



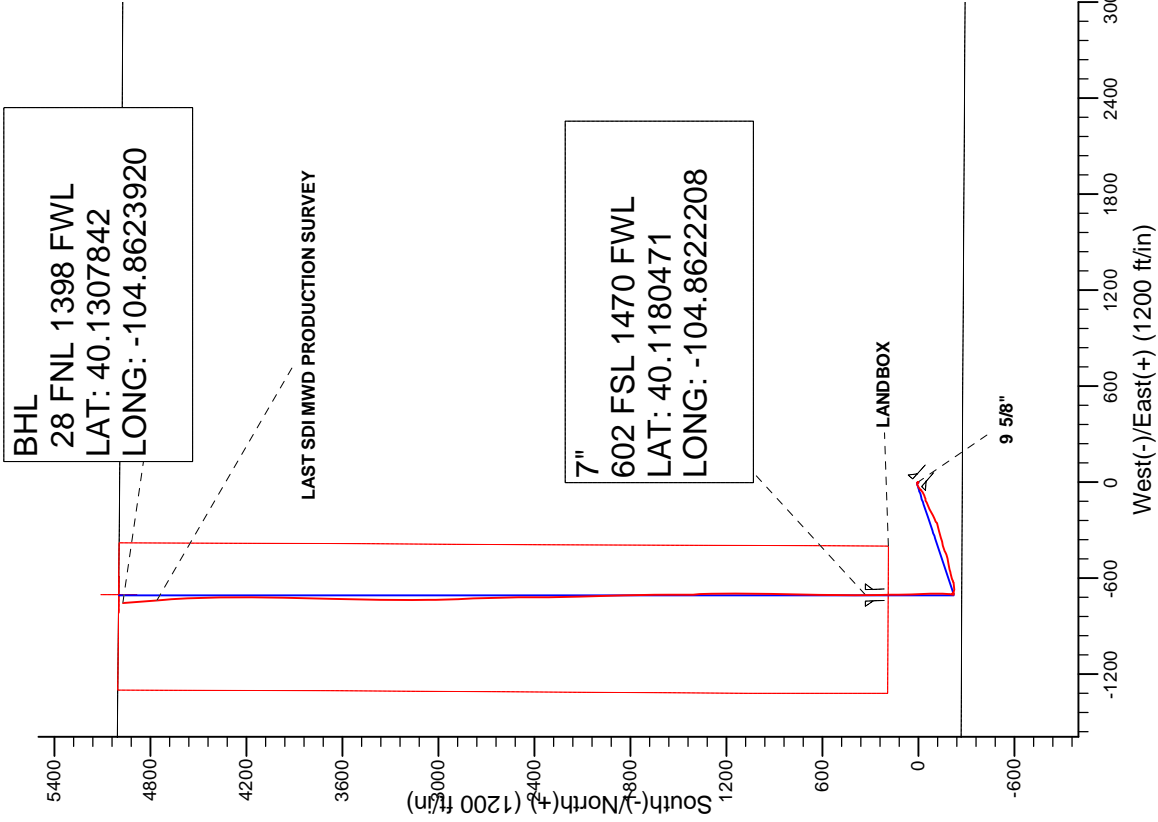
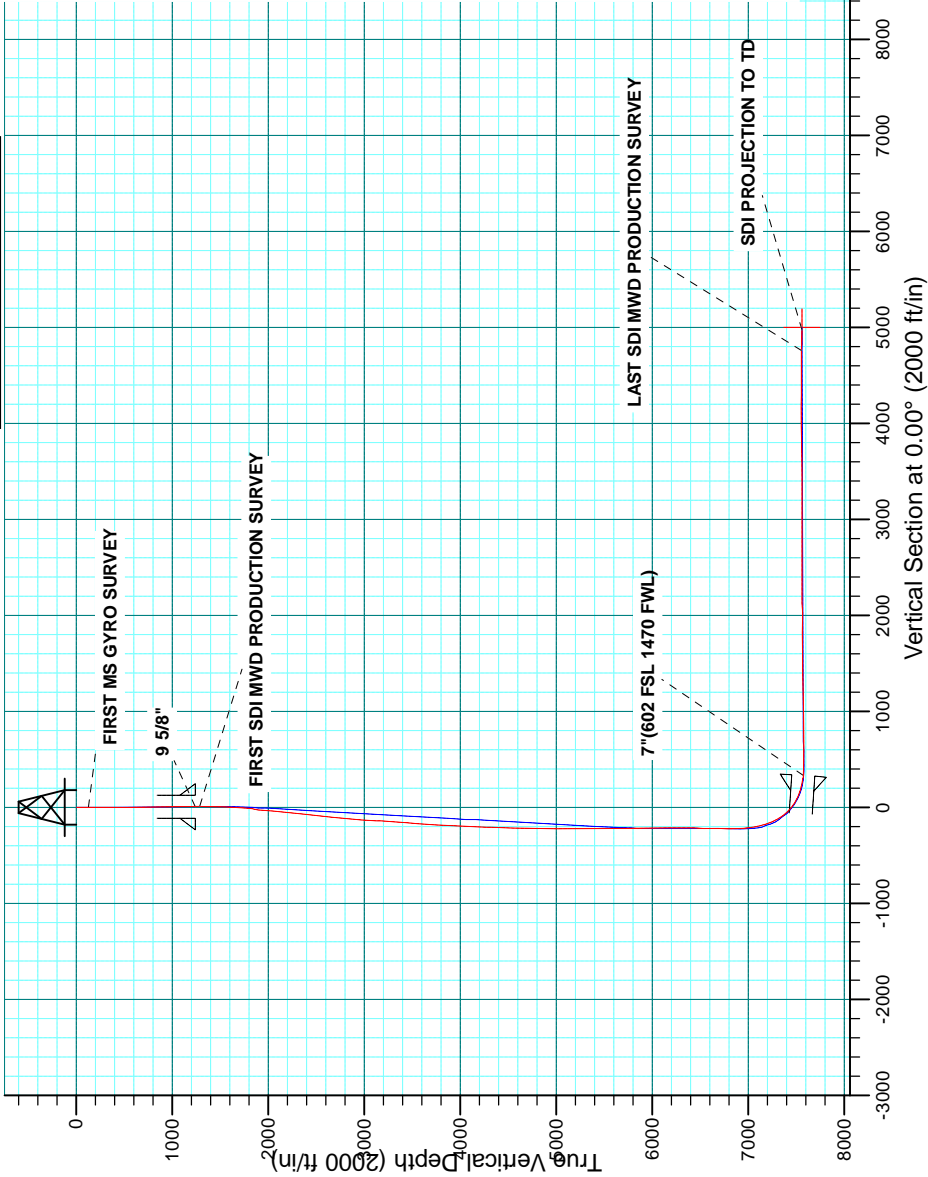
Project: COLORADO NORTHERN ZONE - 83  
Site: MULGA 13-23HZ PAD  
Well: MULGA 29C-23HZ  
Wellbore: OH  
Design: OH



WELL DETAILS: MULGA 29C-23HZ				
GL 4947 & KB 25 @ 4972.00ft (HP 311)				
+N/-S 0.00	+E/-W 0.00	Northing 1286163.18	Easting 3179071.56	Latitude 40.1171359 Longitude -104.8597040

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

CASING DETAILS		
TVD	MD	Name Size
1240.96	1241.00	9 5/8" 9.625
7572.57	7951.00	7" 7.000



Design: OH (MULGA 29C-23HZ/OH)

Created By: R.Scott Date: 16:13, July 15 2014



**Scientific Drilling**

# **US ROCKIES REGION PLANNING**

**COLORADO NORTHERN ZONE - 83**

**MULGA 13-23HZ PAD**

**MULGA 29C-23HZ**

**OH**

**Design: OH**

## **Standard Survey Report**

**15 July, 2014**

<b>Company:</b>	US ROCKIES REGION PLANNING	<b>Local Co-ordinate Reference:</b>	Well MULGA 29C-23HZ
<b>Project:</b>	COLORADO NORTHERN ZONE - 83	<b>TVD Reference:</b>	GL 4947 & KB 25 @ 4972.00ft (HP 311)
<b>Site:</b>	MULGA 13-23HZ PAD	<b>MD Reference:</b>	GL 4947 & KB 25 @ 4972.00ft (HP 311)
<b>Well:</b>	MULGA 29C-23HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	Denver Sales

<b>Project</b>	COLORADO NORTHERN ZONE - 83, KERR MCGEE OIL & GAS ONSHORE LP		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	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 29C-23HZ, 275 FSL 2176 FWL					
Well Position	+N/-S	0.00 ft	Northing:	1,286,163.18 usft	Latitude:	40.1171360
	+E/-W	0.00 ft	Easting:	3,179,071.56 usft	Longitude:	-104.8597040
Position Uncertainty		0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level:	4,947.00 ft

<b>Wellbore</b>	OH				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	BGGM2013	6/17/2014	8.54	66.69	52,569

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

<b>Survey Program</b>	<b>Date</b>	7/15/2014			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
25.00	1,153.00	Survey #1 MS GYRO (OH)	NS-GYRO-MS	North sensing gyrocompassing m/s	
1,286.00	12,593.00	Survey #2 SDI MWD PRODUCTION (OH)	SDI_MWD+CRUST_1.0	SDI MWD + Crustal anomaly, Version 1.0	

<b>Survey</b>										
<b>Measured Depth (ft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Vertical Section (ft)</b>	<b>Dogleg Rate (°/100usft)</b>	<b>Build Rate (°/100usft)</b>	<b>Turn Rate (°/100usft)</b>	
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	0.57	348.80	125.00	0.49	-0.10	0.49	0.57	0.57	0.00	
<b>FIRST MS GYRO SURVEY</b>										
225.00	0.50	22.47	224.99	1.38	-0.03	1.38	0.32	-0.07	33.67	
325.00	0.15	59.44	324.99	1.85	0.25	1.85	0.39	-0.35	36.97	
425.00	0.45	302.74	424.99	2.13	0.04	2.13	0.53	0.30	-116.70	
525.00	0.76	344.40	524.99	2.98	-0.47	2.98	0.52	0.31	41.66	
625.00	0.64	10.74	624.98	4.17	-0.55	4.17	0.34	-0.12	26.34	
725.00	0.21	25.71	724.98	4.88	-0.36	4.88	0.44	-0.43	14.97	

<b>Company:</b>	US ROCKIES REGION PLANNING	<b>Local Co-ordinate Reference:</b>	Well MULGA 29C-23HZ
<b>Project:</b>	COLORADO NORTHERN ZONE - 83	<b>TVD Reference:</b>	GL 4947 & KB 25 @ 4972.00ft (HP 311)
<b>Site:</b>	MULGA 13-23HZ PAD	<b>MD Reference:</b>	GL 4947 & KB 25 @ 4972.00ft (HP 311)
<b>Well:</b>	MULGA 29C-23HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	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	0.26	295.06	824.98	5.14	-0.49	5.14	0.34	0.05	-90.65
925.00	0.71	298.34	924.97	5.53	-1.24	5.53	0.45	0.45	3.28
1,025.00	0.60	333.72	1,024.97	6.30	-2.02	6.30	0.41	-0.11	35.38
1,125.00	0.41	8.66	1,124.96	7.12	-2.20	7.12	0.35	-0.19	34.94
1,153.00	0.45	341.72	1,152.96	7.32	-2.22	7.32	0.73	0.14	-96.21
<b>LAST MS GYRO SURVEY</b>									
1,241.00	0.43	311.50	1,240.96	7.87	-2.57	7.87	0.26	-0.02	-34.34
<b>9 5/8"</b>									
1,286.00	0.47	297.24	1,285.96	8.07	-2.86	8.07	0.26	0.08	-31.70
<b>FIRST SDI MWD PRODUCTION SURVEY</b>									
1,378.00	2.22	265.96	1,377.93	8.11	-4.98	8.11	1.99	1.90	-34.00
1,469.00	4.25	262.29	1,468.78	7.54	-10.08	7.54	2.24	2.23	-4.03
1,561.00	6.52	248.72	1,560.37	5.18	-18.32	5.18	2.81	2.47	-14.75
1,743.00	7.89	224.86	1,740.97	-7.42	-36.77	-7.42	1.79	0.75	-13.11
1,835.00	10.48	230.44	1,831.78	-17.23	-47.68	-17.23	2.97	2.82	6.07
1,926.00	12.28	240.08	1,921.00	-27.33	-62.45	-27.33	2.87	1.98	10.59
2,018.00	13.59	251.01	2,010.68	-35.73	-81.15	-35.73	3.01	1.42	11.88
2,109.00	15.06	252.72	2,098.85	-42.72	-102.55	-42.72	1.68	1.62	1.88
2,201.00	15.44	247.88	2,187.61	-50.88	-125.31	-50.88	1.44	0.41	-5.26
2,383.00	15.14	243.68	2,363.17	-70.54	-169.06	-70.54	0.63	-0.16	-2.31
2,475.00	14.16	240.43	2,452.18	-81.42	-189.61	-81.42	1.39	-1.07	-3.53
2,566.00	12.59	240.60	2,540.71	-91.79	-207.94	-91.79	1.73	-1.73	0.19
2,658.00	13.51	244.58	2,630.34	-101.32	-226.38	-101.32	1.40	1.00	4.33
2,749.00	12.98	243.16	2,718.91	-110.50	-245.10	-110.50	0.68	-0.58	-1.56
2,840.00	12.75	250.87	2,807.64	-118.40	-263.71	-118.40	1.90	-0.25	8.47
2,932.00	13.25	255.39	2,897.28	-124.39	-283.50	-124.39	1.23	0.54	4.91
3,026.00	13.33	255.55	2,988.76	-129.81	-304.42	-129.81	0.09	0.09	0.17
3,121.00	13.96	255.81	3,081.08	-135.35	-326.13	-135.35	0.67	0.66	0.27
3,215.00	14.98	253.48	3,172.10	-141.59	-348.77	-141.59	1.25	1.09	-2.48
3,309.00	14.60	254.90	3,262.99	-148.13	-371.86	-148.13	0.56	-0.40	1.51
3,403.00	14.47	253.87	3,353.98	-154.48	-394.58	-154.48	0.31	-0.14	-1.10
3,498.00	14.74	249.19	3,445.91	-162.07	-417.28	-162.07	1.27	0.28	-4.93
3,592.00	15.20	245.40	3,536.72	-171.45	-439.66	-171.45	1.15	0.49	-4.03
3,781.00	12.66	264.81	3,720.25	-183.64	-482.85	-183.64	2.80	-1.34	10.27
3,875.00	12.25	258.52	3,812.04	-186.56	-502.88	-186.56	1.51	-0.44	-6.69
3,970.00	14.50	257.34	3,904.46	-191.17	-524.36	-191.17	2.39	2.37	-1.24
4,064.00	13.82	259.17	3,995.60	-195.86	-546.87	-195.86	0.87	-0.72	1.95
4,158.00	10.81	251.87	4,087.43	-200.72	-566.28	-200.72	3.60	-3.20	-7.77
4,347.00	9.71	257.31	4,273.41	-209.73	-598.68	-209.73	0.78	-0.58	2.88
4,441.00	6.14	251.07	4,366.50	-213.11	-611.17	-213.11	3.90	-3.80	-6.64
4,630.00	4.07	247.00	4,554.74	-219.01	-626.91	-219.01	1.11	-1.10	-2.15
4,724.00	4.69	267.53	4,648.47	-220.48	-633.82	-220.48	1.78	0.66	21.84
4,819.00	6.04	265.79	4,743.06	-221.01	-642.68	-221.01	1.43	1.42	-1.83
4,913.00	7.60	261.82	4,836.39	-222.26	-653.77	-222.26	1.73	1.66	-4.22

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<b>Site:</b>	MULGA 13-23HZ PAD	<b>MD Reference:</b>	GL 4947 & KB 25 @ 4972.00ft (HP 311)
<b>Well:</b>	MULGA 29C-23HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	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)
5,102.00	4.31	277.99	5,024.35	-223.05	-673.18	-223.05	1.94	-1.74	8.56
5,290.00	2.76	273.12	5,211.99	-221.82	-684.69	-221.82	0.84	-0.82	-2.59
5,384.00	1.82	274.60	5,305.92	-221.58	-688.44	-221.58	1.00	-1.00	1.57
5,478.00	0.93	282.40	5,399.89	-221.29	-690.67	-221.29	0.97	-0.95	8.30
5,667.00	0.50	277.80	5,588.87	-220.85	-692.99	-220.85	0.23	-0.23	-2.43
5,856.00	0.42	59.60	5,777.87	-220.39	-693.21	-220.39	0.46	-0.04	75.03
6,139.00	2.01	351.18	6,060.80	-214.96	-693.08	-214.96	0.67	0.56	-24.18
6,233.00	1.15	229.76	6,154.79	-213.94	-694.05	-213.94	2.97	-0.91	-129.17
6,422.00	0.81	217.67	6,343.76	-216.22	-696.31	-216.22	0.21	-0.18	-6.40
6,516.00	0.81	205.76	6,437.75	-217.35	-697.01	-217.35	0.18	0.00	-12.67
6,611.00	0.71	216.18	6,532.74	-218.43	-697.65	-218.43	0.18	-0.11	10.97
6,705.00	0.82	226.33	6,626.73	-219.36	-698.48	-219.36	0.19	0.12	10.80
6,800.00	0.76	239.28	6,721.72	-220.15	-699.51	-220.15	0.20	-0.06	13.63
6,894.00	0.67	238.70	6,815.72	-220.76	-700.52	-220.76	0.10	-0.10	-0.62
6,988.00	0.77	293.96	6,909.71	-220.79	-701.56	-220.79	0.72	0.11	58.79
7,082.00	7.88	8.93	7,003.40	-214.15	-701.14	-214.15	8.21	7.56	79.76
7,177.00	11.82	5.45	7,096.98	-198.03	-699.20	-198.03	4.19	4.15	-3.66
7,224.00	15.57	6.04	7,142.64	-186.96	-698.08	-186.96	7.98	7.98	1.26
7,271.00	18.19	7.45	7,187.61	-173.41	-696.47	-173.41	5.64	5.57	3.00
7,365.00	26.22	1.66	7,274.58	-138.04	-693.96	-138.04	8.84	8.54	-6.16
7,412.00	31.35	356.77	7,315.76	-115.44	-694.35	-115.44	12.00	10.91	-10.40
7,460.00	34.90	356.78	7,355.96	-89.26	-695.82	-89.26	7.40	7.40	0.02
7,491.00	37.19	357.99	7,381.02	-71.04	-696.65	-71.04	7.74	7.39	3.90
7,554.00	44.72	358.66	7,428.56	-29.79	-697.84	-29.79	11.97	11.95	1.06
7,648.00	59.66	357.53	7,486.03	44.22	-700.37	44.22	15.92	15.89	-1.20
7,695.00	64.25	358.24	7,508.12	85.66	-701.90	85.66	9.86	9.77	1.51
7,742.00	69.21	359.42	7,526.68	128.82	-702.77	128.82	10.80	10.55	2.51
7,789.00	72.74	359.87	7,542.00	173.24	-703.04	173.24	7.56	7.51	0.96
7,837.00	76.32	359.85	7,554.80	219.49	-703.16	219.49	7.46	7.46	-0.04
7,884.00	79.61	359.90	7,564.60	265.45	-703.26	265.45	7.00	7.00	0.11
7,907.00	82.23	359.37	7,568.23	288.16	-703.40	288.16	11.62	11.39	-2.30
7,951.00	86.44	359.40	7,572.57	331.94	-703.87	331.94	9.56	9.56	0.06
7"(602 FSL 1470 FWL)									
7,969.00	88.16	359.41	7,573.42	349.91	-704.06	349.91	9.56	9.56	0.06
8,138.00	88.76	359.97	7,577.96	518.85	-704.97	518.85	0.49	0.36	0.33
8,327.00	91.11	1.68	7,578.18	707.81	-702.25	707.81	1.54	1.24	0.90
8,421.00	90.81	1.18	7,576.60	801.77	-699.91	801.77	0.62	-0.32	-0.53
8,516.00	90.34	0.25	7,575.65	896.75	-698.72	896.75	1.10	-0.49	-0.98
8,610.00	91.88	1.13	7,573.83	990.72	-697.59	990.72	1.89	1.64	0.94
8,704.00	91.45	0.97	7,571.10	1,084.67	-695.87	1,084.67	0.49	-0.46	-0.17
8,798.00	90.84	0.31	7,569.22	1,178.64	-694.82	1,178.64	0.96	-0.65	-0.70
8,893.00	90.37	359.33	7,568.22	1,273.64	-695.12	1,273.64	1.14	-0.49	-1.03
8,987.00	89.33	356.97	7,568.46	1,367.58	-698.15	1,367.58	2.74	-1.11	-2.51

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<b>Site:</b>	MULGA 13-23HZ PAD	<b>MD Reference:</b>	GL 4947 & KB 25 @ 4972.00ft (HP 311)
<b>Well:</b>	MULGA 29C-23HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	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)
9,175.00	91.71	0.28	7,566.76	1,555.48	-702.66	1,555.48	2.17	1.27	1.76
9,270.00	90.74	359.18	7,564.73	1,650.45	-703.11	1,650.45	1.54	-1.02	-1.16
9,364.00	90.24	358.42	7,563.92	1,744.43	-705.08	1,744.43	0.97	-0.53	-0.81
9,647.00	89.63	358.53	7,564.24	2,027.33	-712.61	2,027.33	0.22	-0.22	0.04
9,742.00	91.11	359.12	7,563.63	2,122.30	-714.56	2,122.30	1.68	1.56	0.62
9,930.00	91.31	359.34	7,559.66	2,310.24	-717.08	2,310.24	0.16	0.11	0.12
10,025.00	89.90	359.15	7,558.66	2,405.22	-718.34	2,405.22	1.50	-1.48	-0.20
10,119.00	89.80	358.63	7,558.90	2,499.21	-720.16	2,499.21	0.56	-0.11	-0.55
10,213.00	90.50	359.65	7,558.66	2,593.19	-721.57	2,593.19	1.32	0.74	1.09
10,307.00	90.07	358.62	7,558.19	2,687.18	-722.99	2,687.18	1.19	-0.46	-1.10
10,402.00	90.17	357.75	7,557.99	2,782.13	-726.00	2,782.13	0.92	0.11	-0.92
10,590.00	89.56	358.99	7,558.43	2,970.05	-731.34	2,970.05	0.74	-0.32	0.66
10,685.00	88.83	357.57	7,559.77	3,065.00	-734.19	3,065.00	1.68	-0.77	-1.49
10,779.00	89.23	0.04	7,561.36	3,158.95	-736.15	3,158.95	2.66	0.43	2.63
10,873.00	89.80	0.05	7,562.15	3,252.95	-736.08	3,252.95	0.61	0.61	0.01
11,062.00	90.97	1.26	7,560.88	3,441.93	-733.92	3,441.93	0.89	0.62	0.64
11,156.00	91.17	1.84	7,559.13	3,535.88	-731.38	3,535.88	0.65	0.21	0.62
11,251.00	91.82	1.60	7,556.65	3,630.80	-728.53	3,630.80	0.73	0.68	-0.25
11,345.00	90.98	1.02	7,554.35	3,724.75	-726.38	3,724.75	1.09	-0.89	-0.62
11,533.00	90.07	1.06	7,552.63	3,912.71	-722.97	3,912.71	0.48	-0.48	0.02
11,628.00	89.73	0.82	7,552.80	4,007.69	-721.41	4,007.69	0.44	-0.36	-0.25
11,722.00	89.87	0.40	7,553.13	4,101.69	-720.41	4,101.69	0.47	0.15	-0.45
11,816.00	89.60	0.24	7,553.56	4,195.68	-719.88	4,195.68	0.33	-0.29	-0.17
11,910.00	89.53	359.25	7,554.27	4,289.68	-720.30	4,289.68	1.06	-0.07	-1.05
12,099.00	90.10	358.62	7,554.88	4,478.64	-723.81	4,478.64	0.45	0.30	-0.33
12,193.00	90.13	357.49	7,554.70	4,572.59	-727.00	4,572.59	1.20	0.03	-1.20
12,287.00	89.73	357.21	7,554.81	4,666.49	-731.35	4,666.49	0.52	-0.43	-0.30
12,382.00	89.73	356.02	7,555.26	4,761.32	-736.96	4,761.32	1.25	0.00	-1.25
LAST SDI MWD PRODUCTION SURVEY									
12,593.00	89.73	356.02	7,556.25	4,971.81	-751.60	4,971.81	0.00	0.00	0.00
SDI PROJECTION TO TD									

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (in)	Hole Diameter (in)	
1,241.00	1,240.96	9 5/8"	9.625	13.500	
7,951.00	7,572.57	7"(602 FSL 1470 FWL)	7.000	8.750	

<b>Company:</b>	US ROCKIES REGION PLANNING	<b>Local Co-ordinate Reference:</b>	Well MULGA 29C-23HZ
<b>Project:</b>	COLORADO NORTHERN ZONE - 83	<b>TVD Reference:</b>	GL 4947 & KB 25 @ 4972.00ft (HP 311)
<b>Site:</b>	MULGA 13-23HZ PAD	<b>MD Reference:</b>	GL 4947 & KB 25 @ 4972.00ft (HP 311)
<b>Well:</b>	MULGA 29C-23HZ	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	Denver Sales

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
125.00	125.00	0.49	-0.10	FIRST MS GYRO SURVEY
1,153.00	1,152.96	7.32	-2.22	LAST MS GYRO SURVEY
1,286.00	1,285.96	8.07	-2.86	FIRST SDI MWD PRODUCTION SURVEY
12,382.00	7,555.26	4,761.32	-736.96	LAST SDI MWD PRODUCTION SURVEY
12,593.00	7,556.25	4,971.81	-751.60	SDI PROJECTION TO TD

Checked By: _____	Approved By: _____	Date: _____
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