

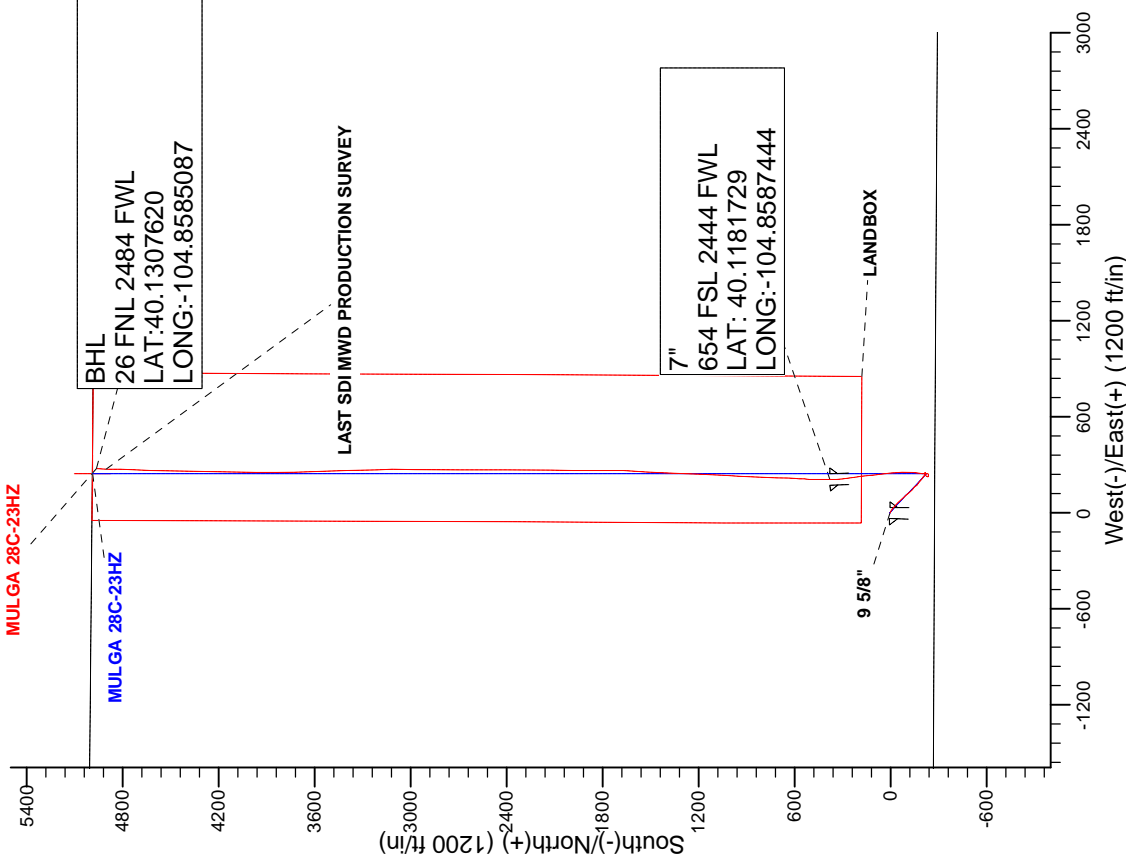
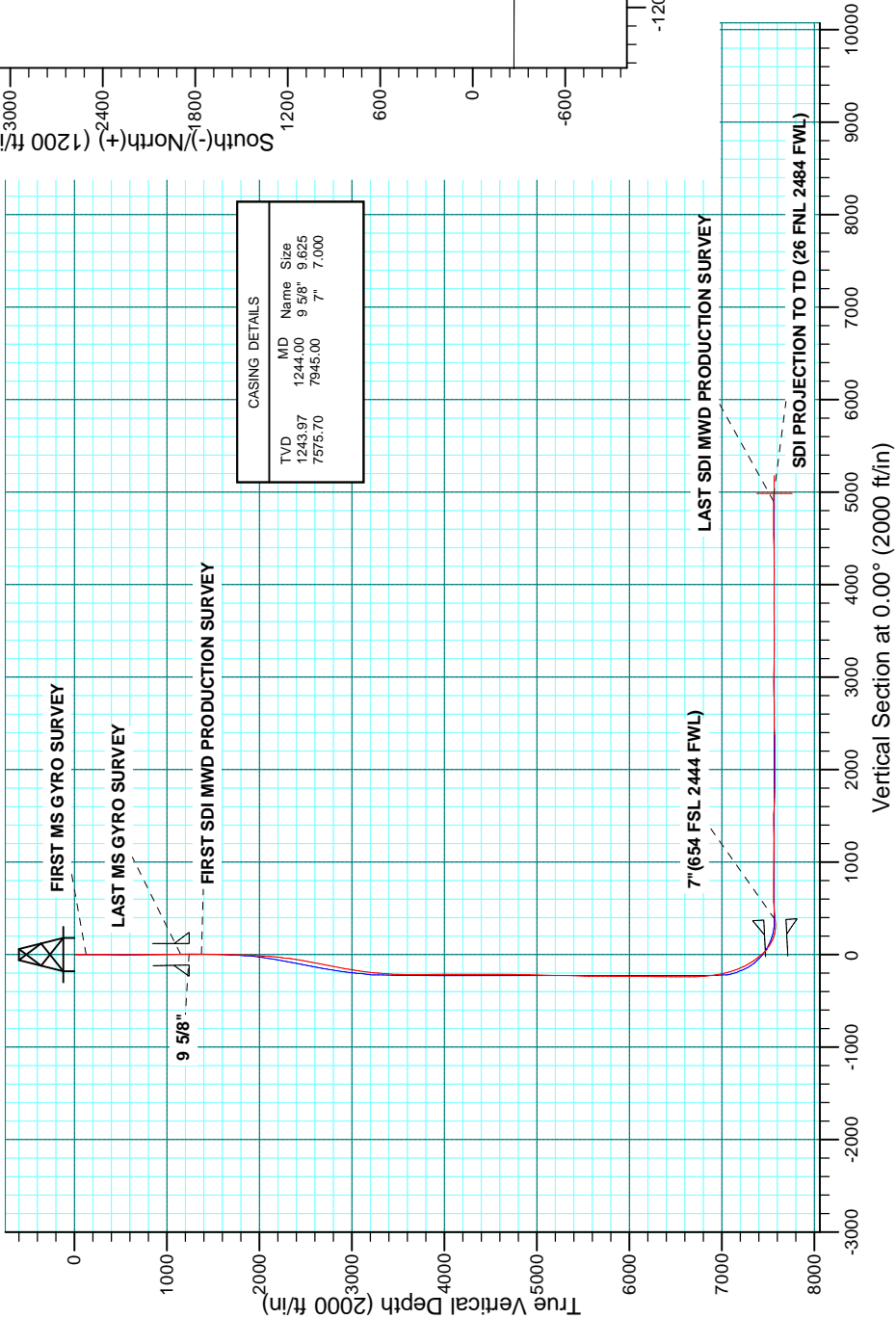


Project: COLORADO NORTHERN ZONE - 83
Site: MULGA 13-23HZ PAD
Well: MULGA 28C-23HZ
Wellbore: OH
Design: OH



WELL DETAILS: MULGA 28C-23HZ				
GL 4947 & KB 25 @ 4972.00ft (HP 311)				
+N/S 0.00	+E/-W 0.00	Northing 1286163.62	Easting 3179131.69	Latitude 40.1171359
				Longitude -104.8594890

PROJECT DETAILS: COLORADO NORTHERN ZONE - 83	
Geodetic System:	US State Plane 1983
Datum:	North American Datum 1983
Ellipsoid:	GRS 1980
Zone:	Colorado Northern Zone
Location:	SECTION 23 T2N R67 W
System Datum:	Mean Sea Level





Scientific Drilling

US ROCKIES REGION PLANNING

COLORADO NORTHERN ZONE - 83

MULGA 13-23HZ PAD

MULGA 28C-23HZ

OH

Design: OH

Standard Survey Report

04 August, 2014

Company:	US ROCKIES REGION PLANNING	Local Co-ordinate Reference:	Well MULGA 28C-23HZ
Project:	COLORADO NORTHERN ZONE - 83	TVD Reference:	GL 4947 & KB 25 @ 4972.00ft (HP 311)
Site:	MULGA 13-23HZ PAD	MD Reference:	GL 4947 & KB 25 @ 4972.00ft (HP 311)
Well:	MULGA 28C-23HZ	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Denver Sales

Project	COLORADO NORTHERN ZONE - 83, KERR MCGEE OIL & GAS ONSHORE LP		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Site		MULGA 13-23HZ PAD, SECTION 23 T2N R67 W			
Site Position:		Northing:	1,286,163.64 usft	Latitude:	40.1171360
From:	Lat/Long	Easting:	3,179,131.69 usft	Longitude:	-104.8594890
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in	Grid Convergence:	0.41 °

Well	MULGA 28C-23HZ, 275 FSL 2237 FWL					
Well Position	+N/-S	0.00 ft	Northing:	1,286,163.62 usft	Latitude:	40.1171360
	+E/-W	0.00 ft	Easting:	3,179,131.69 usft	Longitude:	-104.8594890
Position Uncertainty		0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level:	4,947.00 ft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2013	6/17/2014	8.53	66.69	52,569

Design	OH				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00		0.00

Survey Program	Date	8/4/2014			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
25.00	1,148.00	Survey #1 MS GYRO (OH)	NS-GYRO-MS	North sensing gyrocompassing m/s	
1,374.00	12,534.00	Survey #2 SDI MWD PRODUCTION (OH)	SDI MWD	SDI MWD - Standard ver 1.0.1	

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
25.00	0.00	0.00	25.00	0.00	0.00	0.00	0.00	0.00	0.00	
125.00	0.41	154.74	125.00	-0.32	0.15	-0.32	0.41	0.41	0.00	
FIRST MS GYRO SURVEY										
225.00	0.26	185.73	225.00	-0.87	0.28	-0.87	0.23	-0.15	30.99	
325.00	0.21	307.08	325.00	-0.99	0.11	-0.99	0.41	-0.05	121.35	
425.00	0.55	15.29	425.00	-0.41	0.09	-0.41	0.51	0.34	68.21	
525.00	0.65	14.39	524.99	0.60	0.36	0.60	0.10	0.10	-0.90	
625.00	0.18	42.72	624.99	1.26	0.61	1.26	0.50	-0.47	28.33	
725.00	0.28	310.54	724.99	1.54	0.53	1.54	0.34	0.10	-92.18	

Company:	US ROCKIES REGION PLANNING	Local Co-ordinate Reference:	Well MULGA 28C-23HZ
Project:	COLORADO NORTHERN ZONE - 83	TVD Reference:	GL 4947 & KB 25 @ 4972.00ft (HP 311)
Site:	MULGA 13-23HZ PAD	MD Reference:	GL 4947 & KB 25 @ 4972.00ft (HP 311)
Well:	MULGA 28C-23HZ	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Denver Sales

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
825.00	0.45	315.29	824.98	1.97	0.07	1.97	0.17	0.17	4.75
925.00	0.47	306.95	924.98	2.50	-0.54	2.50	0.07	0.02	-8.34
1,025.00	0.49	326.20	1,024.98	3.10	-1.10	3.10	0.16	0.02	19.25
1,125.00	0.50	353.53	1,124.97	3.89	-1.39	3.89	0.23	0.01	27.33
1,148.00	0.51	358.96	1,147.97	4.09	-1.40	4.09	0.21	0.04	23.61
LAST MS GYRO SURVEY									
1,244.00	0.38	0.42	1,243.97	4.84	-1.41	4.84	0.13	-0.13	1.52
9 5/8"									
1,374.00	0.21	5.21	1,373.97	5.51	-1.38	5.51	0.13	-0.13	3.69
FIRST SDI MWD PRODUCTION SURVEY									
1,557.00	2.23	132.20	1,556.92	3.45	1.29	3.45	1.29	1.10	69.39
1,740.00	2.99	122.40	1,739.73	-1.50	7.95	-1.50	0.48	0.42	-5.36
1,831.00	4.18	123.82	1,830.55	-4.61	12.71	-4.61	1.31	1.31	1.56
2,014.00	5.96	125.32	2,012.83	-13.82	26.01	-13.82	0.98	0.97	0.82
2,106.00	7.32	129.14	2,104.21	-20.28	34.45	-20.28	1.55	1.48	4.15
2,197.00	9.05	128.12	2,194.28	-28.36	44.58	-28.36	1.91	1.90	-1.12
2,289.00	9.82	130.69	2,285.04	-37.94	56.22	-37.94	0.95	0.84	2.79
2,380.00	11.30	138.15	2,374.50	-49.64	68.05	-49.64	2.21	1.63	8.20
2,471.00	13.27	138.90	2,463.41	-64.15	80.87	-64.15	2.17	2.16	0.82
2,563.00	13.32	139.90	2,552.94	-80.22	94.64	-80.22	0.26	0.05	1.09
2,654.00	13.14	138.13	2,641.53	-95.94	108.29	-95.94	0.49	-0.20	-1.95
2,746.00	13.45	136.54	2,731.06	-111.49	122.63	-111.49	0.52	0.34	-1.73
2,837.00	14.92	137.92	2,819.29	-127.87	137.76	-127.87	1.66	1.62	1.52
2,929.00	15.91	136.08	2,907.98	-145.74	154.45	-145.74	1.20	1.08	-2.00
3,023.00	15.93	132.31	2,998.37	-163.71	172.92	-163.71	1.10	0.02	-4.01
3,117.00	12.40	128.81	3,089.50	-178.72	190.33	-178.72	3.86	-3.76	-3.72
3,211.00	11.78	129.53	3,181.42	-191.16	205.60	-191.16	0.68	-0.66	0.77
3,306.00	8.54	125.24	3,274.92	-201.40	218.84	-201.40	3.50	-3.41	-4.52
3,400.00	6.74	118.63	3,368.08	-208.07	229.39	-208.07	2.13	-1.91	-7.03
3,494.00	5.75	112.98	3,461.52	-212.55	238.56	-212.55	1.24	-1.05	-6.01
3,589.00	2.88	102.98	3,556.24	-214.95	245.27	-214.95	3.11	-3.02	-10.53
3,683.00	1.56	86.69	3,650.17	-215.40	248.85	-215.40	1.54	-1.40	-17.33
3,778.00	0.47	213.46	3,745.16	-215.65	249.93	-215.65	1.98	-1.15	133.44
3,872.00	0.45	264.86	3,839.16	-216.01	249.35	-216.01	0.42	-0.02	54.68
4,061.00	0.57	303.05	4,028.15	-215.56	247.82	-215.56	0.19	0.06	20.21
4,249.00	0.90	319.00	4,216.14	-213.94	246.07	-213.94	0.20	0.18	8.48
4,627.00	1.00	220.74	4,594.10	-214.20	241.97	-214.20	0.38	0.03	-25.99
4,721.00	1.07	244.28	4,688.09	-215.20	240.64	-215.20	0.46	0.07	25.04
4,910.00	1.77	231.36	4,877.03	-217.79	236.77	-217.79	0.40	0.37	-6.84
5,004.00	2.90	236.44	4,970.95	-220.01	233.66	-220.01	1.22	1.20	5.40
5,192.00	1.58	219.37	5,158.81	-224.64	228.05	-224.64	0.78	-0.70	-9.08
5,287.00	1.35	201.04	5,253.77	-226.70	226.82	-226.70	0.55	-0.24	-19.29
5,381.00	1.50	191.21	5,347.75	-228.94	226.18	-228.94	0.30	0.16	-10.46
5,475.00	1.14	217.53	5,441.72	-230.89	225.37	-230.89	0.74	-0.38	28.00

Company:	US ROCKIES REGION PLANNING	Local Co-ordinate Reference:	Well MULGA 28C-23HZ
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Site:	MULGA 13-23HZ PAD	MD Reference:	GL 4947 & KB 25 @ 4972.00ft (HP 311)
Well:	MULGA 28C-23HZ	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Denver Sales

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,569.00	1.45	143.81	5,535.70	-232.59	225.50	-232.59	1.67	0.33	-78.43
5,664.00	1.43	142.50	5,630.67	-234.50	226.93	-234.50	0.04	-0.02	-1.38
5,758.00	0.67	102.59	5,724.66	-235.55	228.18	-235.55	1.08	-0.81	-42.46
5,853.00	0.43	88.07	5,819.65	-235.66	229.08	-235.66	0.29	-0.25	-15.28
5,947.00	0.42	36.76	5,913.65	-235.37	229.64	-235.37	0.39	-0.01	-54.59
6,041.00	0.63	16.31	6,007.65	-234.60	229.99	-234.60	0.30	0.22	-21.76
6,136.00	1.42	118.39	6,102.64	-234.66	231.17	-234.66	1.76	0.83	107.45
6,230.00	1.58	119.16	6,196.60	-235.84	233.33	-235.84	0.17	0.17	0.82
6,324.00	0.77	117.04	6,290.58	-236.76	235.03	-236.76	0.86	-0.86	-2.26
6,419.00	0.55	120.82	6,385.58	-237.29	235.99	-237.29	0.24	-0.23	3.98
6,513.00	0.40	106.05	6,479.57	-237.61	236.69	-237.61	0.20	-0.16	-15.71
6,607.00	0.23	348.54	6,573.57	-237.51	236.97	-237.51	0.58	-0.18	-125.01
6,702.00	2.24	67.21	6,668.55	-236.61	238.64	-236.61	2.32	2.12	82.81
6,796.00	1.47	59.82	6,762.50	-235.29	241.38	-235.29	0.86	-0.82	-7.86
6,891.00	4.69	9.35	6,857.36	-230.84	243.06	-230.84	4.13	3.39	-53.13
6,985.00	10.05	359.25	6,950.55	-218.84	243.58	-218.84	5.84	5.70	-10.74
7,079.00	13.62	3.68	7,042.54	-199.59	244.18	-199.59	3.92	3.80	4.71
7,173.00	18.95	4.79	7,132.74	-173.31	246.17	-173.31	5.68	5.67	1.18
7,267.00	24.47	6.76	7,220.04	-138.74	249.74	-138.74	5.92	5.87	2.10
7,362.00	30.26	0.42	7,304.39	-95.22	252.23	-95.22	6.82	6.09	-6.67
7,456.00	38.02	357.54	7,382.14	-42.53	251.16	-42.53	8.43	8.26	-3.06
7,551.00	45.85	353.69	7,452.76	20.68	246.15	20.68	8.67	8.24	-4.05
7,655.00	56.73	353.26	7,517.71	101.18	236.92	101.18	10.47	10.46	-0.41
7,702.00	64.34	353.12	7,540.81	141.79	232.07	141.79	16.19	16.19	-0.30
7,749.00	71.12	353.28	7,558.61	184.95	226.92	184.95	14.43	14.43	0.34
7,796.00	78.67	353.23	7,570.85	229.98	221.60	229.98	16.06	16.06	-0.11
7,843.00	85.80	352.76	7,577.19	276.17	215.92	276.17	15.20	15.17	-1.00
7,873.00	90.40	353.30	7,578.19	305.92	212.28	305.92	15.44	15.33	1.80
7,890.00	91.44	355.39	7,577.92	322.84	210.61	322.84	13.73	6.12	12.29
7,906.00	92.22	357.40	7,577.40	338.80	209.60	338.80	13.47	4.88	12.56
7,945.00	92.79	358.59	7,575.70	377.74	208.24	377.74	3.38	1.47	3.05
7"(654 FSL 2444 FWL)									
8,044.00	94.24	1.61	7,569.63	476.53	208.41	476.53	3.38	1.46	3.05
8,139.00	93.93	4.20	7,562.86	571.16	213.21	571.16	2.74	-0.33	2.73
8,233.00	91.21	2.35	7,558.64	664.90	218.57	664.90	3.50	-2.89	-1.97
8,328.00	90.50	1.49	7,557.22	759.84	221.75	759.84	1.17	-0.75	-0.91
8,422.00	90.14	2.30	7,556.70	853.78	224.86	853.78	0.94	-0.38	0.86
8,516.00	88.45	3.04	7,557.86	947.67	229.24	947.67	1.96	-1.80	0.79
8,611.00	89.22	2.76	7,559.79	1,042.53	234.05	1,042.53	0.86	0.81	-0.29
8,705.00	89.16	2.16	7,561.12	1,136.43	238.08	1,136.43	0.64	-0.06	-0.64
8,799.00	90.57	1.96	7,561.34	1,230.37	241.46	1,230.37	1.52	1.50	-0.21
8,893.00	90.07	2.02	7,560.81	1,324.31	244.72	1,324.31	0.54	-0.53	0.06
8,987.00	89.50	2.73	7,561.17	1,418.23	248.62	1,418.23	0.97	-0.61	0.76

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Site:	MULGA 13-23HZ PAD	MD Reference:	GL 4947 & KB 25 @ 4972.00ft (HP 311)
Well:	MULGA 28C-23HZ	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Denver Sales

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
9,176.00	87.68	3.26	7,565.82	1,606.90	258.49	1,606.90	1.00	-0.96	0.28
9,365.00	88.02	0.84	7,572.91	1,795.64	265.24	1,795.64	1.29	0.18	-1.28
9,459.00	89.60	358.95	7,574.86	1,889.61	265.07	1,889.61	2.62	1.68	-2.01
9,553.00	90.00	359.70	7,575.19	1,983.60	263.96	1,983.60	0.90	0.43	0.80
9,647.00	90.77	0.98	7,574.56	2,077.59	264.52	2,077.59	1.59	0.82	1.36
9,836.00	90.84	0.53	7,571.90	2,266.56	267.01	2,266.56	0.24	0.04	-0.24
9,930.00	91.14	0.59	7,570.28	2,360.54	267.93	2,360.54	0.33	0.32	0.06
10,025.00	91.24	0.52	7,568.30	2,455.51	268.85	2,455.51	0.13	0.11	-0.07
10,119.00	90.44	359.84	7,566.93	2,549.50	269.15	2,549.50	1.12	-0.85	-0.72
10,213.00	91.14	359.54	7,565.63	2,643.49	268.64	2,643.49	0.81	0.74	-0.32
10,307.00	90.34	359.62	7,564.42	2,737.48	267.95	2,737.48	0.86	-0.85	0.09
10,402.00	91.78	359.74	7,562.66	2,832.46	267.42	2,832.46	1.52	1.52	0.13
10,496.00	90.27	1.39	7,560.98	2,926.43	268.35	2,926.43	2.38	-1.61	1.76
10,590.00	88.55	0.43	7,561.95	3,020.41	269.84	3,020.41	2.10	-1.83	-1.02
10,684.00	88.22	0.16	7,564.59	3,114.37	270.32	3,114.37	0.45	-0.35	-0.29
10,779.00	89.43	358.80	7,566.54	3,209.35	269.46	3,209.35	1.92	1.27	-1.43
10,873.00	90.34	357.86	7,566.73	3,303.30	266.72	3,303.30	1.39	0.97	-1.00
10,967.00	90.94	357.80	7,565.68	3,397.23	263.16	3,397.23	0.64	0.64	-0.06
11,062.00	89.76	358.42	7,565.10	3,492.17	260.03	3,492.17	1.40	-1.24	0.65
11,156.00	90.30	358.50	7,565.05	3,586.14	257.50	3,586.14	0.58	0.57	0.09
11,251.00	90.54	357.67	7,564.36	3,681.08	254.33	3,681.08	0.91	0.25	-0.87
11,345.00	90.57	359.38	7,563.44	3,775.04	251.91	3,775.04	1.82	0.03	1.82
11,533.00	89.33	1.18	7,563.61	3,963.03	252.83	3,963.03	1.16	-0.66	0.96
11,722.00	88.96	0.94	7,566.43	4,151.98	256.32	4,151.98	0.23	-0.20	-0.13
11,816.00	89.73	0.55	7,567.50	4,245.96	257.55	4,245.96	0.92	0.82	-0.41
11,910.00	91.11	1.18	7,566.81	4,339.95	258.96	4,339.95	1.61	1.47	0.67
12,005.00	91.38	1.27	7,564.75	4,434.90	260.99	4,434.90	0.30	0.28	0.09
12,099.00	91.21	1.28	7,562.63	4,528.85	263.09	4,528.85	0.18	-0.18	0.01
12,193.00	90.77	1.24	7,561.00	4,622.82	265.15	4,622.82	0.47	-0.47	-0.04
12,287.00	90.77	1.59	7,559.74	4,716.78	267.47	4,716.78	0.37	0.00	0.37
12,382.00	89.60	1.76	7,559.43	4,811.74	270.25	4,811.74	1.24	-1.23	0.18
12,473.00	89.56	1.32	7,560.10	4,902.70	272.70	4,902.70	0.49	-0.04	-0.48
LAST SDI MWD PRODUCTION SURVEY									
12,534.00	89.56	1.32	7,560.57	4,963.68	274.10	4,963.68	0.00	0.00	0.00
SDI PROJECTION TO TD (26 FNL 2484 FWL)									

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (in)	Hole Diameter (in)	
1,244.00	1,243.97	9 5/8"	9.625	13.500	
7,945.00	7,575.70	7"(654 FSL 2444 FWL)	7.000	8.750	

Company:	US ROCKIES REGION PLANNING	Local Co-ordinate Reference:	Well MULGA 28C-23HZ
Project:	COLORADO NORTHERN ZONE - 83	TVD Reference:	GL 4947 & KB 25 @ 4972.00ft (HP 311)
Site:	MULGA 13-23HZ PAD	MD Reference:	GL 4947 & KB 25 @ 4972.00ft (HP 311)
Well:	MULGA 28C-23HZ	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Denver Sales

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
125.00	125.00	-0.32	0.15	FIRST MS GYRO SURVEY
1,148.00	1,147.97	4.09	-1.40	LAST MS GYRO SURVEY
1,374.00	1,373.97	5.51	-1.38	FIRST SDI MWD PRODUCTION SURVEY
12,473.00	7,560.10	4,902.70	272.70	LAST SDI MWD PRODUCTION SURVEY
12,534.00	7,560.57	4,963.68	274.10	SDI PROJECTION TO TD (26 FNL 2484 FWL)

Checked By: _____	Approved By: _____	Date: _____
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