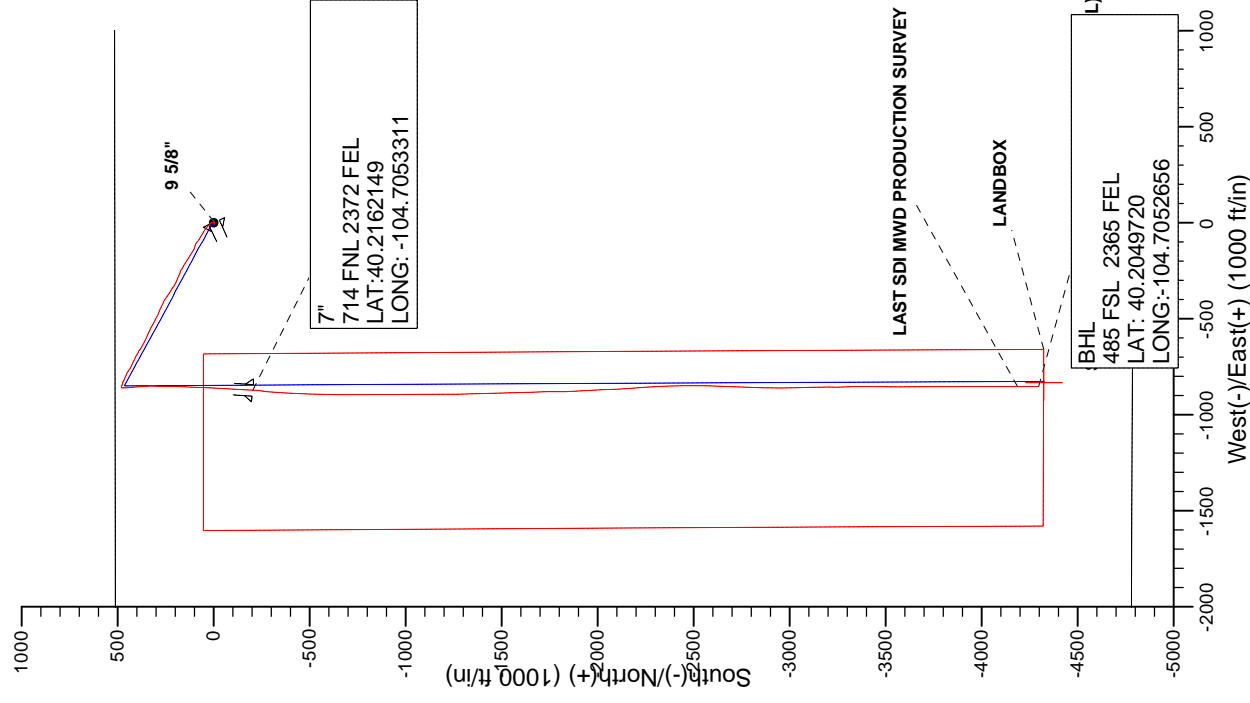
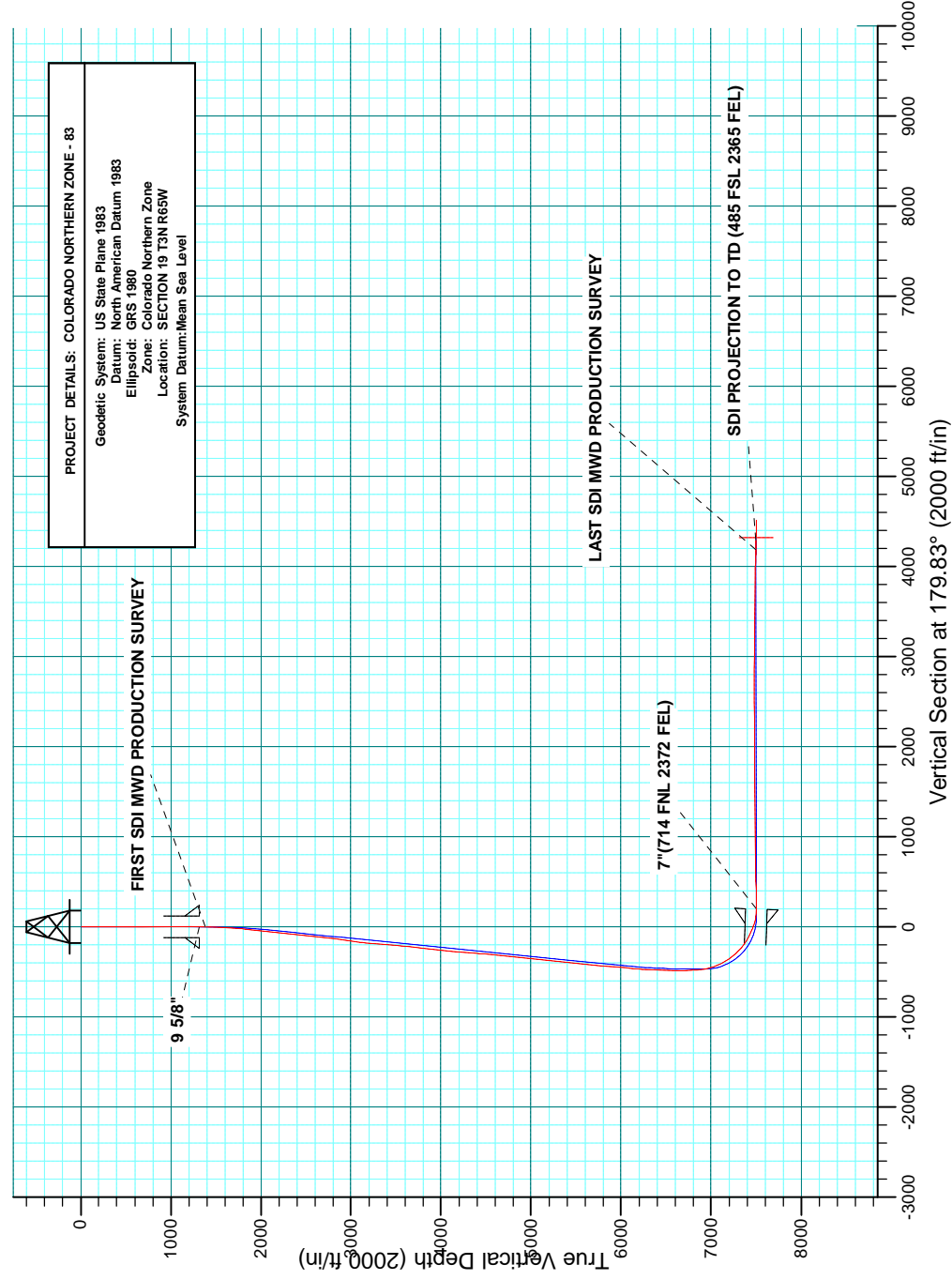




Scientific Drilling



Created By: R.Scott Date: 11:57, December 01 2014

US ROCKIES REGION PLANNING

COLORADO NORTHERN ZONE - 83

WARDELL 2G-19HZ

WARDELL 2G-19HZ

OH

Design: OH

Standard Survey Report

01 December, 2014

Company:	US ROCKIES REGION PLANNING	Local Co-ordinate Reference:	Well WARDELL 2G-19HZ
Project:	COLORADO NORTHERN ZONE - 83	TVD Reference:	GL 4951 & KB 25 @ 4976.00ft (HP 311)
Site:	WARDELL 2G-19HZ	MD Reference:	GL 4951 & KB 25 @ 4976.00ft (HP 311)
Well:	WARDELL 2G-19HZ	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		WARDELL 2G-19HZ, SECTION 19 T3N R65W			
Site Position:		Northing:	1,322,813.70 usft	Latitude:	40.2167700
From:	Lat/Long	Easting:	3,222,790.02 usft	Longitude:	-104.7022110
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in	Grid Convergence:	0.52 °

Well	WARDELL 2G-19HZ, 515 FNL 1502 FEL					
Well Position	+N/-S	0.00 ft	Northing:	1,322,813.67 usft	Latitude:	40.2167699
	+E/-W	0.00 ft	Easting:	3,222,790.02 usft	Longitude:	-104.7022110
Position Uncertainty		0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level:	4,951.00 ft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2013	7/1/2014	8.45	66.79	52,633

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	179.83	

Survey Program	Date	12/1/2014			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
25.00	1,272.00	Survey #1 MS GYRO (OH)	GyroFlex		
1,387.00	12,082.00	Survey #2 SDI MWD PRODUCTION (OH)	SDI_MWD+CRUST_1.0	SDI MWD + Crustal anomaly, Version 1.0	

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	0.47	301.38	125.00	0.21	-0.35	-0.21	0.47	0.47	0.00	
225.00	0.61	244.30	225.00	0.20	-1.18	-0.20	0.53	0.14	-57.08	
325.00	0.58	240.63	324.99	-0.28	-2.10	0.28	0.05	-0.03	-3.67	
425.00	0.72	213.02	424.98	-1.06	-2.88	1.05	0.34	0.14	-27.61	
525.00	0.47	200.27	524.98	-1.97	-3.37	1.96	0.28	-0.25	-12.75	
625.00	0.33	158.32	624.98	-2.62	-3.40	2.61	0.31	-0.14	-41.95	
725.00	0.44	103.71	724.97	-2.98	-2.92	2.97	0.37	0.11	-54.61	
825.00	0.41	105.71	824.97	-3.17	-2.21	3.16	0.03	-0.03	2.00	

Company:	US ROCKIES REGION PLANNING	Local Co-ordinate Reference:	Well WARDELL 2G-19HZ
Project:	COLORADO NORTHERN ZONE - 83	TVD Reference:	GL 4951 & KB 25 @ 4976.00ft (HP 311)
Site:	WARDELL 2G-19HZ	MD Reference:	GL 4951 & KB 25 @ 4976.00ft (HP 311)
Well:	WARDELL 2G-19HZ	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)
925.00	0.66	105.86	924.97	-3.42	-1.31	3.42	0.25	0.25	0.15
1,025.00	0.86	75.22	1,024.96	-3.39	-0.03	3.39	0.45	0.20	-30.64
1,125.00	0.94	76.08	1,124.95	-3.00	1.49	3.00	0.08	0.08	0.86
1,225.00	0.98	60.45	1,224.93	-2.38	3.03	2.39	0.26	0.04	-15.63
1,272.00	0.94	68.24	1,271.93	-2.04	3.74	2.05	0.29	-0.09	16.57
1,320.00	0.73	66.12	1,319.92	-1.77	4.39	1.78	0.44	-0.44	-4.43
9 5/8"									
1,387.00	0.44	59.77	1,386.92	-1.47	5.00	1.48	0.44	-0.43	-9.47
FIRST SDI MWD PRODUCTION SURVEY									
1,478.00	1.38	14.69	1,477.91	-0.23	5.58	0.25	1.22	1.03	-49.54
1,569.00	2.79	345.54	1,568.84	2.97	5.30	-2.96	1.89	1.55	-32.03
1,674.00	4.81	325.22	1,673.61	9.06	2.15	-9.06	2.28	1.92	-19.35
1,766.00	6.21	325.68	1,765.19	16.34	-2.85	-16.35	1.52	1.52	0.50
1,857.00	8.38	317.29	1,855.45	25.28	-10.13	-25.31	2.65	2.38	-9.22
1,948.00	10.01	313.25	1,945.27	35.57	-20.39	-35.63	1.93	1.79	-4.44
2,040.00	10.71	303.56	2,035.78	45.78	-33.33	-45.88	2.04	0.76	-10.53
2,131.00	12.64	303.61	2,124.89	55.97	-48.67	-56.11	2.12	2.12	0.05
2,222.00	13.33	299.71	2,213.57	66.68	-66.08	-66.87	1.23	0.76	-4.29
2,314.00	11.83	299.33	2,303.36	76.55	-83.51	-76.80	1.63	-1.63	-0.41
2,405.00	13.41	303.11	2,392.16	86.89	-100.48	-87.18	1.96	1.74	4.15
2,496.00	13.03	295.90	2,480.75	97.13	-118.55	-97.48	1.86	-0.42	-7.92
2,588.00	11.48	295.80	2,570.65	105.65	-136.13	-106.05	1.68	-1.68	-0.11
2,680.00	10.88	299.48	2,660.91	113.91	-151.93	-114.36	1.01	-0.65	4.00
2,771.00	12.45	302.18	2,750.03	123.36	-167.71	-123.85	1.83	1.73	2.97
2,863.00	13.90	301.96	2,839.60	134.49	-185.48	-135.04	1.58	1.58	-0.24
2,954.00	13.75	301.64	2,927.97	145.95	-203.96	-146.55	0.19	-0.16	-0.35
3,045.00	14.39	300.40	3,016.24	157.34	-222.92	-158.00	0.78	0.70	-1.36
3,136.00	14.07	300.57	3,104.44	168.69	-242.20	-169.41	0.35	-0.35	0.19
3,227.00	12.60	290.68	3,193.00	177.82	-261.01	-178.60	2.98	-1.62	-10.87
3,319.00	12.31	289.58	3,282.83	184.65	-279.64	-185.48	0.41	-0.32	-1.20
3,413.00	10.20	296.08	3,375.02	191.67	-296.56	-192.55	2.62	-2.24	6.91
3,507.00	9.92	295.58	3,467.58	198.83	-311.34	-199.75	0.31	-0.30	-0.53
3,602.00	11.59	300.65	3,560.91	207.23	-326.93	-208.19	2.02	1.76	5.34
3,696.00	11.70	303.64	3,652.98	217.32	-342.99	-218.34	0.65	0.12	3.18
3,790.00	12.13	303.40	3,744.95	228.04	-359.17	-229.10	0.46	0.46	-0.26
3,885.00	12.60	304.11	3,837.75	239.34	-376.08	-240.46	0.52	0.49	0.75
3,979.00	11.93	301.38	3,929.60	250.15	-392.86	-251.31	0.94	-0.71	-2.90
4,073.00	12.07	302.17	4,021.55	260.44	-409.48	-261.66	0.23	0.15	0.84
4,168.00	12.09	293.98	4,114.45	269.77	-426.97	-271.04	1.80	0.02	-8.62
4,262.00	11.45	294.56	4,206.47	277.65	-444.46	-278.97	0.69	-0.68	0.62
4,356.00	10.09	294.95	4,298.82	285.00	-460.41	-286.37	1.45	-1.45	0.41
4,451.00	10.52	291.70	4,392.28	291.72	-476.01	-293.13	0.76	0.45	-3.42
4,545.00	11.68	298.47	4,484.53	299.43	-492.35	-300.89	1.85	1.23	7.20

Company:	US ROCKIES REGION PLANNING	Local Co-ordinate Reference:	Well WARDELL 2G-19HZ
Project:	COLORADO NORTHERN ZONE - 83	TVD Reference:	GL 4951 & KB 25 @ 4976.00ft (HP 311)
Site:	WARDELL 2G-19HZ	MD Reference:	GL 4951 & KB 25 @ 4976.00ft (HP 311)
Well:	WARDELL 2G-19HZ	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)
4,639.00	12.80	297.36	4,576.39	308.75	-509.96	-310.26	1.22	1.19	-1.18
4,733.00	12.32	297.66	4,668.14	318.19	-528.09	-319.76	0.52	-0.51	0.32
4,827.00	11.62	297.43	4,760.09	327.21	-545.38	-328.83	0.75	-0.74	-0.24
4,922.00	11.68	297.81	4,853.14	336.10	-562.38	-337.77	0.10	0.06	0.40
5,016.00	12.03	294.38	4,945.13	344.59	-579.71	-346.31	0.84	0.37	-3.65
5,111.00	11.54	291.09	5,038.13	352.09	-597.60	-353.86	0.88	-0.52	-3.46
5,205.00	12.38	296.18	5,130.09	359.92	-615.41	-361.75	1.43	0.89	5.41
5,299.00	11.50	297.20	5,222.06	368.65	-632.79	-370.53	0.96	-0.94	1.09
5,394.00	11.54	306.28	5,315.15	378.60	-648.88	-380.53	1.91	0.04	9.56
5,488.00	13.11	300.87	5,406.99	389.64	-665.61	-391.61	2.07	1.67	-5.76
5,582.00	11.90	299.67	5,498.76	399.91	-683.18	-401.93	1.32	-1.29	-1.28
5,676.00	13.28	294.76	5,590.50	409.23	-701.41	-411.31	1.86	1.47	-5.22
5,771.00	12.69	293.79	5,683.07	418.00	-720.86	-420.14	0.66	-0.62	-1.02
5,865.00	10.99	296.80	5,775.06	426.21	-738.31	-428.40	1.92	-1.81	3.20
5,959.00	10.95	299.20	5,867.35	434.61	-754.10	-436.84	0.49	-0.04	2.55
6,054.00	11.84	299.50	5,960.47	443.81	-770.46	-446.09	0.94	0.94	0.32
6,148.00	11.31	298.55	6,052.56	452.96	-786.95	-455.29	0.60	-0.56	-1.01
6,243.00	9.84	295.51	6,145.95	460.91	-802.46	-463.29	1.65	-1.55	-3.20
6,337.00	8.44	293.10	6,238.75	467.08	-816.05	-469.49	1.54	-1.49	-2.56
6,431.00	7.11	292.57	6,331.88	472.02	-827.77	-474.47	1.42	-1.41	-0.56
6,526.00	5.36	289.83	6,426.32	475.78	-837.37	-478.26	1.87	-1.84	-2.88
6,620.00	3.89	286.65	6,520.01	478.18	-844.56	-480.68	1.59	-1.56	-3.38
6,808.00	2.18	271.71	6,707.74	480.11	-854.24	-482.65	0.99	-0.91	-7.95
6,903.00	1.35	201.82	6,802.71	479.13	-856.47	-481.67	2.25	-0.87	-73.57
6,997.00	7.47	174.66	6,896.39	472.01	-856.31	-474.55	6.70	6.51	-28.89
7,091.00	14.85	181.70	6,988.55	453.86	-856.10	-456.40	7.97	7.85	7.49
7,186.00	25.28	174.44	7,077.67	421.41	-854.49	-423.94	11.27	10.98	-7.64
7,280.00	31.32	176.47	7,160.40	377.00	-851.04	-379.53	6.51	6.43	2.16
7,374.00	37.15	180.69	7,238.09	324.19	-849.87	-326.71	6.69	6.20	4.49
7,468.00	46.43	182.30	7,308.10	261.64	-851.59	-264.16	9.94	9.87	1.71
7,563.00	54.58	181.15	7,368.48	188.43	-853.75	-190.96	8.63	8.58	-1.21
7,657.00	61.23	179.75	7,418.39	108.84	-854.34	-111.38	7.19	7.07	-1.49
7,751.00	67.14	182.66	7,459.32	24.29	-856.17	-26.83	6.88	6.29	3.10
7,845.00	76.45	184.54	7,488.65	-64.72	-861.81	62.16	10.08	9.90	2.00
7,939.00	86.54	183.60	7,502.54	-157.33	-868.39	154.76	10.78	10.73	-1.00
7,984.00	88.45	183.97	7,504.50	-202.19	-871.35	199.60	4.33	4.25	0.82
7"(714 FNL 2372 FEL)									
8,010.00	89.56	184.18	7,504.95	-228.12	-873.20	225.53	4.33	4.25	0.82
8,057.00	89.97	184.56	7,505.15	-274.98	-876.78	272.38	1.19	0.87	0.81
8,105.00	90.91	185.16	7,504.78	-322.81	-880.85	320.19	2.32	1.96	1.25
8,152.00	91.54	183.90	7,503.77	-369.65	-884.56	367.02	3.00	1.34	-2.68
8,199.00	91.01	182.08	7,502.73	-416.57	-887.01	413.94	4.03	-1.13	-3.87
8,293.00	91.64	181.91	7,500.55	-510.49	-890.28	507.84	0.69	0.67	-0.18
8,388.00	90.10	180.28	7,499.11	-605.45	-892.10	602.80	2.36	-1.62	-1.72

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Site:	WARDELL 2G-19HZ	MD Reference:	GL 4951 & KB 25 @ 4976.00ft (HP 311)
Well:	WARDELL 2G-19HZ	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)
8,482.00	90.13	180.60	7,498.92	-699.45	-892.82	696.80	0.34	0.03	0.34
8,576.00	90.47	180.50	7,498.43	-793.45	-893.72	790.79	0.38	0.36	-0.11
8,671.00	91.41	180.59	7,496.87	-888.43	-894.63	885.77	0.99	0.99	0.09
8,765.00	90.87	179.67	7,495.00	-982.41	-894.84	979.75	1.13	-0.57	-0.98
8,859.00	90.84	179.78	7,493.60	-1,076.40	-894.39	1,073.74	0.12	-0.03	0.12
8,953.00	90.54	179.45	7,492.47	-1,170.39	-893.76	1,167.73	0.47	-0.32	-0.35
9,048.00	90.67	178.23	7,491.46	-1,265.36	-891.83	1,262.71	1.29	0.14	-1.28
9,142.00	90.81	178.65	7,490.25	-1,359.32	-889.27	1,356.67	0.47	0.15	0.45
9,236.00	90.47	178.38	7,489.20	-1,453.28	-886.84	1,450.64	0.46	-0.36	-0.29
9,331.00	90.71	178.59	7,488.22	-1,548.24	-884.33	1,545.61	0.34	0.25	0.22
9,425.00	90.47	178.28	7,487.25	-1,642.20	-881.76	1,639.58	0.42	-0.26	-0.33
9,520.00	90.20	178.29	7,486.70	-1,737.16	-878.92	1,734.54	0.28	-0.28	0.01
9,614.00	90.23	178.60	7,486.35	-1,831.12	-876.37	1,828.51	0.33	0.03	0.33
9,708.00	89.53	177.13	7,486.54	-1,925.05	-872.86	1,922.45	1.73	-0.74	-1.56
9,802.00	90.71	177.77	7,486.35	-2,018.96	-868.68	2,016.37	1.43	1.26	0.68
9,897.00	88.99	176.28	7,486.60	-2,113.82	-863.75	2,111.25	2.40	-1.81	-1.57
9,991.00	90.03	176.07	7,487.40	-2,207.61	-857.48	2,205.05	1.13	1.11	-0.22
10,085.00	90.84	177.61	7,486.69	-2,301.46	-852.30	2,298.92	1.85	0.86	1.64
10,180.00	91.21	179.34	7,484.99	-2,396.41	-849.77	2,393.87	1.86	0.39	1.82
10,274.00	91.78	179.57	7,482.53	-2,490.37	-848.88	2,487.84	0.65	0.61	0.24
10,368.00	92.18	181.37	7,479.29	-2,584.31	-849.65	2,581.77	1.96	0.43	1.91
10,463.00	88.99	181.58	7,478.32	-2,679.26	-852.09	2,676.72	3.37	-3.36	0.22
10,557.00	88.72	181.85	7,480.19	-2,773.20	-854.91	2,770.65	0.41	-0.29	0.29
10,652.00	88.66	182.06	7,482.37	-2,868.12	-858.15	2,865.56	0.23	-0.06	0.22
10,746.00	88.72	179.84	7,484.51	-2,962.07	-859.70	2,959.51	2.36	0.06	-2.36
10,840.00	87.95	177.95	7,487.25	-3,056.01	-857.89	3,053.45	2.17	-0.82	-2.01
10,934.00	89.43	178.51	7,489.40	-3,149.94	-854.99	3,147.39	1.68	1.57	0.60
11,029.00	91.01	180.30	7,489.03	-3,244.93	-854.00	3,242.38	2.51	1.66	1.88
11,123.00	90.34	179.60	7,487.92	-3,338.92	-853.92	3,336.37	1.03	-0.71	-0.74
11,217.00	90.67	180.26	7,487.09	-3,432.91	-853.81	3,430.37	0.78	0.35	0.70
11,312.00	89.23	179.72	7,487.18	-3,527.91	-853.79	3,525.36	1.62	-1.52	-0.57
11,406.00	89.06	179.68	7,488.58	-3,621.90	-853.30	3,619.35	0.19	-0.18	-0.04
11,500.00	89.06	179.88	7,490.12	-3,715.89	-852.94	3,713.34	0.21	0.00	0.21
11,594.00	88.76	179.26	7,491.91	-3,809.87	-852.23	3,807.32	0.73	-0.32	-0.66
11,688.00	88.83	179.83	7,493.89	-3,903.84	-851.49	3,901.30	0.61	0.07	0.61
11,783.00	88.76	180.01	7,495.89	-3,998.82	-851.35	3,996.28	0.20	-0.07	0.19
11,877.00	89.93	180.53	7,496.96	-4,092.81	-851.80	4,090.27	1.36	1.24	0.55
11,971.00	89.56	180.35	7,497.38	-4,186.81	-852.52	4,184.26	0.44	-0.39	-0.19
LAST SDI MWD PRODUCTION SURVEY									
12,082.00	89.56	180.35	7,498.23	-4,297.80	-853.20	4,295.25	0.00	0.00	0.00
SDI PROJECTION TO TD (485 FSL 2365 FEL)									

Company:	US ROCKIES REGION PLANNING	Local Co-ordinate Reference:	Well WARDELL 2G-19HZ
Project:	COLORADO NORTHERN ZONE - 83	TVD Reference:	GL 4951 & KB 25 @ 4976.00ft (HP 311)
Site:	WARDELL 2G-19HZ	MD Reference:	GL 4951 & KB 25 @ 4976.00ft (HP 311)
Well:	WARDELL 2G-19HZ	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Denver Sales

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name		Casing Diameter (in)	Hole Diameter (in)
1,320.00	1,319.92	9 5/8"		9.625	13.500
7,984.00	7,504.50	7"(714 FNL 2372 FEL)		7.000	8.750

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
1,387.00	1,386.92	-1.47	5.00	FIRST SDI MWD PRODUCTION SURVEY	
11,971.00	7,497.38	-4,186.81	-852.52	LAST SDI MWD PRODUCTION SURVEY	
12,082.00	7,498.23	-4,297.80	-853.20	SDI PROJECTION TO TD (485 FSL 2365 FEL)	

Checked By: _____ Approved By: _____ Date: _____