Schlumberger | **Cimarex** | Final PvA | CIMAREX

Borehole:	Well:	Field:	Structure:
Original Borehole	Cimarex Cascade 28 Federal 86H	NM Lea County (NAD 83)	Cimarex Cascade 28 Federal 86H

Gravity & Magnetic Parameters
Model: HDGM 2019 | Dip: 59.702° | Date: 29-Oct-2019
MagDec: 6.6° | FS: 47728.33nT | Gravity FS: 999.437mgn (9.80665 Based)

Surface Location (NAD83 New Mexico State Plane, Eastern Zone, US Feet)
Lat: N 32 6 27.80 | Northing: 403768.32ftUS | Grid Conv: 0.404°
Lon: W 103 34 23.68 | Easting: 779892.71ftUS | Scale Fact: 0.99997253

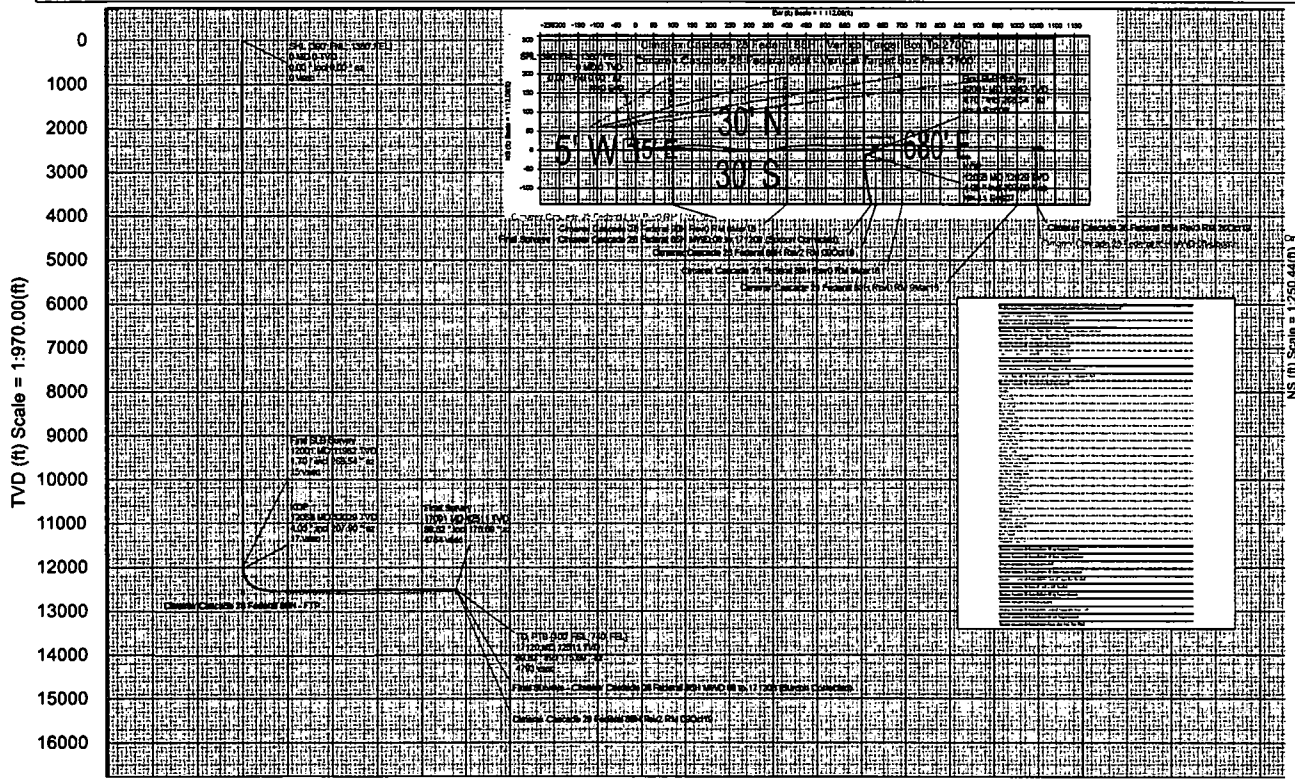
Miscellaneous
Slot: Cimarex Cascade 28 Federal 86H | TVD Ref: RKB(3391.6ft above MSL)
Plan: Final Surveys - Cimarex Cascade 28 Federal 86H MWD OR to 17120ft (Surcon Corrected)

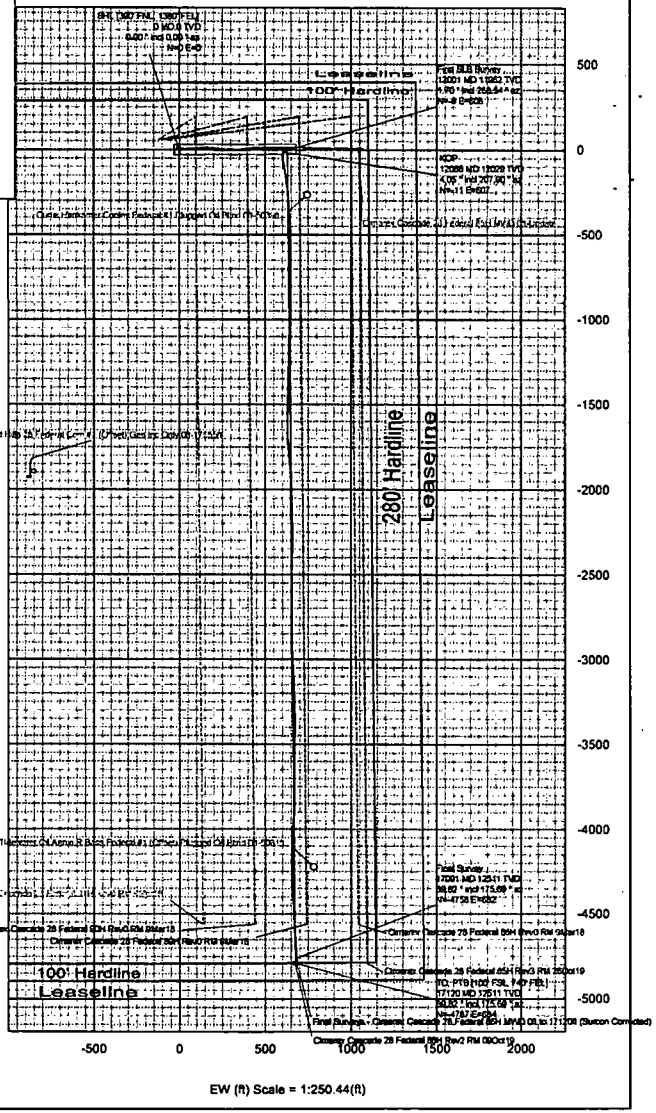
Critical Points

Critical Point	MD	INCL	AZIM	TVD	VSEC	N(+)/S(-)	E(+)/W(-)	DLS
SHL [360' FNL, 1360' FEL]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
First SLS Survey	12001.00	1.70	268.54	11961.76	14.69	-9.36	606.45	0.64
KOP	12068.00	4.05	207.90	12028.70	16.59	-10.98	606.56	9.47
Final Survey	17091.00	89.82	175.69	12511.39	4763.99	-4757.89	692.07	1.23
TD, PTB [100' FSL, 740' FEL]	17120.00	89.82	175.69	12511.49	4792.93	-4786.80	694.25	0.00

Grid / True / Mag
Grid North
Tot Corr (M->G 6.196°)
Mag Dec (6.600°)
Grid Conv (0.404°)

CONTROLLED





Schlumberger

Final Surveys - Cimarex Cascade 28 Federal 86H MWD 0ft to 17120ft (Surcon Corrected) Survey Geodetic Report

(Def Survey)

CIMAREX

Report Date:	November 20, 2019 - 10:21 AM	**Survey / DLS Computation:**	Minimum Curvature / Lubinski
Client:	Cimarex	**Vertical Section Azimuth:**	179.470 ° (Grid North)
Field:	NM Lea County (NAD 83)	**Vertical Section Origin:**	0.000 ft, 0.000 ft
Structure / Slot:	Cimarex Cascade 28 Federal 86H / Cimarex Cascade 28 Federal 86H	**TVD Reference Datum:**	RKB
Well:	Cimarex Cascade 28 Federal 86H	**TVD Reference Elevation:**	3391.600 ft above MSL
Borehole:	Original Borehole	**Seabed / Ground Elevation:**	3365.600 ft above MSL
UWI / API#:	Unknown / 30-025-46314	**Magnetic Declination:**	6.600 °
Survey Name:	Final Surveys - Cimarex Cascade 28 Federal 86H MWD 0ft to 17120ft (Surcon Corrected)	**Total Gravity Field Strength:**	998.4372mgn (9.80665 Based)
Survey Date:	October 14, 2019	**Gravity Model:**	GARM
Tort / AHD / DDI / ERD Ratio:	219.785 ° / 5531.651 ft / 6.220 / 0.441	**Total Magnetic Field Strength:**	47728.330 nT
Coordinate Reference System:	NAD83 New Mexico State Plane, Eastern Zone, US Feet	**Magnetic Dip Angle:**	59.702 °
Location Lat / Long:	N 32° 6' 27.79806", W 103° 34' 23.68479"	**Declination Date:**	October 28, 2019
Location Grid N/E Y/X:	N 403755.320 ftUS, E 776682.710 ftUS	**Magnetic Declination Model:**	HDGM 2019
CRS Grid Convergence Angle:	0.4040 °	**North Reference:**	Grid North
Grid Scale Factor:	0.99997253	**Grid Convergence Used:**	0.4040 °
Version / Patch:	2.10.782.0	**Total Corr Mag North->Grid North:**	6.1957 °
		Local Coord Referenced To:	Structure Reference Point

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")	Closure Azimuth (°)	Closure (ft)
SHL [390' FNL, 1380' FEL]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	403755.32	776682.71	N 32 6 27.80	W 103 34 23.68	0.00	0.00
	200.00	1.07	333.83	199.99	-1.68	1.68	-0.82	0.54	403757.00	776681.89	N 32 6 27.81	W 103 34 23.69	333.83	1.87
	301.00	1.17	334.53	300.97	-3.47	3.45	-1.68	0.10	403758.77	776681.03	N 32 6 27.83	W 103 34 23.70	334.02	3.84
	484.00	1.12	330.93	483.93	-6.73	6.70	-3.36	0.05	403762.02	776679.35	N 32 6 27.86	W 103 34 23.72	333.41	7.50
	667.00	1.17	321.09	666.90	-9.77	9.72	-5.40	0.11	403765.04	776677.31	N 32 6 27.89	W 103 34 23.75	330.96	11.12
	757.00	1.33	307.80	756.87	-11.14	11.08	-6.80	0.37	403766.40	776675.91	N 32 6 27.91	W 103 34 23.76	328.45	13.00
	848.00	1.41	304.46	847.85	-12.43	12.36	-8.56	0.12	403767.68	776674.15	N 32 6 27.92	W 103 34 23.78	325.29	15.03
	933.00	1.50	303.26	932.82	-13.65	13.56	-10.35	0.11	403768.88	776672.36	N 32 6 27.93	W 103 34 23.80	322.64	17.06
	1034.00	1.59	302.56	1033.78	-15.15	15.04	-12.64	0.09	403770.36	776670.07	N 32 6 27.95	W 103 34 23.83	319.96	19.64
	1128.00	1.59	218.57	1127.76	-14.85	14.72	-14.55	2.26	403770.04	776668.16	N 32 6 27.94	W 103 34 23.85	315.33	20.70
	1223.00	2.40	207.24	1222.70	-12.07	11.92	-16.28	0.94	403767.24	776666.43	N 32 6 27.92	W 103 34 23.87	306.21	20.18
	1317.00	0.80	108.02	1316.67	-10.12	9.97	-16.56	2.82	403765.29	776666.15	N 32 6 27.90	W 103 34 23.88	301.05	19.33
	1412.00	1.75	66.20	1411.65	-10.48	10.35	-14.60	1.34	403765.67	776668.11	N 32 6 27.90	W 103 34 23.85	305.33	17.90
	1506.00	1.65	63.07	1505.61	-11.65	11.54	-12.08	0.15	403766.86	776670.63	N 32 6 27.91	W 103 34 23.82	313.69	16.71
	1601.00	1.46	60.59	1600.57	-12.84	12.75	-9.81	0.21	403768.07	776672.90	N 32 6 27.92	W 103 34 23.80	322.44	16.09
	1695.00	1.45	55.17	1694.54	-14.09	14.02	-7.79	0.15	403769.34	776674.92	N 32 6 27.94	W 103 34 23.77	330.95	16.04
	1884.00	1.38	56.05	1883.49	-16.69	16.66	-3.94	0.04	403771.98	776678.77	N 32 6 27.96	W 103 34 23.73	346.70	17.12
	1979.00	1.76	133.77	1978.46	-16.30	16.29	-1.93	2.10	403771.61	776680.78	N 32 6 27.96	W 103 34 23.71	353.23	16.40
	2073.00	1.95	139.26	2072.41	-14.07	14.08	0.15	0.28	403769.40	776682.86	N 32 6 27.94	W 103 34 23.68	0.62	14.08
	2168.00	1.38	193.34	2167.37	-11.73	11.74	0.94	1.68	403767.06	776683.65	N 32 6 27.91	W 103 34 23.67	4.59	11.78
	2262.00	1.31	203.81	2261.35	-9.65	9.65	0.25	0.27	403764.97	776682.96	N 32 6 27.89	W 103 34 23.68	1.47	9.66
	2357.00	1.13	195.52	2356.33	-7.76	7.76	-0.44	0.26	403763.08	776682.27	N 32 6 27.87	W 103 34 23.69	356.75	7.77
	2451.00	1.04	193.74	2450.31	-6.04	6.04	-0.89	0.10	403761.36	776681.82	N 32 6 27.86	W 103 34 23.69	351.60	6.10
	2546.00	0.92	187.56	2545.30	-4.45	4.44	-1.20	0.17	403759.76	776681.51	N 32 6 27.84	W 103 34 23.70	344.92	4.60
	2640.00	0.89	175.36	2639.28	-2.98	2.97	-1.24	0.21	403758.29	776681.47	N 32 6 27.83	W 103 34 23.70	337.37	3.21
	2735.00	2.53	94.93	2734.25	-2.04	2.05	0.91	2.67	403757.37	776683.62	N 32 6 27.82	W 103 34 23.67	23.97	2.25
	2829.00	3.21	92.18	2828.13	-1.72	1.77	5.61	0.74	403757.09	776688.32	N 32 6 27.82	W 103 34 23.62	72.46	5.88
	2923.00	6.40	82.90	2921.79	-2.20	2.32	13.44	3.48	403757.64	776696.15	N 32 6 27.82	W 103 34 23.53	80.20	13.64
	3018.00	6.61	83.22	3016.18	-3.40	3.62	24.12	0.22	403758.94	776706.83	N 32 6 27.83	W 103 34 23.40	81.46	24.39
	3112.00	7.73	85.71	3109.44	-4.40	4.73	35.80	1.24	403760.05	776718.51	N 32 6 27.84	W 103 34 23.27	82.47	36.11
	3207.00	9.40	91.84	3203.38	-4.50	4.96	49.93	2.00	403760.28	776732.64	N 32 6 27.84	W 103 34 23.10	84.33	50.17
	3301.00	8.73	92.55	3296.21	-3.80	4.40	64.73	0.72	403759.72	776747.43	N 32 6 27.84	W 103 34 22.93	86.11	64.88
	3395.00	6.89	89.04	3389.33	-3.46	4.17	77.49	2.02	403759.49	776760.20	N 32 6 27.83	W 103 34 22.78	86.92	77.60
	3584.00	6.76	90.43	3576.99	-3.36	4.28	99.95	0.11	403759.60	776782.66	N 32 6 27.83	W 103 34 22.52	87.55	100.04

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 ° ' ")	Closure Azimuth (°)	Closure (ft)
	3678.00	6.98	89.92	3670.32	-3.22	4.25	111.19	0.24	403759.57	776793.90	N 32 6 27.83	W 103 34 22.39	87.81	111.27
	3867.00	7.01	89.96	3857.91	-3.03	4.27	134.21	0.02	403759.59	776816.92	N 32 6 27.83	W 103 34 22.12	88.18	134.28
	3961.00	7.10	89.26	3951.20	-3.00	4.35	145.75	0.13	403759.67	776828.46	N 32 6 27.83	W 103 34 21.99	88.29	145.82
	4056.00	6.06	94.37	4045.57	-2.60	4.04	156.63	1.26	403759.36	776839.33	N 32 6 27.83	W 103 34 21.86	88.52	156.68
	4150.00	5.76	96.69	4139.07	-1.58	3.12	166.26	0.41	403758.44	776848.96	N 32 6 27.82	W 103 34 21.75	88.93	166.29
	4244.00	7.11	90.17	4232.48	-0.91	2.55	176.76	1.63	403757.87	776859.47	N 32 6 27.81	W 103 34 21.63	89.17	176.78
	4339.00	7.80	91.80	4326.67	-0.58	2.33	189.08	0.76	403757.65	776871.79	N 32 6 27.81	W 103 34 21.49	89.29	189.10
	4433.00	7.90	93.52	4419.79	0.13	1.73	201.91	0.27	403757.05	776884.61	N 32 6 27.80	W 103 34 21.34	89.51	201.91
	4528.00	8.28	97.31	4513.85	1.53	0.46	215.21	0.69	403755.78	776897.91	N 32 6 27.79	W 103 34 21.18	89.88	215.21
	4622.00	7.54	100.69	4606.95	3.65	-1.54	227.98	0.93	403753.78	776910.69	N 32 6 27.77	W 103 34 21.03	90.39	227.99
	4716.00	7.57	91.34	4700.14	5.05	-2.83	240.23	1.31	403752.49	776922.94	N 32 6 27.75	W 103 34 20.89	90.68	240.25
	4811.00	7.58	88.23	4794.31	5.12	-2.79	252.75	0.43	403752.53	776935.45	N 32 6 27.75	W 103 34 20.75	90.63	252.77
	4999.00	7.10	89.06	4980.77	4.77	-2.21	276.76	0.26	403753.11	776959.46	N 32 6 27.76	W 103 34 20.47	90.46	276.77
	5094.00	7.35	90.42	5075.02	4.83	-2.16	288.71	0.32	403753.16	776971.41	N 32 6 27.76	W 103 34 20.33	90.43	288.72
	5189.00	7.60	89.89	5169.21	4.98	-2.19	301.07	0.27	403753.13	776983.77	N 32 6 27.76	W 103 34 20.18	90.42	301.08
	5283.00	7.73	89.43	5262.37	5.02	-2.12	313.61	0.15	403753.20	776996.31	N 32 6 27.76	W 103 34 20.04	90.39	313.61
	5378.00	7.74	88.80	5356.51	4.94	-1.92	326.39	0.09	403753.40	777009.09	N 32 6 27.76	W 103 34 19.89	90.34	326.40
	5472.00	7.81	89.21	5449.64	4.84	-1.70	339.10	0.10	403753.62	777021.80	N 32 6 27.76	W 103 34 19.74	90.29	339.11
	5567.00	7.87	88.94	5543.75	4.75	-1.49	352.06	0.07	403753.83	777034.76	N 32 6 27.76	W 103 34 19.59	90.24	352.06
	5661.00	7.68	83.74	5636.89	4.06	-0.69	364.74	0.77	403754.63	777047.44	N 32 6 27.77	W 103 34 19.44	90.11	364.74
	5756.00	6.67	88.06	5731.15	3.29	0.19	376.56	1.20	403755.51	777059.26	N 32 6 27.77	W 103 34 19.31	89.97	376.56
	5850.00	6.74	88.79	5824.50	3.09	0.49	387.53	0.12	403755.81	777070.23	N 32 6 27.78	W 103 34 19.18	89.93	387.54
	6039.00	6.44	86.78	6012.25	2.46	1.32	409.21	0.20	403756.64	777091.90	N 32 6 27.78	W 103 34 18.93	89.81	409.21
	6133.00	6.43	85.96	6105.66	1.89	1.99	419.72	0.10	403757.31	777102.42	N 32 6 27.79	W 103 34 18.81	89.73	419.72
	6228.00	6.49	84.99	6200.06	1.15	2.83	430.37	0.13	403758.15	777113.07	N 32 6 27.80	W 103 34 18.68	89.62	430.38
	6417.00	7.20	91.35	6387.71	0.70	3.49	452.86	0.55	403758.81	777135.55	N 32 6 27.80	W 103 34 18.42	89.56	452.87
	6511.00	7.36	90.62	6480.96	1.02	3.28	464.77	0.20	403758.60	777147.46	N 32 6 27.80	W 103 34 18.28	89.60	464.78
	6605.00	6.79	91.94	6574.24	1.38	3.03	476.34	0.63	403758.35	777159.04	N 32 6 27.79	W 103 34 18.15	89.64	476.35
	6700.00	6.83	92.16	6668.57	1.88	2.63	487.60	0.05	403757.95	777170.29	N 32 6 27.79	W 103 34 18.02	89.69	487.60
	6794.00	6.79	93.15	6761.91	2.50	2.11	498.73	0.13	403757.43	777181.43	N 32 6 27.78	W 103 34 17.89	89.76	498.74
	6889.00	6.59	92.67	6856.26	3.17	1.55	509.78	0.22	403756.87	777192.48	N 32 6 27.78	W 103 34 17.76	89.83	509.79
	6983.00	6.57	91.70	6949.64	3.68	1.14	520.55	0.12	403756.46	777203.24	N 32 6 27.77	W 103 34 17.63	89.87	520.55
	7078.00	6.57	93.24	7044.02	4.25	0.67	531.41	0.19	403755.99	777214.10	N 32 6 27.77	W 103 34 17.51	89.93	531.41
	7172.00	6.65	87.41	7137.39	4.40	0.61	542.21	0.72	403755.93	777224.91	N 32 6 27.77	W 103 34 17.38	89.94	542.21
	7267.00	6.54	86.77	7231.76	3.95	1.17	553.11	0.14	403756.49	777235.80	N 32 6 27.77	W 103 34 17.25	89.88	553.11
	7361.00	6.64	86.69	7325.14	3.44	1.78	563.88	0.11	403757.10	777246.57	N 32 6 27.78	W 103 34 17.13	89.82	563.88
	7456.00	6.74	88.05	7419.50	3.03	2.29	574.93	0.20	403757.61	777257.63	N 32 6 27.78	W 103 34 17.00	89.77	574.94
	7550.00	6.65	88.23	7512.86	2.78	2.64	585.89	0.10	403757.96	777268.58	N 32 6 27.78	W 103 34 16.87	89.74	585.89
	7645.00	6.25	89.40	7607.25	2.65	2.87	596.56	0.44	403758.19	777279.25	N 32 6 27.78	W 103 34 16.75	89.72	596.56
	7739.00	4.43	92.57	7700.84	2.84	2.76	605.30	1.96	403758.08	777287.99	N 32 6 27.78	W 103 34 16.65	89.74	605.31
	7834.00	3.86	94.32	7795.59	3.31	2.35	612.15	0.61	403757.67	777294.85	N 32 6 27.78	W 103 34 16.57	89.78	612.16
	7929.00	2.76	87.42	7890.43	3.50	2.22	617.63	1.23	403757.53	777300.32	N 32 6 27.78	W 103 34 16.50	89.79	617.63
	8023.00	1.35	49.75	7984.37	2.71	3.03	620.73	2.00	403758.35	777303.43	N 32 6 27.78	W 103 34 16.47	89.72	620.74
	8212.00	1.00	22.61	8173.34	-0.23	5.99	623.07	0.34	403761.31	777305.76	N 32 6 27.81	W 103 34 16.44	89.45	623.10
	8307.00	1.14	19.34	8268.32	-1.88	7.65	623.70	0.16	403762.97	777306.39	N 32 6 27.83	W 103 34 16.43	89.30	623.75
	8402.00	1.06	18.70	8363.30	-3.60	9.37	624.29	0.09	403764.69	777306.99	N 32 6 27.85	W 103 34 16.43	89.14	624.36
	8496.00	0.83	18.53	8457.29	-5.06	10.84	624.79	0.24	403766.16	777307.48	N 32 6 27.86	W 103 34 16.42	89.01	624.88
	8590.00	0.72	23.13	8551.28	-6.25	12.03	625.24	0.13	403767.35	777307.93	N 32 6 27.87	W 103 34 16.42	88.90	625.35
	8685.00	0.62	37.78	8646.27	-7.20	12.99	625.79	0.21	403768.31	777308.48	N 32 6 27.88	W 103 34 16.41	88.81	625.92
	8779.00	0.55	35.45	8740.27	-7.96	13.76	626.36	0.08	403769.08	777309.05	N 32 6 27.89	W 103 34 16.40	88.74	626.51
	8874.00	0.33	26.37	8835.27	-8.58	14.37	626.75	0.24	403769.69	777309.44	N 32 6 27.90	W 103 34 16.40	88.69	626.91
	8968.00	0.12	37.99	8929.27	-8.89	14.69	626.93	0.23	403770.01	777309.62	N 32 6 27.90	W 103 34 16.40	88.66	627.10
	9063.00	0.12	62.93	9024.27	-9.02	14.82	627.08	0.05	403770.14	777309.77	N 32 6 27.90	W 103 34 16.39	88.65	627.25
	9157.00	0.34	219.45	9118.27	-8.85	14.65	626.99	0.48	403769.97	777309.68	N 32 6 27.90	W 103 34 16.39	88.66	627.16
	9252.00	0.52	202.50	9213.26	-8.23	14.03	626.64	0.23	403769.35	777309.33	N 32 6 27.89	W 103 34 16.40	88.72	626.80
	9347.00	0.44	202.73	9308.26	-7.50	13.30	626.34	0.08	403768.62	777309.03	N 32 6 27.89	W 103 34 16.40	88.78	626.48
	9441.00	0.59	179.84	9402.26	-6.69	12.48	626.20	0.27	403767.80	777308.89	N 32 6 27.88	W 103 34 16.40	88.86	626.32
	9536.00	0.49	134.05	9497.25	-5.91	11.71	626.49	0.45	403767.03	777309.18	N 32 6 27.87	W 103 34 16.40	88.93	626.60
	9630.00	0.43	116.00	9591.25	-5.47	11.27	627.10	0.17	403766.59	777309.79	N 32 6 27.87	W 103 34 16.39	88.97	627.20
	9682.00	0.68	85.25	9643.25	-5.41	11.21	627.58	0.73	403766.53	777310.27	N 32 6 27.87	W 103 34 16.39	88.98	627.68
	9724.00	0.88	93.85	9685.24	-5.40	11.21	628.15	0.55	403766.53	777310.84	N 32 6 27.87	W 103 34 16.38	88.98	628.25
	9819.00	1.00	83.66	9780.23	-5.43	11.26	629.70	0.22	403766.57	777312.39	N 32 6 27.87	W 103 34 16.36	88.98	629.80
	9913.00	1.14	84.15	9874.21	-5.60	11.44	631.45	0.15	403766.76	777314.14	N 32 6 27.87	W 103 34 16.34	88.96	631.55
	10008.00	1.02	122.54	9969.20	-5.23	11.08	633.10	0.76	403766.40	777315.79	N 32 6 27.86	W 103 34 16.32	89.00	633.20
	10102.00	1.20	131.39	10063.18	-4.11	9.98	634.55	0.26	403765.30	777317.24	N 32 6 27.85	W 103 34 16.31	89.10	634.62
	10197.00	1.28	123.35	10158.16	-2.86	8.74	636.18	0.20	403764.06	777318.87	N 32 6 27.84	W 103 34 16.29	89.21	636.24
	10291.00	1.16	207.74	10252.14	-1.43	7.32	636.61	1.75	403762.64	777319.30	N 32 6 27.83	W 103 34 16.28	89.34	636.65
	10385.00	1.48	218.52	10346.12	0.35	5.53	635.41	0.43	403760.85	777318.10	N 32 6 27.81	W 103 34 16.30	89.50	635.44

Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLS (°/100ft)	Northing (fUS)	Easting (fUS)	Latitude (N/S ° ' ")	Longitude (E/W ° ' ")	Closure Azimuth (°)	Closure (ft)
	10480.00	1.62	207.40	10441.08	2.49	3.38	634.03	0.35	403758.70	777316.72	N 32 6 27.79	W 103 34 16.31	89.69	634.04
	10575.00	1.31	238.69	10536.05	4.23	1.62	632.49	0.89	403756.94	777315.18	N 32 6 27.77	W 103 34 16.33	89.85	632.49
	10669.00	1.23	231.87	10630.03	5.40	0.44	630.77	0.18	403755.76	777313.47	N 32 6 27.76	W 103 34 16.35	89.96	630.77
	10763.00	1.24	211.97	10724.01	6.87	-1.05	629.44	0.45	403754.27	777312.13	N 32 6 27.74	W 103 34 16.37	90.10	629.44
	10858.00	1.51	208.99	10818.98	8.82	-3.01	628.29	0.29	403752.31	777310.98	N 32 6 27.72	W 103 34 16.38	90.27	628.30
	10952.00	1.39	247.31	10912.95	10.33	-4.54	626.64	1.02	403750.78	777309.33	N 32 6 27.71	W 103 34 16.40	90.41	626.65
	11047.00	1.24	255.82	11007.93	11.01	-5.23	624.58	0.26	403750.09	777307.27	N 32 6 27.70	W 103 34 16.42	90.48	624.60
	11141.00	1.40	224.50	11101.90	12.06	-6.30	622.79	0.78	403749.02	777305.48	N 32 6 27.69	W 103 34 16.45	90.58	622.82
	11236.00	1.14	224.77	11196.88	13.55	-7.80	621.31	0.27	403747.52	777304.00	N 32 6 27.68	W 103 34 16.46	90.72	621.36
	11330.00	0.81	241.28	11290.87	14.52	-8.78	620.07	0.46	403746.54	777302.76	N 32 6 27.67	W 103 34 16.48	90.81	620.13
	11425.00	0.75	257.76	11385.86	14.96	-9.24	618.87	0.24	403746.08	777301.56	N 32 6 27.66	W 103 34 16.49	90.86	618.94
	11520.00	0.86	247.05	11480.85	15.36	-9.65	617.61	0.20	403745.67	777300.30	N 32 6 27.66	W 103 34 16.51	90.89	617.68
	11614.00	0.99	273.79	11574.84	15.57	-9.87	616.15	0.47	403745.45	777298.84	N 32 6 27.66	W 103 34 16.52	90.92	616.23
	11709.00	0.85	276.12	11669.83	15.42	-9.74	614.63	0.15	403745.58	777297.32	N 32 6 27.66	W 103 34 16.54	90.91	614.70
	11803.00	0.98	274.10	11763.81	15.28	-9.61	613.13	0.14	403745.71	777295.82	N 32 6 27.66	W 103 34 16.56	90.90	613.21
	11898.00	1.38	271.76	11858.79	15.17	-9.51	611.18	0.42	403745.81	777293.87	N 32 6 27.66	W 103 34 16.58	90.89	611.25
	11960.00	1.54	275.95	11920.77	15.04	-9.40	609.60	0.31	403745.92	777292.30	N 32 6 27.66	W 103 34 16.60	90.88	609.68
First SLB Survey	12001.00	1.70	268.54	11961.76	14.99	-9.36	608.45	0.64	403745.96	777291.14	N 32 6 27.66	W 103 34 16.61	90.88	608.52
	12033.00	1.70	237.59	11993.74	15.25	-9.63	607.57	2.83	403745.69	777290.26	N 32 6 27.66	W 103 34 16.62	90.91	607.65
	12064.00	3.69	209.62	12024.71	16.35	-10.74	606.69	7.51	403744.58	777289.38	N 32 6 27.65	W 103 34 16.63	91.01	606.79
KOP	*12068.00*	*4.05*	*207.90*	*12028.70*	*16.59*	*-10.98*	*606.56*	*9.47*	*403744.34*	*777289.25*	*N 32 6 27.65*	*W 103 34 16.63*	*91.04*	*606.66*
	12096.00	6.63	201.16	12056.58	18.96	-13.36	605.52	9.47	403741.96	777288.21	N 32 6 27.62	W 103 34 16.65	91.26	605.66
	12127.00	8.76	194.15	12087.30	22.91	-17.32	604.29	7.50	403738.00	777286.98	N 32 6 27.58	W 103 34 16.66	91.64	604.54
	12159.00	11.01	187.89	12118.82	28.29	-22.71	603.28	7.78	403732.61	777285.97	N 32 6 27.53	W 103 34 16.67	92.16	603.70
	12186.00	13.85	184.35	12145.18	34.06	-28.49	602.68	10.89	403726.83	777285.37	N 32 6 27.47	W 103 34 16.68	92.71	603.35
	12217.00	17.15	179.65	12175.05	42.33	-36.76	602.42	11.38	403718.56	777285.12	N 32 6 27.39	W 103 34 16.68	93.49	603.54
	12249.00	20.72	174.33	12205.32	52.69	-47.12	603.01	12.38	403708.21	777285.70	N 32 6 27.29	W 103 34 16.68	94.47	604.85
	12280.00	24.55	172.84	12233.93	64.56	-58.97	604.36	12.49	403696.35	777287.05	N 32 6 27.17	W 103 34 16.66	95.57	607.23
	12312.00	29.11	170.31	12262.48	78.85	-73.24	606.50	14.69	403682.08	777289.19	N 32 6 27.03	W 103 34 16.64	96.89	610.90
	12343.00	33.32	169.43	12288.98	94.69	-89.05	609.33	13.66	403666.27	777292.02	N 32 6 26.87	W 103 34 16.61	98.31	615.80
	12375.00	38.49	169.61	12314.89	113.16	-107.50	612.74	16.16	403647.82	777295.43	N 32 6 26.69	W 103 34 16.57	99.95	622.10
	12406.00	41.70	170.27	12338.60	132.85	-127.16	616.22	10.45	403628.17	777298.92	N 32 6 26.50	W 103 34 16.53	101.66	629.21
	12438.00	45.62	171.04	12361.75	154.68	-148.95	619.80	12.36	403606.37	777302.50	N 32 6 26.28	W 103 34 16.49	103.51	637.45
	12469.00	50.35	171.25	12382.49	177.46	-171.70	623.35	15.27	403583.62	777306.04	N 32 6 26.06	W 103 34 16.45	105.40	646.56
	12501.00	52.02	171.50	12402.55	202.15	-196.36	627.09	5.25	403558.97	777309.78	N 32 6 25.81	W 103 34 16.41	107.39	657.11
	12532.00	55.55	173.70	12420.86	226.97	-221.15	630.30	12.74	403534.17	777312.99	N 32 6 25.57	W 103 34 16.38	109.33	667.97
	12564.00	59.94	176.03	12437.94	253.94	-248.10	632.70	15.04	403507.23	777315.40	N 32 6 25.30	W 103 34 16.35	111.41	679.61
	12595.00	65.23	177.03	12452.21	281.41	-275.56	634.36	17.30	403479.77	777317.05	N 32 6 25.03	W 103 34 16.33	113.48	691.63
	12614.00	68.04	177.32	12459.74	298.84	-292.98	635.22	14.86	403462.35	777317.91	N 32 6 24.85	W 103 34 16.32	114.76	699.53
	12701.00	76.80	177.49	12485.99	381.64	-375.75	638.97	10.07	403379.58	777321.66	N 32 6 24.04	W 103 34 16.29	120.46	741.26
	12733.00	77.40	177.71	12493.14	412.82	-406.91	640.28	1.99	403348.42	777322.97	N 32 6 23.73	W 103 34 16.27	122.44	758.64
	12765.00	77.84	177.65	12500.00	444.06	-438.14	641.54	1.39	403317.19	777324.23	N 32 6 23.42	W 103 34 16.26	124.33	776.88
	12796.00	78.58	178.11	12506.33	474.39	-468.47	642.66	2.79	403286.87	777325.36	N 32 6 23.12	W 103 34 16.25	126.09	795.28
	12828.00	79.36	178.10	12512.46	505.79	-499.86	643.70	2.44	403255.48	777326.39	N 32 6 22.81	W 103 34 16.24	127.83	814.99
	12859.00	79.90	178.14	12518.04	536.28	-530.33	644.70	1.75	403225.00	777327.39	N 32 6 22.51	W 103 34 16.23	129.44	834.80
	12891.00	80.72	178.42	12523.42	567.81	-561.86	645.65	2.70	403193.47	777328.34	N 32 6 22.19	W 103 34 16.22	131.03	855.89
	12923.00	81.61	178.71	12528.34	599.43	-593.47	646.44	2.92	403161.86	777329.13	N 32 6 21.88	W 103 34 16.22	132.55	877.55
	12954.00	83.01	179.13	12532.48	630.15	-624.19	647.02	4.71	403131.15	777329.71	N 32 6 21.58	W 103 34 16.21	133.97	899.03
	12986.00	83.99	179.29	12536.11	661.94	-655.98	647.46	3.10	403099.36	777330.15	N 32 6 21.26	W 103 34 16.21	135.37	921.69
	13017.00	85.67	179.62	12538.90	692.81	-686.85	647.75	5.52	403068.49	777330.44	N 32 6 20.96	W 103 34 16.21	136.68	944.11
	13049.00	87.05	180.11	12540.93	724.75	-718.79	647.83	4.58	403036.56	777330.52	N 32 6 20.64	W 103 34 16.21	137.97	967.64
	13081.00	88.14	180.37	12542.27	756.72	-750.76	647.69	3.50	403004.59	777330.38	N 32 6 20.32	W 103 34 16.22	139.21	991.54
	13112.00	89.64	180.48	12542.88	787.70	-781.75	647.46	4.85	402973.59	777330.15	N 32 6 20.02	W 103 34 16.22	140.37	1015.06
	13176.00	91.39	180.99	12542.30	851.68	-845.74	646.64	2.85	402909.61	777329.33	N 32 6 19.38	W 103 34 16.24	142.60	1064.62
	13271.00	91.11	181.13	12540.23	946.62	-940.70	644.89	0.33	402814.65	777327.58	N 32 6 18.44	W 103 34 16.26	145.57	1140.52
	13366.00	90.92	181.74	12538.54	1041.55	-1035.65	642.51	0.67	402719.70	777325.20	N 32 6 17.51	W 103 34 16.30	148.19	1218.77
	13460.00	91.09	182.01	12536.90	1135.46	-1129.59	639.43	0.34	402625.76	777322.12	N 32 6 16.58	W 103 34 16.34	150.49	1298.02
	13555.00	90.86	181.15	12535.28	1230.38	-1224.54	636.81	0.94	402530.82	777319.50	N 32 6 15.64	W 103 34 16.38	152.52	1380.23
	13649.00	90.77	180.17	12533.94	1324.35	-1318.52	635.73	1.05	402436.84	777318.42	N 32 6 14.71	W 103 34 16.40	154.26	1463.78
	13744.00	90.95	181.33	12532.52	1419.31	-1413.50	634.49	1.24	402341.86	777317.18	N 32 6 13.77	W 103 34 16.42	155.83	1549.37
	13839.00	91.83	181.63	12530.21	1514.22	-1508.44	632.03	0.98	402246.92	777314.73	N 32 6 12.83	W 103 34 16.46	157.27	1635.50
	13934.00	91.91	181.23	12527.11	1609.12	-1603.36	629.66	0.43	402152.01	777312.36	N 32 6 11.89	W 103 34 16.50	158.56	1722.57
	14028.00	90.64	176.72	12525.02	1703.06	-1697.30	631.35	4.98	402058.07	777314.04	N 32 6 10.96	W 103 34 16.48	159.60	1810.91
	14124.00	89.29	172.70	12525.08	1798.71	-1792.86	640.19	4.42	401962.51	777322.89	N 32 6 10.01	W 103 34 16.39	160.35	1903.74
	14219.00	90.52	177.12	12525.24	1893.38	-1887.46	648.62	4.83	401867.91	777331.31	N 32 6 9.08	W 103 34 16.30	161.03	1995.80
	14313.00	90.93	179.64	12524.05	1987.35	-1981.41	651.28	2.72	401773.97	777333.97	N 32 6 8.15	W 103 34 16.28	161.80	2085.70
	14408.00	90.89	178.96	12522.54	2082.34	-2076.39	652.44	0.72	401678.99	777335.13	N 32 6 7.21	W 103 34 16.27	162.56	2176.48

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 ° ' ")	Closure Azimuth (°)	Closure (ft)
	14503.00	90.47	177.55	12521.41	2177.31	-2171.34	655.33	1.55	401584.05	777338.02	N 32 6 6.27	W 103 34 16.24	163.21	2268.08
	14598.00	91.25	180.21	12519.98	2272.28	-2266.30	657.19	2.92	401489.09	777339.88	N 32 6 5.33	W 103 34 16.23	163.83	2359.66
	14692.00	90.97	180.86	12518.16	2366.25	-2360.28	656.31	0.75	401395.11	777339.00	N 32 6 4.40	W 103 34 16.25	164.46	2449.83
	14787.00	91.24	181.64	12516.33	2461.18	-2455.24	654.24	0.87	401300.16	777336.93	N 32 6 3.46	W 103 34 16.28	165.08	2540.91
	14881.00	90.58	179.92	12514.84	2555.14	-2549.21	652.96	1.96	401206.18	777335.65	N 32 6 2.53	W 103 34 16.30	165.63	2631.51
	14976.00	90.44	179.73	12513.99	2650.14	-2644.21	653.25	0.25	401111.19	777335.94	N 32 6 1.59	W 103 34 16.31	166.12	2723.71
	15071.00	90.52	179.75	12513.20	2745.13	-2739.20	653.68	0.09	401016.20	777336.37	N 32 6 0.65	W 103 34 16.31	166.58	2816.12
	15165.00	90.84	180.42	12512.08	2839.12	-2833.20	653.54	0.79	400922.21	777336.23	N 32 5 59.72	W 103 34 16.32	167.01	2907.60
	15260.00	90.41	177.48	12511.04	2934.10	-2928.16	655.28	3.13	400827.24	777337.97	N 32 5 58.78	W 103 34 16.31	167.39	3000.59
	15354.00	89.51	176.78	12511.11	3028.02	-3022.05	659.99	1.21	400733.36	777342.68	N 32 5 57.85	W 103 34 16.26	167.68	3093.27
	15449.00	90.37	177.00	12511.21	3122.92	-3116.90	665.14	0.93	400638.51	777347.83	N 32 5 56.91	W 103 34 16.21	167.95	3187.08
	15543.00	90.11	178.50	12510.82	3216.88	-3210.83	668.83	1.62	400544.59	777351.52	N 32 5 55.98	W 103 34 16.17	168.23	3279.75
	15638.00	89.37	179.18	12511.25	3311.87	-3305.81	670.76	1.06	400449.61	777353.45	N 32 5 55.04	W 103 34 16.16	168.53	3373.17
	15732.00	90.18	180.28	12511.62	3405.87	-3399.80	671.20	1.45	400355.62	777353.89	N 32 5 54.11	W 103 34 16.16	168.83	3465.42
	15826.00	89.97	180.55	12511.49	3499.85	-3493.80	670.52	0.36	400261.62	777353.21	N 32 5 53.18	W 103 34 16.18	169.14	3557.56
	15921.00	91.37	181.61	12510.38	3594.80	-3588.77	668.73	1.85	400166.65	777351.42	N 32 5 52.24	W 103 34 16.21	169.44	3650.55
	16016.00	89.35	178.90	12509.78	3689.78	-3683.76	668.30	3.56	400071.67	777351.00	N 32 5 51.30	W 103 34 16.22	169.72	3743.89
	16111.00	89.35	179.36	12510.86	3784.77	-3778.74	669.75	0.48	399976.69	777352.44	N 32 5 50.36	W 103 34 16.21	169.95	3837.63
	16206.00	91.71	182.30	12509.98	3879.72	-3873.71	668.37	3.97	399881.73	777351.06	N 32 5 49.42	W 103 34 16.23	170.21	3930.95
	16300.00	88.64	182.53	12509.70	3973.59	-3967.61	664.41	3.28	399787.82	777347.10	N 32 5 48.49	W 103 34 16.29	170.49	4022.86
	16395.00	89.67	182.60	12511.10	4068.44	-4062.51	660.16	1.09	399692.93	777342.85	N 32 5 47.55	W 103 34 16.34	170.77	4115.79
	16490.00	90.76	180.22	12510.74	4163.37	-4157.47	657.82	2.76	399597.97	777340.51	N 32 5 46.61	W 103 34 16.38	171.01	4209.19
	16585.00	89.80	178.13	12510.28	4258.37	-4252.45	659.19	2.42	399502.99	777341.88	N 32 5 45.67	W 103 34 16.37	171.19	4303.24
	16680.00	90.02	178.25	12510.43	4353.34	-4347.40	662.19	0.26	399408.05	777344.88	N 32 5 44.73	W 103 34 16.34	171.34	4397.55
	16775.00	89.45	177.70	12510.87	4448.31	-4442.34	665.55	0.83	399313.11	777348.24	N 32 5 43.79	W 103 34 16.31	171.48	4491.92
	16869.00	90.52	177.68	12510.89	4542.26	-4536.26	669.34	1.14	399219.19	777352.03	N 32 5 42.86	W 103 34 16.28	171.61	4585.38
	16964.00	89.62	176.82	12510.77	4637.19	-4631.15	673.89	1.31	399124.30	777356.58	N 32 5 41.93	W 103 34 16.23	171.72	4679.93
	17059.00	89.77	176.08	12511.28	4732.05	-4725.97	679.78	0.79	399029.49	777362.47	N 32 5 40.99	W 103 34 16.17	171.81	4774.61
Final Survey	17091.00	89.82	175.69	12511.39	4763.99	-4757.89	682.07	1.23	398997.57	777364.76	N 32 5 40.67	W 103 34 16.15	171.84	4806.53
TD, PTB [100' FSL, 740' FEL]	17120.00	89.82	175.69	12511.49	4792.93	-4786.80	684.25	0.00	398968.66	777366.94	N 32 5 40.38	W 103 34 16.12	171.86	4835.46

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	14.750	10.750	NAL_MWD_IFR1+MS-Depth Only	Original Borehole / Final Surveys - Cimarex Cascade 28 Federal 86H MWD 0ft to 17120ft (Surcon
	1	26.000	26.000	Act Stns	14.750	10.750	NAL_MWD_IFR1+MS-Depth Only	Original Borehole / Final Surveys - Cimarex Cascade 28 Federal 86H MWD 0ft to 17120ft (Surcon
	1	26.000	1020.000	Act Stns	14.750	10.750	NAL_MWD_IFR1+MS	Original Borehole / Final Surveys - Cimarex Cascade 28 Federal 86H
	1	1020.000	12020.000	Act Stns	9.875	7.625	NAL_MWD_IFR1+MS	Original Borehole / Final Surveys - Cimarex Cascade 28 Federal 86H
	1	12020.000	12670.000	Act Stns	8.750	7.000	NAL_MWD_IFR1+MS	Original Borehole / Final Surveys - Cimarex Cascade 28 Federal 86H
	1	12670.000	17120.000	Act Stns	6.750	4.750	NAL_MWD_IFR1+MS	Original Borehole / Final Surveys - Cimarex Cascade 28 Federal 86H