Enseco Survey Report

08 February, 2011

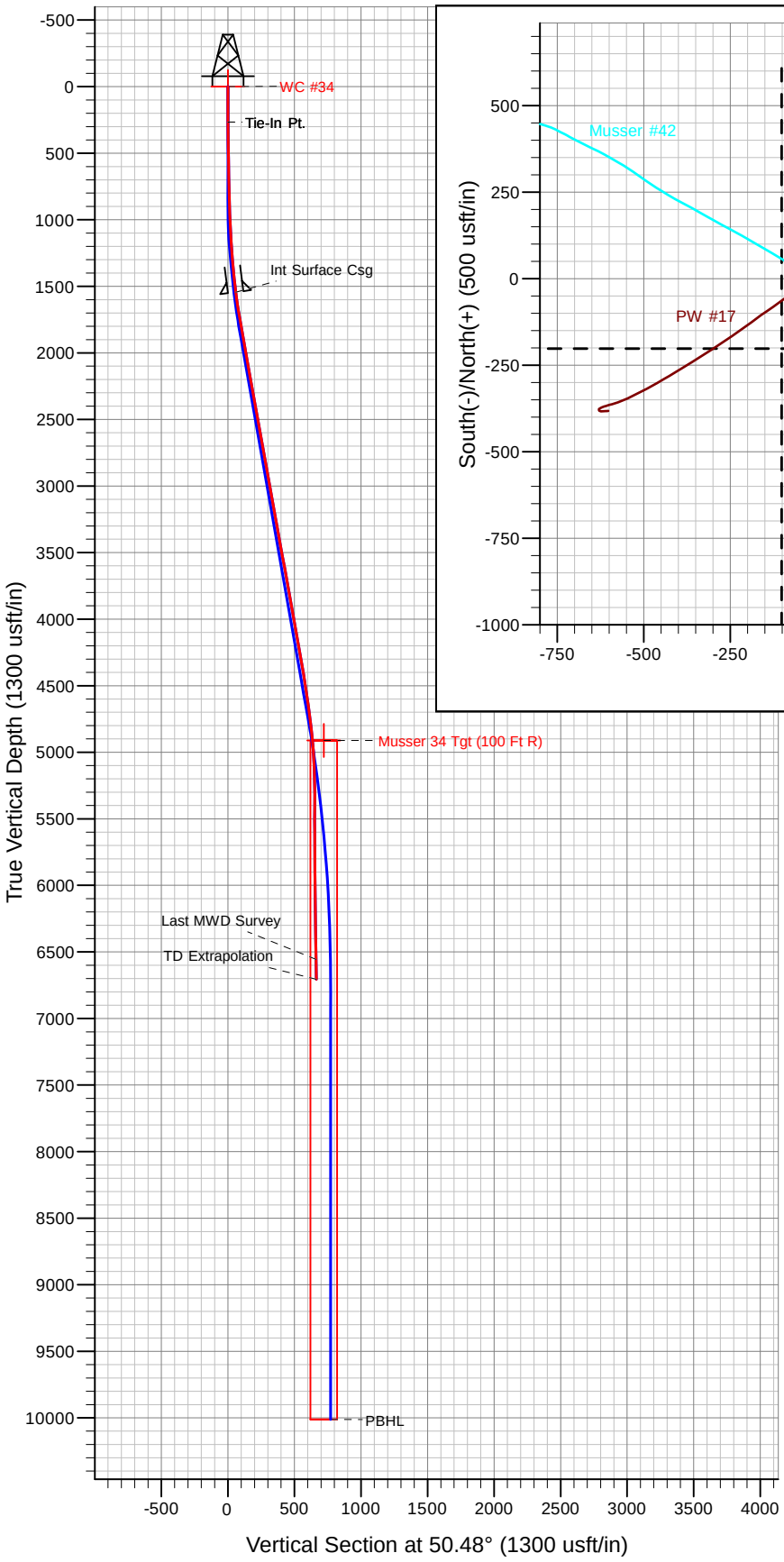
Wexpro Company

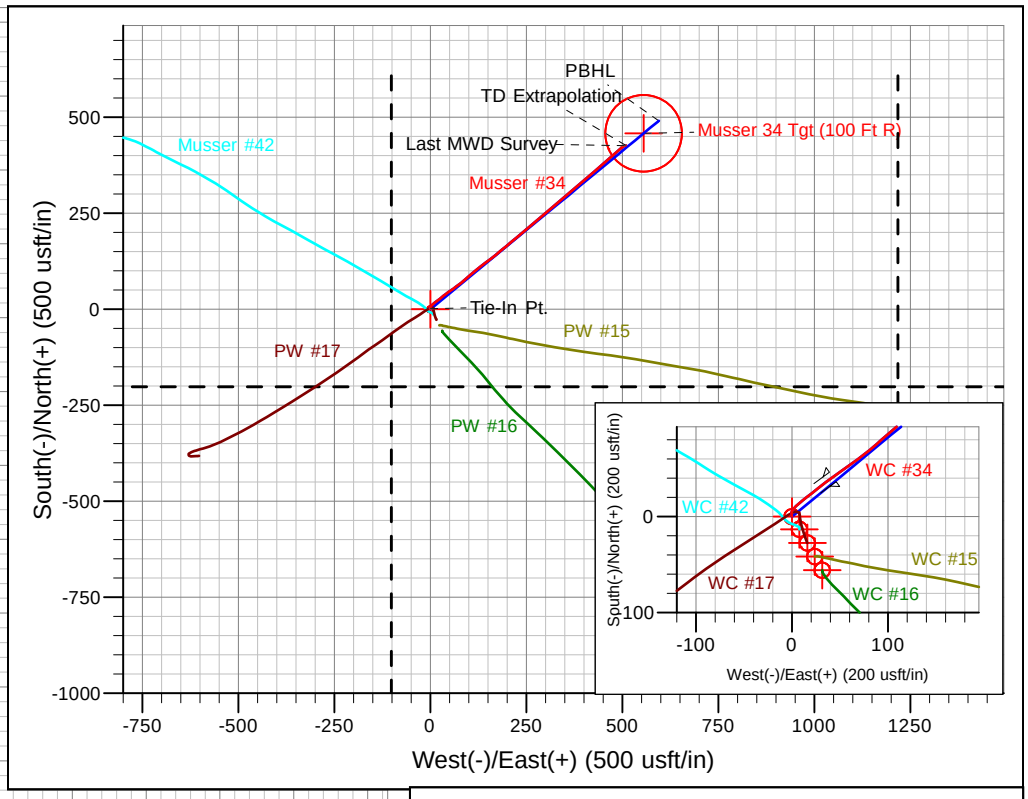
Moffat County, Colorado
Sec 15, T11N, R97W, 6 PM
Musser #34

10557-159

Survey: Final Surveys to TD

Wexpro Company
Project: Moffat County, Colorado
Site: Sec 15, T11N, R97W, 6 PM
Well: Musser #34
Wellbore: 10557-159
Design: Final Surveys

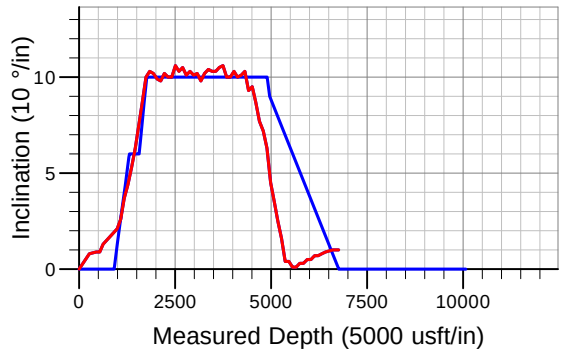




Ref Information: Well Center

Geodetic System: US State Plane 1983
Ellipsoid: GRS 1980
Zone: Colorado Northern Zone
Northing: 1596068.82
Easting: 2220937.24
Latitude: 40° 56' 8.041 N
Longitude: 108° 19' 12.000 W

Ground Elevation: 7037.0
KB Elevation: Actual KB @ 7065.0usft (SST 88)



ANNOTATIONS

TVD	MD	Annotation
266.0	266.0	Tie-In Pt.
1544.9	1547.0	Int Surface Csg
6555.7	6608.0	Last MWD Survey
6705.7	6758.0	TD Extrapolation

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Musser #34
Company:	Wexpro Company	**TVD Reference:**	Actual KB @ 7065.0usft (SST 88)
Project:	Moffat County, Colorado	**MD Reference:**	Actual KB @ 7065.0usft (SST 88)
Site:	Sec 15, T11N, R97W, 6 PM	**North Reference:**	True
Well:	Musser #34	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	10557-159		
Design:	Final Surveys		

Project Moffat County, Colorado

Map System:	US State Plane 1983	**System Datum:**	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

Site Sec 15, T11N, R97W, 6 PM

Site Position:		**Northing:**	1,596,083.30 usft	**Latitude:**	40° 56' 8.182 N
From:	Map	**Easting:**	2,220,929.13 usft	**Longitude:**	108° 19' 12.112 W
Position Uncertainty:	0.0 usft	**Slot Radius:**	13-3/16"	**Grid Convergence:**	-1.82 °

Well Musser #34

Well Position	**+N/-S**	-14.2 usft	**Northing:**	1,596,068.82 usft	**Latitude:**	40° 56' 8.041 N
	+E/-W	8.6 usft	**Easting:**	2,220,937.24 usft	**Longitude:**	108° 19' 12.000 W
Position Uncertainty		0.0 usft	**Wellhead Elevation:**	7,065.0 usft	**Ground Level:**	7,037.0 usft

Wellbore 10557-159

Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	IGRF2010	2/8/2011	10.74	66.87	53,007

Design Final Surveys

Audit Notes:

Version:	1.0	**Phase:**	ACTUAL	**Tie On Depth:**	0.0

Vertical Section:	**Depth From (TVD) (usft)**	**+N/-S (usft)**	**+E/-W (usft)**	**Direction (°)**
	0.0	0.0	0.0	50.48

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Musser #34
Company:	Wexpro Company	**TVD Reference:**	Actual KB @ 7065.0usft (SST 88)
Project:	Moffat County, Colorado	**MD Reference:**	Actual KB @ 7065.0usft (SST 88)
Site:	Sec 15, T11N, R97W, 6 PM	**North Reference:**	True
Well:	Musser #34	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	10557-159		
Design:	Final Surveys		

Survey

MD (usft)	Inc (°)	Azi (°)	TVD (usft)	SS (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	7,065.00	0.0	0.0	0.0	0.00	0.00	0.00
Tie-In Pt.										
266.0	**0.80**	**346.90**	**266.0**	**6,799.01**	**1.8**	**-0.4**	**0.8**	**0.30**	**0.30**	**0.00**
447.0	0.90	8.60	447.0	6,618.03	4.4	-0.5	2.4	0.18	0.06	11.99
538.0	0.90	29.40	538.0	6,527.04	5.8	0.0	3.6	0.36	0.00	22.86
628.0	1.30	38.00	627.9	6,437.06	7.2	0.9	5.3	0.48	0.44	9.56
719.0	1.50	41.00	718.9	6,346.09	8.9	2.4	7.5	0.23	0.22	3.30
810.0	1.70	41.70	809.9	6,255.12	10.8	4.0	10.0	0.22	0.22	0.77
901.0	1.90	46.00	900.8	6,164.17	12.9	6.0	12.8	0.27	0.22	4.73
993.0	2.10	54.80	992.8	6,072.22	14.9	8.5	16.0	0.40	0.22	9.57
1,084.0	2.60	48.80	1,083.7	5,981.30	17.2	11.4	19.8	0.61	0.55	-6.59
1,179.0	3.70	54.80	1,178.6	5,886.45	20.4	15.5	25.0	1.21	1.16	6.32
1,274.0	4.40	51.20	1,273.3	5,791.68	24.5	20.9	31.7	0.78	0.74	-3.79
1,368.0	5.30	51.00	1,367.0	5,698.02	29.4	27.1	39.6	0.96	0.96	-0.21
1,463.0	6.30	52.30	1,461.5	5,603.51	35.4	34.6	49.2	1.06	1.05	1.37
Int Surface Csg										
1,547.0	**7.38**	**53.90**	**1,544.9**	**5,520.10**	**41.4**	**42.6**	**59.2**	**1.31**	**1.29**	**1.90**
1,649.0	8.70	55.30	1,645.9	5,419.11	49.6	54.2	73.4	1.31	1.29	1.38
1,744.0	10.00	54.30	1,739.6	5,325.38	58.6	66.8	88.8	1.38	1.37	-1.05
1,840.0	10.30	49.50	1,834.1	5,230.88	69.0	80.1	105.7	0.93	0.31	-5.00
1,935.0	10.20	49.50	1,927.6	5,137.40	80.0	93.0	122.6	0.11	-0.11	0.00
2,031.0	9.90	48.30	2,022.1	5,042.87	91.0	105.6	139.4	0.38	-0.31	-1.25
2,126.0	9.80	52.00	2,115.7	4,949.27	101.4	118.1	155.6	0.67	-0.11	3.89
2,221.0	10.20	51.80	2,209.3	4,855.71	111.6	131.1	172.1	0.42	0.42	-0.21
2,317.0	10.00	52.80	2,303.8	4,761.20	121.9	144.4	188.9	0.28	-0.21	1.04
2,412.0	10.00	53.80	2,397.4	4,667.64	131.7	157.6	205.4	0.18	0.00	1.05
2,508.0	10.60	50.50	2,491.8	4,573.19	142.3	171.2	222.6	0.88	0.63	-3.44
2,603.0	10.30	50.00	2,585.2	4,479.77	153.3	184.4	239.8	0.33	-0.32	-0.53
2,698.0	10.50	50.30	2,678.7	4,386.33	164.3	197.6	256.9	0.22	0.21	0.32
2,794.0	10.10	51.20	2,773.1	4,291.88	175.1	210.9	274.1	0.45	-0.42	0.94
2,889.0	10.30	50.50	2,866.6	4,198.38	185.8	223.9	290.9	0.25	0.21	-0.74
2,984.0	10.10	50.00	2,960.1	4,104.88	196.5	236.8	307.7	0.23	-0.21	-0.53
3,080.0	10.20	47.80	3,054.6	4,010.38	207.6	249.6	324.7	0.42	0.10	-2.29
3,175.0	9.80	49.50	3,148.2	3,916.83	218.5	262.0	341.1	0.52	-0.42	1.79
3,270.0	10.20	49.80	3,241.7	3,823.27	229.2	274.5	357.6	0.42	0.42	0.32
3,366.0	10.40	49.50	3,336.2	3,728.82	240.3	287.6	374.8	0.22	0.21	-0.31
3,461.0	10.30	49.80	3,429.6	3,635.36	251.4	300.6	391.9	0.12	-0.11	0.32
3,557.0	10.30	50.80	3,524.1	3,540.91	262.3	313.8	409.0	0.19	0.00	1.04
3,652.0	10.50	51.80	3,617.5	3,447.47	273.1	327.2	426.2	0.28	0.21	1.05
3,747.0	10.60	50.00	3,710.9	3,354.08	284.0	340.7	443.6	0.36	0.11	-1.89
3,842.0	10.00	49.30	3,804.4	3,260.61	295.0	353.7	460.6	0.65	-0.63	-0.74
3,937.0	10.00	48.50	3,897.9	3,167.05	305.9	366.1	477.0	0.15	0.00	-0.84
4,032.0	10.30	49.00	3,991.5	3,073.54	316.9	378.7	493.8	0.33	0.32	0.53
4,128.0	10.00	49.50	4,086.0	2,979.04	328.0	391.5	510.7	0.33	-0.31	0.52
4,223.0	10.10	48.30	4,179.5	2,885.50	338.8	404.0	527.3	0.24	0.11	-1.26
4,319.0	10.30	48.00	4,274.0	2,791.02	350.2	416.6	544.2	0.22	0.21	-0.31
4,414.0	9.30	51.20	4,367.6	2,697.41	360.7	428.9	560.4	1.20	-1.05	3.37
4,510.0	9.50	49.50	4,462.3	2,602.69	370.7	441.0	576.1	0.36	0.21	-1.77
4,605.0	8.70	47.70	4,556.1	2,508.89	380.6	452.3	591.1	0.89	-0.84	-1.89
4,700.0	7.70	50.50	4,650.1	2,414.86	389.5	462.5	604.6	1.13	-1.05	2.95
4,796.0	7.20	50.20	4,745.3	2,319.67	397.4	472.1	617.1	0.52	-0.52	-0.31
4,891.0	6.30	47.30	4,839.7	2,225.33	404.8	480.5	628.2	1.01	-0.95	-3.05
4,987.0	4.50	46.30	4,935.2	2,129.76	411.0	487.1	637.3	1.88	-1.88	-1.04
5,082.0	3.50	50.20	5,030.0	2,035.00	415.4	492.0	643.9	1.09	-1.05	4.11

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Musser #34
Company:	Wexpro Company	**TVD Reference:**	Actual KB @ 7065.0usft (SST 88)
Project:	Moffat County, Colorado	**MD Reference:**	Actual KB @ 7065.0usft (SST 88)
Site:	Sec 15, T11N, R97W, 6 PM	**North Reference:**	True
Well:	Musser #34	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	10557-159		
Design:	Final Surveys		

Survey

MD (usft)	Inc (°)	Azi (°)	TVD (usft)	SS (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,178.0	2.50	53.30	5,125.9	1,939.13	418.5	495.9	648.9	1.05	-1.04	3.23
5,273.0	1.60	46.00	5,220.8	1,844.19	420.7	498.6	652.3	0.98	-0.95	-7.68
5,368.0	0.40	222.90	5,315.8	1,749.20	421.4	499.3	653.3	2.10	-1.26	186.21
5,464.0	0.40	235.40	5,411.8	1,653.21	420.9	498.8	652.6	0.09	0.00	13.02
5,559.0	0.10	324.50	5,506.8	1,558.21	420.8	498.5	652.3	0.43	-0.32	93.79
5,655.0	0.10	66.80	5,602.8	1,462.21	420.9	498.5	652.4	0.16	0.00	106.56
5,750.0	0.30	10.50	5,697.8	1,367.21	421.2	498.6	652.7	0.27	0.21	-59.26
5,845.0	0.30	72.70	5,792.8	1,272.21	421.5	498.9	653.1	0.33	0.00	65.47
5,941.0	0.50	27.90	5,888.8	1,176.21	421.9	499.3	653.7	0.37	0.21	-46.67
6,036.0	0.50	41.50	5,983.8	1,081.22	422.6	499.8	654.5	0.12	0.00	14.32
6,131.0	0.70	66.40	6,078.8	986.22	423.2	500.6	655.5	0.34	0.21	26.21
6,226.0	0.70	54.20	6,173.8	891.23	423.7	501.6	656.6	0.16	0.00	-12.84
6,322.0	0.80	56.20	6,269.8	795.24	424.5	502.6	657.8	0.11	0.10	2.08
6,417.0	0.90	60.30	6,364.8	700.25	425.2	503.8	659.2	0.12	0.11	4.32
Last MWD Survey										
6,608.0	**1.00**	**70.80**	**6,555.7**	**509.25**	**426.5**	**506.7**	**662.3**	**0.10**	**0.05**	**5.50**
TD Extrapolation										
6,758.0	**1.00**	**70.80**	**6,705.7**	**359.27**	**427.3**	**509.2**	**664.7**	**0.00**	**0.00**	**0.00**

Casing Points

MD (usft)	TVD (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,547.0	1,544.9	Int Surface Csg	9-5/8	12-1/4

Survey Annotations

MD (usft)	TVD (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
266.0	266.0	1.8	-0.4	Tie-In Pt.
1,547.0	1,544.9	41.4	42.6	Int Surface Csg
6,608.0	6,555.7	426.5	506.7	Last MWD Survey
6,758.0	6,705.7	427.3	509.2	TD Extrapolation