16.247"W	0.20	
7500.00	1.040	115.890	7497.20	26.45	-25.89	79.59	756203.18	477588.31	32°18'39.769"N	103°38'16.227"W	0.16	
7600.00	1.420	130.870	7597.17	27.67	-27.10	81.34	756204.94	477587.10	32°18'39.757"N	103°38'16.206"W	0.49	
7700.00	1.450	125.170	7697.14	29.22	-28.64	83.31	756206.91	477585.56	32°18'39.741"N	103°38'16.183"W	0.15	
7800.00	1.140	133.060	7797.12	30.64	-30.05	85.07	756208.67	477584.16	32°18'39.727"N	103°38'16.163"W	0.36	
7900.00	1.240	144.670	7897.10	32.21	-31.61	86.42	756210.02	477582.59	32°18'39.712"N	103°38'16.147"W	0.26	
8000.00	0.980	149.920	7997.08	33.84	-33.23	87.48	756211.08	477580.97	32°18'39.696"N	103°38'16.135"W	0.28	
8100.00	0.690	167.350	8097.07	35.18	-34.56	88.04	756211.64	477579.64	32°18'39.682"N	103°38'16.129"W	0.38	
8200.00	0.750	173.290	8197.06	36.42	-35.80	88.25	756211.84	477578.41	32°18'39.670"N	103°38'16.126"W	0.10	
8300.00	0.660	185.230	8297.05	37.64	-37.02	88.27	756211.87	477577.18	32°18'39.658"N	103°38'16.126"W	0.17	
8400.00	1.000	197.890	8397.04	39.04	-38.42	87.95	756211.55	477575.78	32°18'39.644"N	103°38'16.130"W	0.38	
8500.00	1.020	191.960	8497.03	40.74	-40.12	87.50	756211.09	477574.08	32°18'39.627"N	103°38'16.135"W	0.11	
8600.00	1.100	206.320	8597.01	42.47	-41.86	86.89	756210.48	477572.35	32°18'39.610"N	103°38'16.143"W	0.28	
8700.00	1.580	201.370	8696.98	44.60	-44.00	85.96	756209.56	477570.20	32°18'39.589"N	103°38'16.154"W	0.49	
8800.00	1.800	202.260	8796.94	47.33	-46.74	84.86	756208.46	477567.46	32°18'39.562"N	103°38'16.167"W	0.22	
8900.00	1.910	206.200	8896.88	50.27	-49.69	83.53	756207.13	477564.52	32°18'39.533"N	103°38'16.182"W	0.17	



Actual Wellpath Report

No. 20 AWP

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REFERENCE WELLPATH IDENTIFICATION			
Operator	Cimarex Energy Co. of Colorado	Slot	No. 20 SHL
Area	Lea County, NM	Well	No. 20
Field	(Cuervo) Sec 14,T23S,R32E	Wellbore	No. 20 AWB
Facility	Cuervo Fed No.20		

WELLPATH DATA (195 stations)												
MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Grid East [US ft]	Grid North [US ft]	Latitude	Longitude	DLS [°/100ft]	Comments
9000.00	1.710	196.320	8996.84	53.19	-52.61	82.38	756205.97	477561.59	32°18'39.504"N	103°38'16.196"W	0.37	
9100.00	1.450	202.580	9096.80	55.78	-55.21	81.47	756205.07	477558.99	32°18'39.478"N	103°38'16.207"W	0.31	
9200.00	1.520	216.460	9196.76	58.01	-57.45	80.20	756203.80	477556.75	32°18'39.456"N	103°38'16.222"W	0.37	
9300.00	1.810	219.940	9296.72	60.28	-59.73	78.40	756201.99	477554.48	32°18'39.434"N	103°38'16.243"W	0.31	
9400.00	1.870	199.620	9396.67	63.01	-62.47	76.83	756200.43	477551.73	32°18'39.407"N	103°38'16.261"W	0.65	
9500.00	1.520	201.270	9496.63	65.78	-65.25	75.81	756199.40	477548.96	32°18'39.380"N	103°38'16.274"W	0.35	
9600.00	2.490	192.360	9596.56	69.13	-68.60	74.86	756198.46	477545.60	32°18'39.346"N	103°38'16.285"W	1.02	
9700.00	3.480	189.580	9696.43	74.24	-73.72	73.89	756197.49	477540.48	32°18'39.296"N	103°38'16.297"W	1.00	
9800.00	3.000	200.450	9796.27	79.67	-79.16	72.47	756196.07	477535.04	32°18'39.242"N	103°38'16.314"W	0.78	
9900.00	3.000	209.570	9896.13	84.38	-83.89	70.26	756193.86	477530.31	32°18'39.195"N	103°38'16.340"W	0.48	
10000.00	2.990	218.300	9996.00	88.69	-88.21	67.36	756190.95	477525.99	32°18'39.153"N	103°38'16.374"W	0.46	
10100.00	2.650	221.320	10095.88	92.45	-92.00	64.21	756187.81	477522.21	32°18'39.116"N	103°38'16.411"W	0.37	
10200.00	2.300	229.270	10195.78	95.47	-95.04	61.17	756184.76	477519.16	32°18'39.086"N	103°38'16.446"W	0.49	
10300.00	2.140	230.310	10295.71	97.95	-97.54	58.21	756181.81	477516.66	32°18'39.061"N	103°38'16.481"W	0.16	
10400.00	1.920	236.770	10395.64	100.04	-99.65	55.37	756178.97	477514.55	32°18'39.040"N	103°38'16.514"W	0.32	
10481.00	6.700	184.700	10476.41	105.49	-105.11	53.85	756177.45	477509.09	32°18'38.987"N	103°38'16.532"W	7.07	
10508.00	9.000	186.200	10503.16	109.16	-108.78	53.49	756177.09	477505.42	32°18'38.950"N	103°38'16.537"W	8.55	
10539.00	12.000	188.000	10533.63	114.75	-114.39	52.78	756176.38	477499.82	32°18'38.895"N	103°38'16.546"W	9.73	
10571.00	14.800	186.500	10564.76	122.10	-121.74	51.85	756175.45	477492.46	32°18'38.822"N	103°38'16.557"W	8.82	
10601.00	17.200	185.400	10593.60	130.32	-129.97	51.00	756174.60	477484.24	32°18'38.741"N	103°38'16.568"W	8.06	
10632.00	20.000	183.800	10622.97	140.17	-139.82	50.22	756173.82	477474.38	32°18'38.643"N	103°38'16.577"W	9.18	
10664.00	22.900	183.300	10652.76	151.84	-151.50	49.50	756173.10	477462.71	32°18'38.528"N	103°38'16.587"W	9.08	
10696.00	25.800	184.300	10681.91	165.00	-164.66	48.62	756172.22	477449.54	32°18'38.398"N	103°38'16.598"W	9.15	
10728.00	29.200	185.000	10710.29	179.72	-179.39	47.42	756171.01	477434.82	32°18'38.252"N	103°38'16.613"W	10.67	
10760.00	33.500	184.900	10737.61	196.29	-195.97	45.98	756169.58	477418.24	32°18'38.088"N	103°38'16.631"W	13.44	
10791.00	38.200	182.800	10762.73	214.39	-214.08	44.78	756168.38	477400.13	32°18'37.909"N	103°38'16.646"W	15.67	
10823.00	43.200	181.600	10786.98	235.23	-234.92	43.99	756167.59	477379.29	32°18'37.703"N	103°38'16.657"W	15.81	
10855.00	48.200	180.700	10809.32	258.11	-257.81	43.54	756167.14	477356.40	32°18'37.476"N	103°38'16.664"W	15.75	
10887.00	52.300	182.900	10829.78	282.69	-282.39	42.75	756166.35	477331.82	32°18'37.233"N	103°38'16.675"W	13.86	
10918.00	56.800	183.800	10847.76	307.88	-307.60	41.27	756164.87	477306.62	32°18'36.984"N	103°38'16.694"W	14.71	



Actual Wellpath Report

No. 20 AWP

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REFERENCE WELLPATH IDENTIFICATION			
Operator	Cimarex Energy Co. of Colorado	Slot	No. 20 SHL
Area	Lea County, NM	Well	No. 20
Field	(Cuervo) Sec 14,T23S,R32E	Wellbore	No. 20 AWP
Facility	Cuervo Fed No.20		

WELLPATH DATA (195 stations)												
MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Grid East [US ft]	Grid North [US ft]	Latitude	Longitude	DLS [°/100ft]	Comments
10950.00	61.500	183.900	10864.16	335.27	-335.00	39.43	756163.03	477279.21	32°18'36.713"N	103°38'16.718"W	14.69	
10982.00	66.100	183.600	10878.29	363.90	-363.64	37.55	756161.15	477250.57	32°18'36.429"N	103°38'16.742"W	14.40	
11013.00	70.900	183.100	10889.65	392.67	-392.43	35.87	756159.47	477221.79	32°18'36.145"N	103°38'16.764"W	15.56	
11043.00	76.000	182.100	10898.19	421.38	-421.15	34.57	756158.17	477193.07	32°18'35.861"N	103°38'16.781"W	17.30	
11075.00	77.900	182.000	10905.41	452.52	-452.30	33.45	756157.05	477161.92	32°18'35.552"N	103°38'16.796"W	5.95	
11107.00	79.200	181.900	10911.77	483.86	-483.64	32.39	756155.98	477130.58	32°18'35.242"N	103°38'16.811"W	4.07	
11138.00	81.100	182.200	10917.07	514.37	-514.16	31.29	756154.89	477100.06	32°18'34.940"N	103°38'16.826"W	6.20	
11170.00	83.000	181.800	10921.50	546.04	-545.84	30.19	756153.79	477068.39	32°18'34.627"N	103°38'16.841"W	6.07	
11202.00	84.800	180.800	10924.90	577.84	-577.65	29.47	756153.06	477036.58	32°18'34.312"N	103°38'16.852"W	6.43	
11234.00	87.100	180.500	10927.16	609.75	-609.56	29.10	756152.70	477004.66	32°18'33.997"N	103°38'16.859"W	7.25	
11265.00	88.800	180.900	10928.26	640.72	-640.54	28.72	756152.32	476973.69	32°18'33.690"N	103°38'16.866"W	5.63	
11297.00	89.100	181.000	10928.85	672.71	-672.53	28.19	756151.79	476941.70	32°18'33.374"N	103°38'16.874"W	0.99	
11329.00	89.900	181.200	10929.13	704.70	-704.52	27.58	756151.18	476909.71	32°18'33.057"N	103°38'16.884"W	2.58	
11360.00	90.000	181.300	10929.16	735.68	-735.51	26.90	756150.50	476878.72	32°18'32.751"N	103°38'16.894"W	0.46	
11392.00	90.900	181.400	10928.91	767.67	-767.50	26.15	756149.75	476846.73	32°18'32.434"N	103°38'16.905"W	2.83	
11455.00	91.600	180.700	10927.53	830.63	-830.48	25.00	756148.59	476783.76	32°18'31.811"N	103°38'16.923"W	1.57	
11518.00	92.100	180.500	10925.50	893.59	-893.44	24.34	756147.94	476720.80	32°18'31.188"N	103°38'16.936"W	0.85	
11581.00	92.100	180.100	10923.19	956.54	-956.40	24.01	756147.61	476657.84	32°18'30.565"N	103°38'16.945"W	0.63	
11644.00	91.100	181.100	10921.43	1019.51	-1019.37	23.35	756146.95	476594.87	32°18'29.942"N	103°38'16.957"W	2.24	
11708.00	90.400	181.000	10920.59	1083.48	-1083.35	22.17	756145.77	476530.89	32°18'29.309"N	103°38'16.975"W	1.10	
11771.00	90.800	180.700	10919.93	1146.46	-1146.34	21.24	756144.84	476467.91	32°18'28.686"N	103°38'16.991"W	0.79	
11835.00	89.500	180.000	10919.76	1210.45	-1210.34	20.85	756144.45	476403.91	32°18'28.053"N	103°38'17.000"W	2.31	
11898.00	89.200	180.300	10920.48	1273.45	-1273.33	20.68	756144.28	476340.92	32°18'27.429"N	103°38'17.007"W	0.67	
11961.00	89.400	180.000	10921.25	1336.44	-1336.33	20.52	756144.12	476277.93	32°18'26.806"N	103°38'17.014"W	0.57	
12024.00	89.600	179.500	10921.80	1399.44	-1399.32	20.79	756144.39	476214.93	32°18'26.183"N	103°38'17.015"W	0.85	
12088.00	89.400	179.000	10922.36	1463.43	-1463.32	21.63	756145.23	476150.94	32°18'25.549"N	103°38'17.010"W	0.84	
12152.00	89.900	178.800	10922.75	1527.43	-1527.30	22.86	756146.46	476086.96	32°18'24.916"N	103°38'17.001"W	0.84	
12216.00	89.100	179.200	10923.31	1591.42	-1591.29	23.98	756147.58	476022.97	32°18'24.283"N	103°38'16.993"W	1.40	
12280.00	89.300	179.800	10924.20	1655.41	-1655.28	24.54	756148.13	475958.99	32°18'23.650"N	103°38'16.991"W	0.99	
12344.00	89.400	180.000	10924.93	1719.41	-1719.28	24.65	756148.25	475894.99	32°18'23.017"N	103°38'16.995"W	0.35	



Actual Wellpath Report

No. 20 AWP

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REFERENCE WELLPATH IDENTIFICATION

Operator	Cimarex Energy Co. of Colorado	Slot	No. 20 SHL
Area	Lea County, NM	Well	No. 20
Field	(Cuervo) Sec 14,T23S,R32E	Wellbore	No. 20 AWB
Facility	Cuervo Fed No.20		

WELLPATH DATA (195 stations)

MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Grid East [US ft]	Grid North [US ft]	Latitude	Longitude	DLS [°/100ft]	Comments
12408.00	89.700	179.600	10925.43	1783.40	-1783.27	24.87	756148.47	475831.00	32°18'22.383"N	103°38'16.997"W	0.78	
12472.00	90.100	180.000	10925.54	1847.40	-1847.27	25.09	756148.69	475767.00	32°18'21.750"N	103°38'16.999"W	0.88	
12535.00	90.300	179.600	10925.32	1910.40	-1910.27	25.31	756148.91	475704.00	32°18'21.127"N	103°38'17.001"W	0.71	
12597.00	90.400	179.900	10924.94	1972.40	-1972.27	25.58	756149.18	475642.01	32°18'20.513"N	103°38'17.003"W	0.51	
12660.00	90.400	181.400	10924.50	2035.39	-2035.26	24.87	756148.47	475579.02	32°18'19.890"N	103°38'17.016"W	2.38	
12724.00	90.700	181.400	10923.89	2099.35	-2099.24	23.31	756146.91	475515.04	32°18'19.257"N	103°38'17.039"W	0.47	
12787.00	91.200	181.400	10922.84	2162.31	-2162.21	21.77	756145.37	475452.07	32°18'18.634"N	103°38'17.062"W	0.79	
12851.00	90.900	180.500	10921.67	2226.28	-2226.19	20.71	756144.31	475388.10	32°18'18.001"N	103°38'17.079"W	1.48	
12916.00	90.000	179.800	10921.16	2291.28	-2291.19	20.54	756144.14	475323.10	32°18'17.358"N	103°38'17.086"W	1.75	
12979.00	90.100	180.100	10921.11	2354.28	-2354.19	20.59	756144.19	475260.10	32°18'16.734"N	103°38'17.090"W	0.50	
13043.00	90.300	180.000	10920.88	2418.27	-2418.19	20.54	756144.13	475196.11	32°18'16.101"N	103°38'17.095"W	0.35	
13107.00	90.500	180.300	10920.44	2482.27	-2482.19	20.37	756143.97	475132.11	32°18'15.468"N	103°38'17.102"W	0.56	
13171.00	89.200	180.000	10920.60	2546.26	-2546.19	20.20	756143.80	475068.12	32°18'14.835"N	103°38'17.109"W	2.08	
13235.00	89.100	179.800	10921.55	2610.26	-2610.18	20.31	756143.91	475004.13	32°18'14.202"N	103°38'17.113"W	0.35	
13299.00	89.300	179.500	10922.45	2674.25	-2674.17	20.70	756144.30	474940.14	32°18'13.568"N	103°38'17.113"W	0.56	
13363.00	89.600	179.500	10923.06	2738.25	-2738.17	21.26	756144.86	474876.14	32°18'12.935"N	103°38'17.111"W	0.47	
13426.00	89.800	179.700	10923.39	2801.25	-2801.16	21.70	756145.30	474813.15	32°18'12.312"N	103°38'17.111"W	0.45	
13490.00	90.100	179.500	10923.45	2865.25	-2865.16	22.15	756145.75	474749.15	32°18'11.678"N	103°38'17.110"W	0.56	
13553.00	90.100	180.200	10923.34	2928.24	-2928.16	22.31	756145.91	474686.16	32°18'11.055"N	103°38'17.113"W	1.11	
13617.00	89.500	179.600	10923.56	2992.24	-2992.16	22.42	756146.02	474622.16	32°18'10.422"N	103°38'17.117"W	1.33	
13681.00	89.700	180.100	10924.01	3056.24	-3056.16	22.59	756146.19	474558.17	32°18'09.789"N	103°38'17.120"W	0.84	
13744.00	89.700	179.900	10924.34	3119.24	-3119.16	22.59	756146.19	474495.17	32°18'09.165"N	103°38'17.124"W	0.32	
13808.00	89.500	179.300	10924.78	3183.24	-3183.15	23.04	756146.64	474431.17	32°18'08.532"N	103°38'17.124"W	0.99	
13872.00	89.500	179.900	10925.34	3247.23	-3247.15	23.49	756147.08	474367.18	32°18'07.899"N	103°38'17.124"W	0.94	
13936.00	90.100	179.700	10925.56	3311.23	-3311.15	23.71	756147.31	474303.19	32°18'07.265"N	103°38'17.126"W	0.99	
14000.00	90.300	180.500	10925.34	3375.23	-3375.15	23.60	756147.20	474239.19	32°18'06.632"N	103°38'17.132"W	1.29	
14063.00	90.600	180.300	10924.85	3438.22	-3438.14	23.16	756146.76	474176.19	32°18'06.009"N	103°38'17.142"W	0.57	
14127.00	90.700	180.500	10924.12	3502.21	-3502.14	22.71	756146.31	474112.20	32°18'05.376"N	103°38'17.152"W	0.35	
14190.00	91.000	179.900	10923.19	3565.20	-3565.13	22.49	756146.09	474049.21	32°18'04.752"N	103°38'17.159"W	1.06	
14254.00	91.200	180.000	10921.96	3629.19	-3629.12	22.55	756146.15	473985.23	32°18'04.119"N	103°38'17.163"W	0.35	



Actual Wellpath Report

No. 20 AWP

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REFERENCE WELLPATH IDENTIFICATION

Operator	Cimarex Energy Co. of Colorado	Slot	No. 20 SHL
Area	Lea County, NM	Well	No. 20
Field	(Cuervo) Sec 14,T23S,R32E	Wellbore	No. 20 AWB
Facility	Cuervo Fed No.20		

WELLPATH DATA (195 stations)

MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Grid East [US ft]	Grid North [US ft]	Latitude	Longitude	DLS [°/100ft]	Comments
14317.00	90.300	179.700	10921.13	3692.18	-3692.11	22.71	756146.31	473922.24	32°18'03.496"N	103°38'17.166"W	1.51	
14381.00	90.400	179.500	10920.74	3756.18	-3756.11	23.16	756146.76	473858.24	32°18'02.863"N	103°38'17.166"W	0.35	
14444.00	89.900	180.200	10920.58	3819.18	-3819.11	23.32	756146.92	473795.25	32°18'02.239"N	103°38'17.169"W	1.37	
14507.00	90.700	180.800	10920.25	3882.17	-3882.10	22.77	756146.37	473732.25	32°18'01.616"N	103°38'17.180"W	1.59	
14571.00	89.200	180.100	10920.30	3946.16	-3946.10	22.27	756145.87	473668.26	32°18'00.983"N	103°38'17.191"W	2.59	
14635.00	89.100	179.900	10921.25	4010.15	-4010.09	22.27	756145.87	473604.27	32°18'00.350"N	103°38'17.195"W	0.35	
14698.00	89.600	179.900	10921.97	4073.14	-4073.09	22.38	756145.98	473541.28	32°17'59.726"N	103°38'17.199"W	0.79	
14762.00	89.400	179.400	10922.53	4137.14	-4137.08	22.77	756146.37	473477.28	32°17'59.093"N	103°38'17.199"W	0.84	
14826.00	89.400	179.300	10923.20	4201.14	-4201.08	23.50	756147.10	473413.29	32°17'58.460"N	103°38'17.196"W	0.16	
14889.00	89.300	180.000	10923.91	4264.13	-4264.07	23.88	756147.48	473350.30	32°17'57.836"N	103°38'17.196"W	1.12	
14953.00	89.000	179.700	10924.86	4328.13	-4328.06	24.05	756147.65	473286.31	32°17'57.203"N	103°38'17.199"W	0.66	
15017.00	89.200	179.800	10925.86	4392.12	-4392.05	24.33	756147.93	473222.32	32°17'56.570"N	103°38'17.200"W	0.35	
15081.00	89.400	179.400	10926.65	4456.11	-4456.05	24.78	756148.38	473158.33	32°17'55.937"N	103°38'17.200"W	0.70	
15112.00	89.600	179.600	10926.92	4487.11	-4487.05	25.05	756148.65	473127.33	32°17'55.630"N	103°38'17.199"W	0.91	
15212.00	89.600	179.600	10927.62	4587.11	-4587.04	25.74	756149.34	473027.34	32°17'54.640"N	103°38'17.199"W	0.00	Projection to bit



Actual Wellpath Report

No. 20 AWP

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REFERENCE WELLPATH IDENTIFICATION			
Operator	Cimarex Energy Co. of Colorado	Slot	No. 20 SHL
Area	Lea County, NM	Well	No. 20
Field	(Cuervo) Sec 14,T23S,R32E	Wellbore	No. 20 AWB
Facility	Cuervo Fed No.20		

TARGETS									
Name	MD [ft]	TVD [ft]	North [ft]	East [ft]	Grid East [US ft]	Grid North [US ft]	Latitude	Longitude	Shape
Cuervo Federal #20 PBHL (Rev-1)		10925.00	-4622.89	32.50	756156.10	472991.50	32°17'54.285"N	103°38'17.123"W	point
No.20 PBHL		11053.00	-4622.89	32.50	756156.10	472991.50	32°17'54.285"N	103°38'17.123"W	point

WELLPATH COMPOSITION - Ref Wellbore: No. 20 AWB					Ref Wellpath: No. 20 AWP	
Start MD [ft]	End MD [ft]	Positional Uncertainty Model			Log Name/Comment	Wellbore
0.00	10400.00	Generic gyro - northseeking (Standard)			Gyrodata / Gyros <100-10600.08>	No. 20 AWB
10400.00	15112.00	NaviTrak (Standard)			BHI / Navitrak MWD <10481-15112>	No. 20 AWB
15112.00	15212.00	Blind Drilling (std)			Projection to bit	No. 20 AWB