



**Scientific
Drilling**

Survey Certification

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

Operator	KP Kauffman Co, Inc.
Well Name & No.	Margaret Twombly B-1
County & State	Weld County, CO
SDI Job No.	410314K123182
Rig	KPK 2
Survey Date	30-Mar-2014

I, Steven F. Gottschalk, 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 4674.32 feet is true and correct as determined from all available records.


Signature

8-Apr-2014
Date

Steven F. Gottschalk
Rockies Region Well Planner
Scientific Drilling - Rocky Mountain District

KP Kauffman Co, Inc.

Weld County, CO

Margaret Twombly

Margaret Twombly B-1

OH

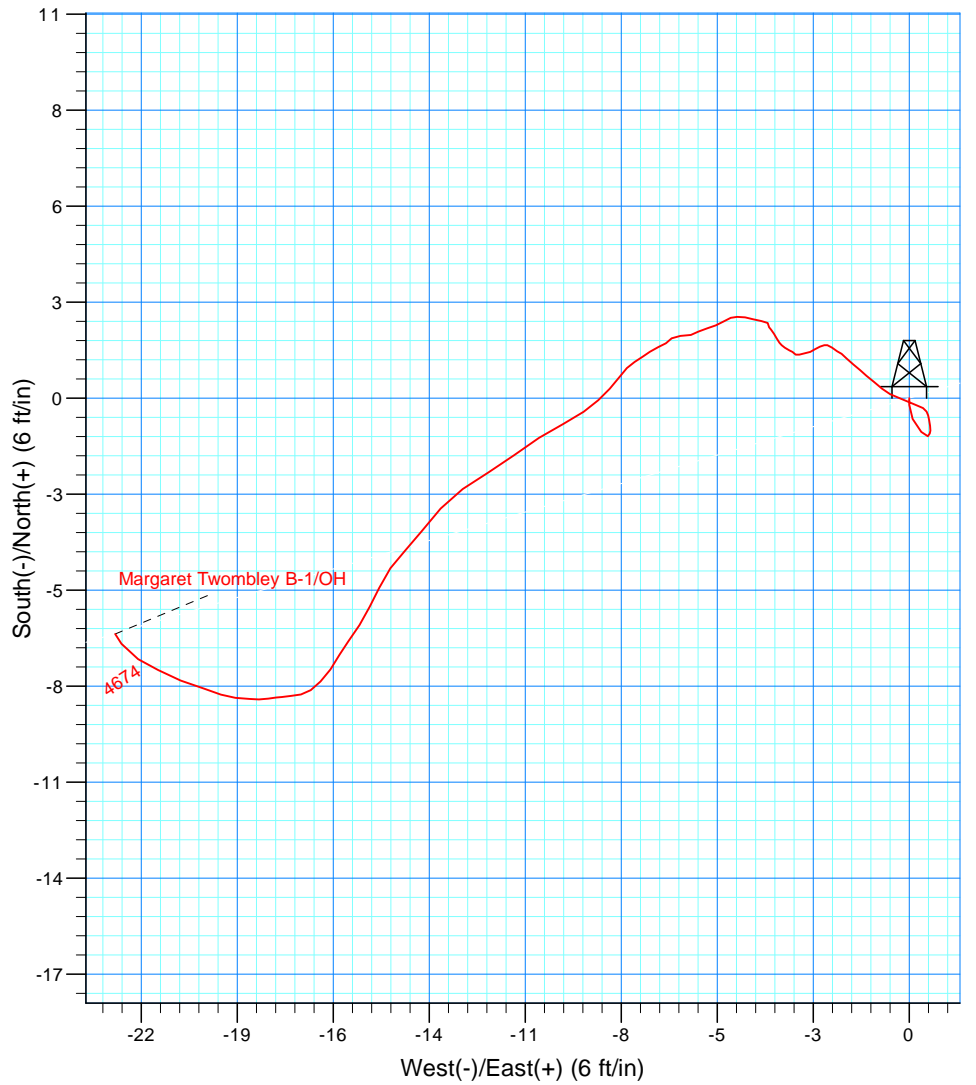
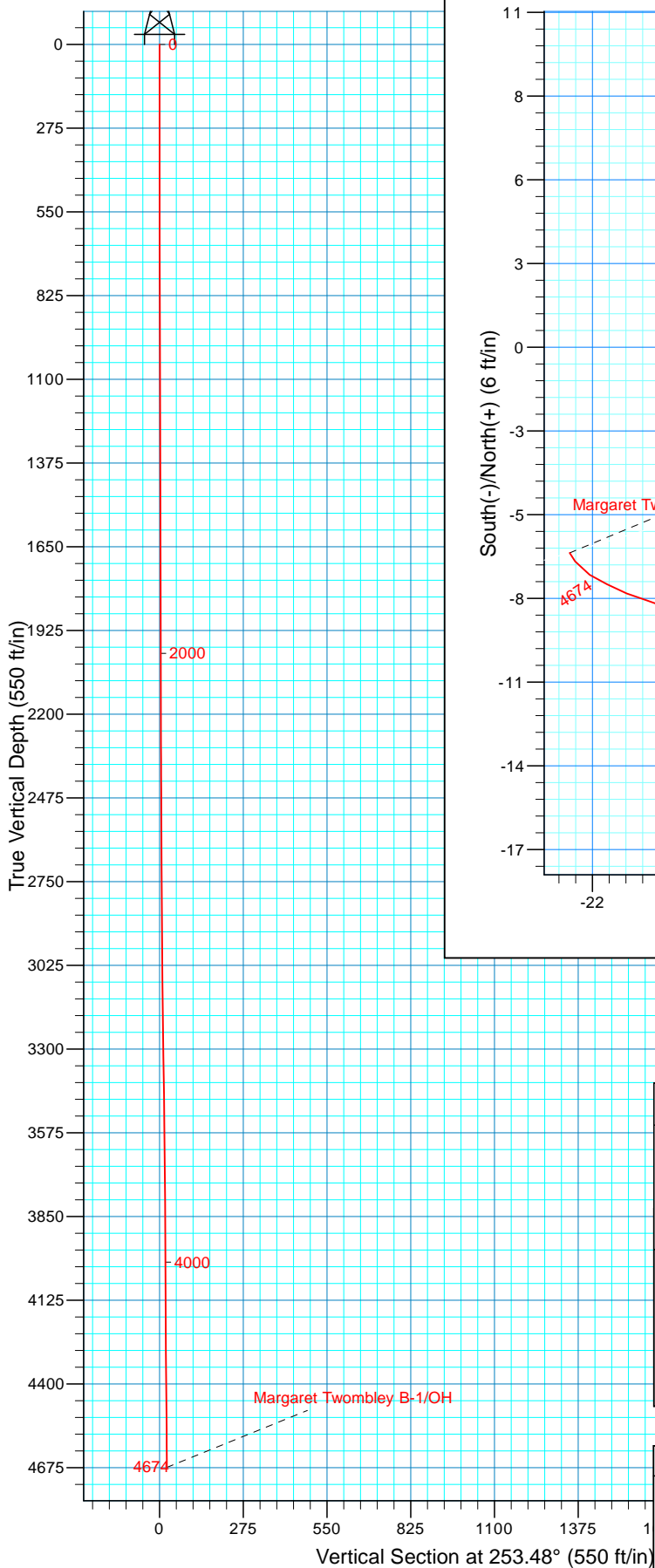
Design: OH

Standard Survey Report

08 April, 2014



Project: Weld County, CO
Site: Margaret Twombly
Well: Margaret Twombly B-1
Wellbore: OH
Design: OH



WELL DETAILS: Margaret Twombly B-1

Ground Level:	4896.00		
Northing	Easting	Latitude	Longitude
1298465.67	3198686.01	40° 9' 1.789 N	104° 47' 21.192 W

Co-ordinate (N/E) Reference: well Margaret Twombly B-1, True North
Vertical (TVD) Reference: GL 4896' @ 4896.00ft (Ground Level)
Section (VS) Reference: Slot - (0.00N, 0.00E)
Measured Depth Reference: GL 4896' @ 4896.00ft (Ground Level)
Calculation Method: Minimum Curvature
Local North: True
Location:

PROJECT DETAILS: Weld County, CO

Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: Colorado Northern Zone

Design: OH (Margaret Twombly B-1/OH)

Created By: Steve Gottschalk
18:42, April 08 2014

Scientific Drilling International

Survey Report

Company:	KP Kauffman Co, Inc.	Local Co-ordinate Reference:	Well Margaret Twombley B-1
Project:	Weld County, CO	TVD Reference:	GL 4896' @ 4896.00ft (Ground Level)
Site:	Margaret Twombley	MD Reference:	GL 4896' @ 4896.00ft (Ground Level)
Well:	Margaret Twombley B-1	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Casper District

Project	Weld County, CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Site		Margaret Twombley			
Site Position:		Northing:	1,298,465.68 usft	Latitude:	40° 9' 1.789 N
From:	Lat/Long	Easting:	3,198,686.01 usft	Longitude:	104° 47' 21.192 W
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in	Grid Convergence:	0.46 °

Well	Margaret Twombley B-1, 1905' FSL, 660' FWL, SEC9 T2N R66W					
Well Position	+N/-S	0.00 ft	Northing:	1,298,465.67 usft	Latitude:	40° 9' 1.789 N
	+E/-W	0.00 ft	Easting:	3,198,686.01 usft	Longitude:	104° 47' 21.192 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level:	4,896.00 ft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2013	4/8/2014	8.52	66.74	52,618

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	253.48	

Survey Program	Date	4/8/2014			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
49.46	4,674.32	Survey #1 Surface Gyro (OH)	SDI Standard Keeper 103	SDI Standard Wireline Keeper ver 1.0.3	

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)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
49.46	0.45	180.41	49.46	-0.19	0.00	0.06	0.91	0.91	0.00
First SDI Gyro Survey									
99.49	0.52	154.10	99.49	-0.59	0.10	0.08	0.46	0.14	-52.59
149.33	0.52	138.80	149.33	-0.97	0.34	-0.05	0.28	0.00	-30.70
199.05	0.14	37.14	199.05	-1.09	0.53	-0.20	1.14	-0.76	-204.47
248.86	0.08	28.88	248.85	-1.01	0.58	-0.27	0.12	-0.12	-16.58
298.51	0.12	6.86	298.50	-0.93	0.61	-0.32	0.11	0.08	-44.35
349.97	0.19	348.78	349.96	-0.79	0.60	-0.35	0.16	0.14	-35.13
399.76	0.19	352.13	399.75	-0.63	0.57	-0.37	0.02	0.00	6.73
449.73	0.12	341.51	449.72	-0.50	0.54	-0.38	0.15	-0.14	-21.25

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Survey Report

Company:	KP Kauffman Co, Inc.	Local Co-ordinate Reference:	Well Margaret Twombly B-1
Project:	Weld County, CO	TVD Reference:	GL 4896' @ 4896.00ft (Ground Level)
Site:	Margaret Twombly	MD Reference:	GL 4896' @ 4896.00ft (Ground Level)
Well:	Margaret Twombly B-1	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Casper District

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)
499.74	0.16	335.63	499.73	-0.38	0.50	-0.37	0.08	0.08	-11.76
549.18	0.19	293.91	549.17	-0.29	0.39	-0.29	0.26	0.06	-84.39
599.95	0.28	292.40	599.94	-0.21	0.20	-0.13	0.18	0.18	-2.97
649.12	0.29	295.23	649.11	-0.11	-0.02	0.05	0.04	0.02	5.76
699.71	0.34	289.76	699.70	0.00	-0.28	0.27	0.12	0.10	-10.81
749.80	0.33	297.04	749.79	0.11	-0.55	0.49	0.09	-0.02	14.53
798.95	0.32	310.98	798.94	0.27	-0.78	0.67	0.16	-0.02	28.36
849.29	0.37	308.18	849.28	0.46	-1.01	0.84	0.10	0.10	-5.56
899.37	0.28	313.58	899.36	0.64	-1.23	0.99	0.19	-0.18	10.78
948.91	0.27	310.58	948.90	0.80	-1.40	1.12	0.04	-0.02	-6.06
999.59	0.30	307.44	999.58	0.96	-1.60	1.26	0.07	0.06	-6.20
1,049.76	0.30	315.84	1,049.75	1.14	-1.80	1.40	0.09	0.00	16.74
1,098.76	0.16	304.05	1,098.75	1.27	-1.94	1.50	0.30	-0.29	-24.06
1,148.89	0.17	299.09	1,148.88	1.34	-2.07	1.60	0.03	0.02	-9.89
1,199.05	0.24	308.03	1,199.04	1.44	-2.21	1.71	0.15	0.14	17.82
1,249.13	0.12	282.29	1,249.12	1.52	-2.35	1.82	0.28	-0.24	-51.40
1,299.12	0.09	249.17	1,299.11	1.52	-2.44	1.90	0.13	-0.06	-66.25
1,349.71	0.20	251.42	1,349.70	1.47	-2.56	2.03	0.22	0.22	4.45
1,398.70	0.18	232.08	1,398.69	1.40	-2.70	2.19	0.14	-0.04	-39.48
1,449.25	0.18	251.83	1,449.23	1.33	-2.84	2.34	0.12	0.00	39.07
1,499.29	0.21	258.12	1,499.27	1.28	-3.00	2.51	0.07	0.06	12.57
1,549.57	0.14	252.57	1,549.55	1.25	-3.15	2.67	0.14	-0.14	-11.04
1,599.55	0.12	295.53	1,599.53	1.25	-3.25	2.76	0.19	-0.04	85.95
1,649.67	0.16	316.83	1,649.65	1.32	-3.35	2.84	0.13	0.08	42.50
1,699.50	0.24	291.71	1,699.48	1.41	-3.49	2.95	0.23	0.16	-50.41
1,749.50	0.20	314.54	1,749.48	1.51	-3.65	3.07	0.19	-0.08	45.66
1,799.75	0.18	325.29	1,799.73	1.64	-3.76	3.14	0.08	-0.04	21.39
1,849.48	0.17	344.10	1,849.46	1.77	-3.83	3.16	0.12	-0.02	37.82
1,898.77	0.23	305.69	1,898.75	1.90	-3.93	3.22	0.29	0.12	-77.93
1,948.98	0.16	354.14	1,948.96	2.03	-4.02	3.27	0.34	-0.14	96.49
1,999.96	0.15	325.87	1,999.94	2.16	-4.06	3.28	0.15	-0.02	-55.45
2,048.83	0.33	269.43	2,048.81	2.21	-4.24	3.43	0.57	0.37	-115.49
2,098.62	0.25	297.87	2,098.60	2.26	-4.48	3.65	0.33	-0.16	57.12
2,149.03	0.29	273.37	2,149.01	2.32	-4.70	3.85	0.24	0.08	-48.60
2,198.95	0.24	272.31	2,198.93	2.33	-4.93	4.07	0.10	-0.10	-2.12
2,248.76	0.20	248.46	2,248.74	2.30	-5.12	4.25	0.20	-0.08	-47.88
2,298.68	0.30	239.35	2,298.66	2.20	-5.31	4.46	0.21	0.20	-18.25
2,348.98	0.30	246.90	2,348.96	2.08	-5.54	4.72	0.08	0.00	15.01
2,399.08	0.31	254.90	2,399.06	2.00	-5.80	4.99	0.09	0.02	15.97
2,449.36	0.29	245.29	2,449.34	1.91	-6.04	5.25	0.11	-0.04	-19.11
2,499.25	0.26	244.75	2,499.23	1.81	-6.26	5.49	0.06	-0.06	-1.08
2,549.84	0.45	276.61	2,549.82	1.78	-6.56	5.78	0.53	0.38	62.98
2,599.87	0.24	210.98	2,599.84	1.71	-6.81	6.04	0.83	-0.42	-131.18

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Survey Report

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Project:	Weld County, CO	TVD Reference:	GL 4896' @ 4896.00ft (Ground Level)
Site:	Margaret Twombly	MD Reference:	GL 4896' @ 4896.00ft (Ground Level)
Well:	Margaret Twombly B-1	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Casper District

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)	
2,649.34	0.28	243.17	2,649.31	1.57	-6.97	6.24	0.30	0.08	65.07	
2,699.36	0.28	245.29	2,699.33	1.46	-7.19	6.48	0.02	0.00	4.24	
2,749.78	0.34	237.64	2,749.75	1.33	-7.43	6.74	0.14	0.12	-15.17	
2,798.46	0.28	231.92	2,798.43	1.18	-7.65	6.99	0.14	-0.12	-11.75	
2,849.99	0.32	241.56	2,849.96	1.03	-7.87	7.25	0.12	0.08	18.71	
2,898.95	0.34	222.69	2,898.92	0.86	-8.09	7.51	0.22	0.04	-38.54	
2,949.96	0.45	216.48	2,949.93	0.59	-8.31	7.80	0.23	0.22	-12.17	
2,998.87	0.53	222.25	2,998.84	0.27	-8.58	8.15	0.19	0.16	11.80	
3,049.86	0.52	227.74	3,049.83	-0.06	-8.91	8.56	0.10	-0.02	10.77	
3,099.92	0.70	234.85	3,099.88	-0.39	-9.33	9.05	0.39	0.36	14.20	
3,149.69	0.87	242.58	3,149.65	-0.74	-9.91	9.71	0.40	0.34	15.53	
3,198.72	1.01	238.31	3,198.67	-1.14	-10.61	10.49	0.32	0.29	-8.71	
3,248.98	0.97	231.47	3,248.92	-1.64	-11.32	11.32	0.25	-0.08	-13.61	
3,299.69	1.04	240.31	3,299.63	-2.13	-12.05	12.16	0.34	0.14	17.43	
3,349.31	0.99	234.14	3,349.24	-2.60	-12.79	13.00	0.24	-0.10	-12.43	
3,399.09	0.96	222.79	3,399.01	-3.16	-13.42	13.77	0.39	-0.06	-22.80	
3,449.92	0.94	216.86	3,449.83	-3.81	-13.96	14.47	0.20	-0.04	-11.67	
3,498.83	0.79	225.14	3,498.74	-4.37	-14.44	15.09	0.40	-0.31	16.93	
3,549.19	0.72	213.53	3,549.09	-4.88	-14.86	15.64	0.33	-0.14	-23.05	
3,599.20	0.79	206.26	3,599.10	-5.45	-15.19	16.11	0.24	0.14	-14.54	
3,649.49	0.55	207.72	3,649.39	-5.97	-15.45	16.52	0.48	-0.48	2.90	
3,699.28	0.85	210.45	3,699.17	-6.50	-15.75	16.95	0.61	0.60	5.48	
3,749.89	0.43	221.11	3,749.78	-6.97	-16.07	17.39	0.86	-0.83	21.06	
3,799.23	0.62	207.79	3,799.12	-7.34	-16.31	17.73	0.46	0.39	-27.00	
3,849.20	0.54	216.30	3,849.09	-7.77	-16.58	18.11	0.23	-0.16	17.03	
3,898.98	0.50	223.62	3,898.86	-8.12	-16.87	18.48	0.16	-0.08	14.70	
3,948.50	0.36	234.98	3,948.38	-8.37	-17.15	18.82	0.33	-0.28	22.94	
3,999.02	0.35	257.68	3,998.90	-8.49	-17.43	19.12	0.28	-0.02	44.93	
4,049.15	0.32	265.14	4,049.03	-8.53	-17.72	19.41	0.11	-0.06	14.88	
4,099.23	0.28	261.52	4,099.11	-8.56	-17.98	19.67	0.09	-0.08	-7.23	
4,148.84	0.10	278.82	4,148.72	-8.57	-18.14	19.83	0.38	-0.36	34.87	
4,199.82	0.42	257.41	4,199.70	-8.61	-18.36	20.05	0.65	0.63	-42.00	
4,250.00	0.21	280.18	4,249.88	-8.63	-18.63	20.32	0.48	-0.42	45.38	
4,298.82	0.39	269.41	4,298.70	-8.62	-18.89	20.56	0.38	0.37	-22.06	
4,348.77	0.57	278.31	4,348.65	-8.58	-19.30	20.95	0.39	0.36	17.82	
4,399.07	0.39	289.14	4,398.94	-8.49	-19.71	21.31	0.40	-0.36	21.53	
4,449.41	0.77	289.93	4,449.28	-8.32	-20.19	21.73	0.76	0.75	1.57	
4,499.99	0.85	287.55	4,499.86	-8.09	-20.87	22.31	0.17	0.16	-4.71	
4,549.50	0.83	302.83	4,549.36	-7.79	-21.52	22.85	0.45	-0.04	30.86	
4,599.32	0.67	292.88	4,599.18	-7.48	-22.09	23.31	0.41	-0.32	-19.97	
4,649.57	0.88	328.02	4,649.42	-7.04	-22.57	23.64	1.01	0.42	69.93	
4,674.32	0.65	326.91	4,674.17	-6.76	-22.75	23.73	0.93	-0.93	-4.48	
Last SDI Gyro Survey										

Scientific Drilling International
Survey Report

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Project:	Weld County, CO	TVD Reference:	GL 4896' @ 4896.00ft (Ground Level)
Site:	Margaret Twombley	MD Reference:	GL 4896' @ 4896.00ft (Ground Level)
Well:	Margaret Twombley B-1	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Casper District

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
49.46	49.46	-0.19	0.00	First SDI Gyro Survey
4,674.32	4,674.17	-6.76	-22.75	Last SDI Gyro Survey

Checked By: _____	Approved By: _____	Date: _____
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