



## Directional Survey Certification

7327 West Barton Road  
Casper, WY 82604  
(307)-472-6621 Fax (307) 472-5439

<b>Operator</b>	_____	OXY USA RMAT
<b>Well Name &amp; No.</b>	_____	Shell 797-03-37
<b>County &amp; State</b>	_____	Garfield County, CO
<b>SDI Job No.</b>	_____	42DEFK10121347
<b>Rig</b>	_____	Nabors M-37

I,                     Rex Hall                    , having personal knowledge of all the facts, hereby certify that the attached directional survey run from a measured depth of           0           feet to a measured depth of   7100   feet is true and correct as determined from all available records.

  
\_\_\_\_\_  
Signature

                    20-Jan-11                      
Date

**Rex Hall**  
Grand Junction Drilling Engineer  
Scientific Drilling - Rocky Mountain District

# **OXY USA RMAT**

**Garfield County, CO NAD27**

**Shell 797-03B Pad**

**Shell 797-03-37 - Slot Q**

**OH**

**Design: OH**

## **Standard Survey Report**

**20 January, 2011**

# Scientific Drilling International

## Survey Report

<b>Company:</b> OXY USA RMAT	<b>Local Co-ordinate Reference:</b> Well Shell 797-03-37 - Slot Q
<b>Project:</b> Garfield County, CO NAD27	<b>TVD Reference:</b> GL 6325' & RKB 22' @ 6347.00ft (M37)
<b>Site:</b> Shell 797-03B Pad	<b>MD Reference:</b> GL 6325' & RKB 22' @ 6347.00ft (M37)
<b>Well:</b> Shell 797-03-37	<b>North Reference:</b> True
<b>Wellbore:</b> OH	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Design:</b> OH	<b>Database:</b> Rockies-R5000.1

<b>Project</b> Garfield County, CO NAD27		
<b>Map System:</b> US State Plane 1927 (Exact solution)	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b> NAD 1927 (NADCON CONUS)		
<b>Map Zone:</b> Colorado Central 502		

<b>Site</b> Shell 797-03B Pad, Sec 3 T7S R97W					
<b>Site Position:</b>		<b>Northing:</b>	610,470.20 usft	<b>Latitude:</b>	39° 28' 42.340 N
<b>From:</b> Lat/Long		<b>Easting:</b>	1,237,588.64 usft	<b>Longitude:</b>	108° 12' 4.750 W
<b>Position Uncertainty:</b>	0.00 ft	<b>Slot Radius:</b>	13.200 in	<b>Grid Convergence:</b>	-1.70 °

<b>Well</b> Shell 797-03-37 - Slot Q,						
<b>Well Position</b>	<b>+N/-S</b>	0.00 ft	<b>Northing:</b>	610,453.47 usft	<b>Latitude:</b>	39° 28' 42.177 N
	<b>+E/-W</b>	0.00 ft	<b>Easting:</b>	1,237,596.07 usft	<b>Longitude:</b>	108° 12' 4.649 W
<b>Position Uncertainty</b>		0.00 ft	<b>Wellhead Elevation:</b>	ft	<b>Ground Level:</b>	6,325.00 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>
	IGRF2005-10	2008/09/15	10.78	65.77	52,511

<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	192.63	

<b>Survey Program</b>		<b>Date</b>	2011/01/20		
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
79.00	497.00	Survey #1 - Surface Gyro MWD (OH)	Standard Keeper 103	Standard Wireline Keeper ver 1.0.3	
591.00	1,000.00	Survey #2 - Surface MWD (OH)	MWD-SDI	MWD - Standard ISCWSA	
1,092.00	7,100.00	Survey #3 - Production MWD (OH)	MWD-SDI	MWD - Standard ISCWSA	

<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 (°/100ft)</b>	<b>Build Rate (°/100ft)</b>	<b>Turn Rate (°/100ft)</b>	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
79.00	0.44	34.01	79.00	0.25	0.17	-0.28	0.56	0.56	0.00	
<b>First SDI Surface Gyro MWD Survey</b>										
112.00	0.53	193.27	112.00	0.21	0.21	-0.25	2.89	0.27	482.61	
143.00	1.23	203.29	142.99	-0.24	0.04	0.22	2.30	2.26	32.32	
174.00	1.76	199.25	173.98	-0.99	-0.25	1.02	1.74	1.71	-13.03	
205.00	2.82	201.01	204.96	-2.15	-0.68	2.25	3.43	3.42	5.68	
237.00	2.99	205.31	236.92	-3.64	-1.32	3.84	0.86	0.53	13.44	
330.00	5.19	199.78	329.68	-9.79	-3.78	10.38	2.40	2.37	-5.95	

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## Survey Report

<b>Company:</b>	OXY USA RMAT	<b>Local Co-ordinate Reference:</b>	Well Shell 797-03-37 - Slot Q
<b>Project:</b>	Garfield County, CO NAD27	<b>TVD Reference:</b>	GL 6325' & RKB 22' @ 6347.00ft (M37)
<b>Site:</b>	Shell 797-03B Pad	<b>MD Reference:</b>	GL 6325' & RKB 22' @ 6347.00ft (M37)
<b>Well:</b>	Shell 797-03-37	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	Rockies-R5000.1

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
424.00	7.74	204.17	423.07	-19.57	-7.81	20.81	2.76	2.71	4.67	
497.00	9.85	205.58	495.21	-29.69	-12.52	31.71	2.91	2.89	1.93	
<b>Last SDI Surface Gyro MWD Survey</b>										
591.00	11.08	198.68	587.65	-45.50	-18.88	48.53	1.87	1.31	-7.34	
<b>First SDI Surface MWD Survey</b>										
684.00	12.49	194.64	678.69	-63.70	-24.29	67.47	1.76	1.52	-4.34	
778.00	13.45	194.46	770.29	-84.12	-29.59	88.55	1.02	1.02	-0.19	
872.00	14.95	192.26	861.41	-106.55	-34.89	111.60	1.70	1.60	-2.34	
965.00	16.27	193.58	950.98	-130.94	-40.50	136.63	1.47	1.42	1.42	
996.00	16.42	194.83	980.73	-139.40	-42.64	145.35	1.23	0.48	4.03	
1,000.00	16.41	194.90	984.56	-140.49	-42.93	146.48	0.59	-0.35	1.69	
<b>Last SDI Surface MWD Survey</b>										
1,092.00	16.09	196.48	1,072.89	-165.27	-49.89	172.18	0.59	-0.34	1.72	
<b>First SDI Production MWD Survey</b>										
1,186.00	17.41	199.56	1,162.90	-191.01	-58.29	199.14	1.69	1.40	3.28	
1,282.00	20.14	201.05	1,253.79	-219.98	-69.04	229.75	2.89	2.84	1.55	
1,377.00	21.72	195.08	1,342.52	-252.22	-79.49	263.50	2.79	1.66	-6.28	
1,472.00	24.09	197.89	1,430.03	-287.65	-90.02	300.37	2.75	2.49	2.96	
1,567.00	26.64	200.09	1,515.87	-326.11	-103.29	340.81	2.86	2.68	2.32	
1,663.00	28.84	201.32	1,600.83	-367.90	-119.10	385.04	2.37	2.29	1.28	
1,757.00	30.78	202.11	1,682.39	-411.30	-136.40	431.18	2.11	2.06	0.84	
1,853.00	32.18	201.14	1,764.26	-457.91	-154.87	480.69	1.55	1.46	-1.01	
1,948.00	32.62	201.84	1,844.47	-505.27	-173.52	530.99	0.61	0.46	0.74	
2,044.00	33.41	200.53	1,924.97	-554.04	-192.41	582.71	1.11	0.82	-1.36	
2,139.00	32.98	199.91	2,004.46	-602.85	-210.39	634.27	0.58	-0.45	-0.65	
2,234.00	32.27	198.68	2,084.48	-651.18	-227.32	685.14	1.02	-0.75	-1.29	
2,329.00	31.48	199.47	2,165.15	-698.59	-243.71	734.99	0.94	-0.83	0.83	
2,425.00	30.34	198.94	2,247.51	-745.16	-259.93	783.97	1.22	-1.19	-0.55	
2,520.00	28.65	199.65	2,330.20	-789.31	-275.38	830.43	1.82	-1.78	0.75	
2,615.00	28.23	198.15	2,413.74	-832.11	-290.04	875.40	0.87	-0.44	-1.58	
2,710.00	28.67	195.60	2,497.27	-875.41	-303.17	920.52	1.36	0.46	-2.68	
2,806.00	28.67	194.20	2,581.50	-919.91	-315.01	966.54	0.70	0.00	-1.46	
2,902.00	29.02	196.13	2,665.59	-964.61	-327.13	1,012.81	1.04	0.36	2.01	
2,997.00	27.17	196.92	2,749.39	-1,007.50	-339.84	1,057.44	1.99	-1.95	0.83	
3,093.00	27.87	197.54	2,834.53	-1,049.87	-352.98	1,101.65	0.79	0.73	0.65	
3,188.00	28.14	194.99	2,918.41	-1,092.68	-365.47	1,146.16	1.29	0.28	-2.68	
3,284.00	28.23	195.25	3,003.02	-1,136.45	-377.30	1,191.46	0.16	0.09	0.27	
3,380.00	28.49	195.16	3,087.50	-1,180.46	-389.26	1,237.02	0.27	0.27	-0.09	
3,476.00	26.47	195.96	3,172.67	-1,223.13	-401.13	1,281.25	2.14	-2.10	0.83	
3,572.00	24.62	196.57	3,259.28	-1,262.87	-412.72	1,322.57	1.95	-1.93	0.64	
3,668.00	21.72	198.77	3,347.53	-1,298.86	-424.14	1,360.19	3.15	-3.02	2.29	
3,763.00	19.70	199.38	3,436.38	-1,330.62	-435.11	1,393.57	2.14	-2.13	0.64	
3,859.00	17.67	201.40	3,527.32	-1,359.45	-445.79	1,424.04	2.22	-2.11	2.10	
3,954.00	15.56	198.59	3,618.35	-1,384.95	-455.12	1,450.97	2.38	-2.22	-2.96	

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## Survey Report

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<b>Site:</b>	Shell 797-03B Pad	<b>MD Reference:</b>	GL 6325' & RKB 22' @ 6347.00ft (M37)
<b>Well:</b>	Shell 797-03-37	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	Rockies-R5000.1

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
4,048.00	13.01	199.30	3,709.44	-1,406.89	-462.64	1,474.02	2.72	-2.71	0.76	
4,144.00	11.17	203.95	3,803.30	-1,425.59	-469.98	1,493.87	2.17	-1.92	4.84	
4,239.00	9.41	199.47	3,896.77	-1,441.32	-476.31	1,510.61	2.03	-1.85	-4.72	
4,334.00	8.09	201.23	3,990.67	-1,454.88	-481.32	1,524.93	1.42	-1.39	1.85	
4,429.00	7.47	201.32	4,084.79	-1,466.86	-485.98	1,537.64	0.65	-0.65	0.09	
4,524.00	7.47	204.74	4,178.99	-1,478.22	-490.81	1,549.78	0.47	0.00	3.60	
4,619.00	7.21	204.13	4,273.21	-1,489.27	-495.83	1,561.66	0.29	-0.27	-0.64	
4,714.00	8.00	209.84	4,367.37	-1,500.45	-501.56	1,573.82	1.15	0.83	6.01	
4,810.00	8.88	200.53	4,462.34	-1,513.18	-507.48	1,587.54	1.69	0.92	-9.70	
4,905.00	7.65	200.70	4,556.35	-1,525.96	-512.29	1,601.07	1.29	-1.29	0.18	
5,000.00	7.91	201.32	4,650.47	-1,537.97	-516.90	1,613.79	0.29	0.27	0.65	
5,095.00	9.23	203.43	4,744.41	-1,551.05	-522.31	1,627.74	1.43	1.39	2.22	
5,190.00	7.83	203.95	4,838.36	-1,563.95	-527.97	1,641.57	1.48	-1.47	0.55	
5,286.00	7.03	204.92	4,933.55	-1,575.26	-533.10	1,653.72	0.84	-0.83	1.01	
5,380.00	7.30	205.89	5,026.82	-1,585.85	-538.13	1,665.15	0.31	0.29	1.03	
5,476.00	7.47	197.27	5,122.02	-1,597.29	-542.64	1,677.31	1.17	0.18	-8.98	
5,572.00	7.83	191.91	5,217.17	-1,609.65	-545.84	1,690.07	0.83	0.38	-5.58	
5,667.00	6.68	194.81	5,311.41	-1,621.33	-548.59	1,702.06	1.27	-1.21	3.05	
5,762.00	6.16	190.15	5,405.81	-1,631.69	-550.90	1,712.67	0.77	-0.55	-4.91	
5,857.00	6.51	183.56	5,500.23	-1,642.08	-552.14	1,723.09	0.85	0.37	-6.94	
5,953.00	6.68	184.44	5,595.60	-1,653.08	-552.91	1,733.99	0.21	0.18	0.92	
6,047.00	5.72	179.17	5,689.05	-1,663.21	-553.26	1,743.95	1.19	-1.02	-5.61	
6,143.00	6.07	189.01	5,784.54	-1,673.01	-553.99	1,753.67	1.11	0.36	10.25	
6,238.00	6.77	197.89	5,878.95	-1,683.30	-556.49	1,764.26	1.28	0.74	9.35	
6,333.00	7.12	193.41	5,973.25	-1,694.35	-559.58	1,775.72	0.68	0.37	-4.72	
6,428.00	7.47	185.67	6,067.49	-1,706.23	-561.56	1,787.74	1.10	0.37	-8.15	
6,523.00	6.77	187.17	6,161.75	-1,717.93	-562.86	1,799.44	0.76	-0.74	1.58	
6,618.00	6.86	193.67	6,256.08	-1,729.00	-564.90	1,810.69	0.82	0.09	6.84	
6,714.00	5.80	194.64	6,351.50	-1,739.26	-567.48	1,821.27	1.11	-1.10	1.01	
6,806.00	5.10	193.41	6,443.08	-1,747.74	-569.61	1,830.01	0.77	-0.76	-1.34	
6,901.00	4.75	193.85	6,537.73	-1,755.66	-571.53	1,838.16	0.37	-0.37	0.46	
6,998.00	3.78	189.45	6,634.46	-1,762.72	-573.02	1,845.37	1.05	-1.00	-4.54	
7,045.00	3.43	185.76	6,681.37	-1,765.64	-573.41	1,848.31	0.89	-0.74	-7.85	
<b>Last SDI Production MWD Survey</b>										
7,100.00	3.43	185.76	6,736.27	-1,768.92	-573.74	1,851.58	0.00	0.00	0.00	
<b>Projection To TD - BHL = 608717.79, 1236984.86</b>										

# Scientific Drilling International

## Survey Report

<b>Company:</b>	OXY USA RMAT	<b>Local Co-ordinate Reference:</b>	Well Shell 797-03-37 - Slot Q
<b>Project:</b>	Garfield County, CO NAD27	<b>TVD Reference:</b>	GL 6325' & RKB 22' @ 6347.00ft (M37)
<b>Site:</b>	Shell 797-03B Pad	<b>MD Reference:</b>	GL 6325' & RKB 22' @ 6347.00ft (M37)
<b>Well:</b>	Shell 797-03-37	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	Rockies-R5000.1

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
79.00	79.00	0.25	0.17	First SDI Surface Gyro MWD Survey
497.00	495.21	-29.69	-12.52	Last SDI Surface Gyro MWD Survey
591.00	587.65	-45.50	-18.88	First SDI Surface MWD Survey
1,000.00	984.56	-140.49	-42.93	Last SDI Surface MWD Survey
1,092.00	1,072.89	-165.27	-49.89	First SDI Production MWD Survey
7,045.00	6,681.37	-1,765.64	-573.41	Last SDI Production MWD Survey
7,100.00	6,736.27	-1,768.92	-573.74	Projection To TD
7,100.00	6,736.27	-1,768.92	-573.74	BHL = 608717.79, 1236984.86

Checked By: _____	Approved By: _____	Date: _____
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