



DATE: APRIL 4,2013

WELL NAME: HERRING DRAW 5-33

COUNTY, STATE: MOFFAT COUNTY, CO.

WELL SHL (footages): 1205' FNL, 1012' FWL

LATITUDE\LONGITUDE: 40° 20' 44.76 N \ 107° 30' 20.180 W

TOOL TYPE: LWD

BIT to SENSOR (ft): 66'

RIG NAME: SAVANNA 650

KB (ft): 6815'

GL (ft): 6800'

TVD REFERENCE (ft): 2758.68'

FIRST SURVEY (ft): 183'

LAST SURVEY (ft): 6504'

SURVEY PERSONNEL: SCOTT PARMENTER

SURVEY DATE: 3/21/13

NORTH REFERENCE: True

The data and calculations for this survey have been checked by me and conform to the calibration standards and operational procedures set forth by Weatherford International Ltd. I am authorized and qualified to review the data, calculations and this report, and that the report represents a true and correct Directional Survey of this well based on the original data corrected to True North and obtained at the well site. Wellbore coordinates are calculated using minimum curvature method.

Matt Maydew



Project: MOFFAT COUNTY, CO
Site: HERRING DRAW 5-33
Well: HERRING DRAW 5-33
Wellbore: HERRING DRAW 5-33
Design: HERRING DRAW 5-33
Latitude: 40° 20' 44.760 N
Longitude: 107° 30' 20.180 W
GL: 6800.00
KB: KB @ 6815.00ft (SAVANNA 650)



WELLBORE TARGET DETAILS (LAT/LONG)

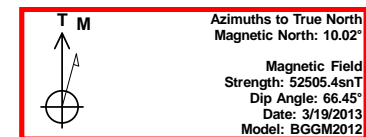
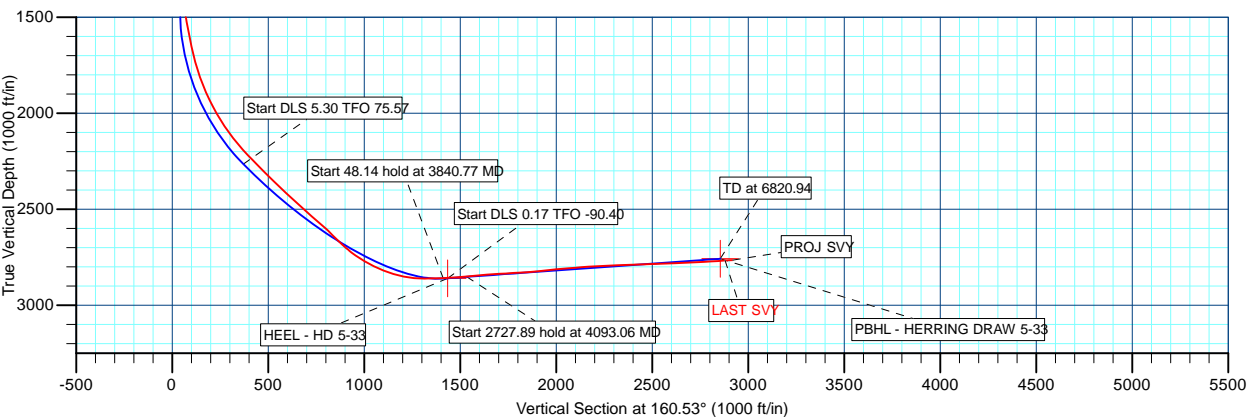
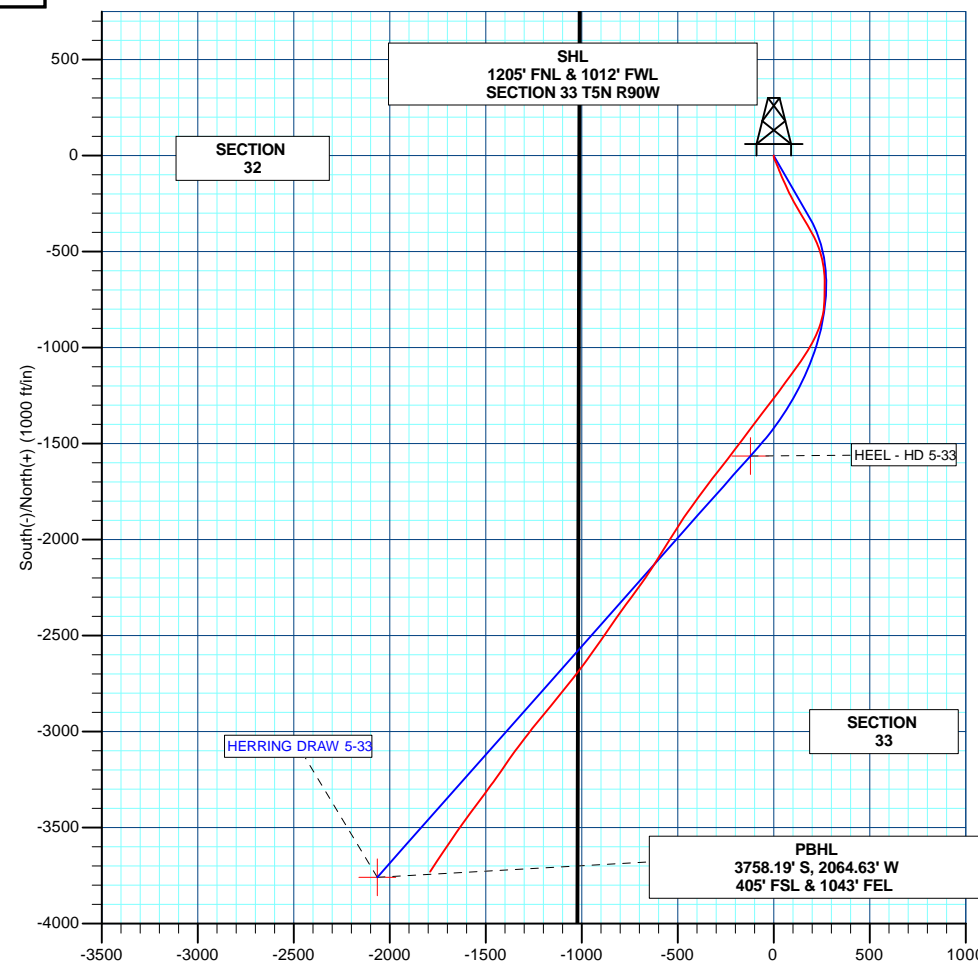
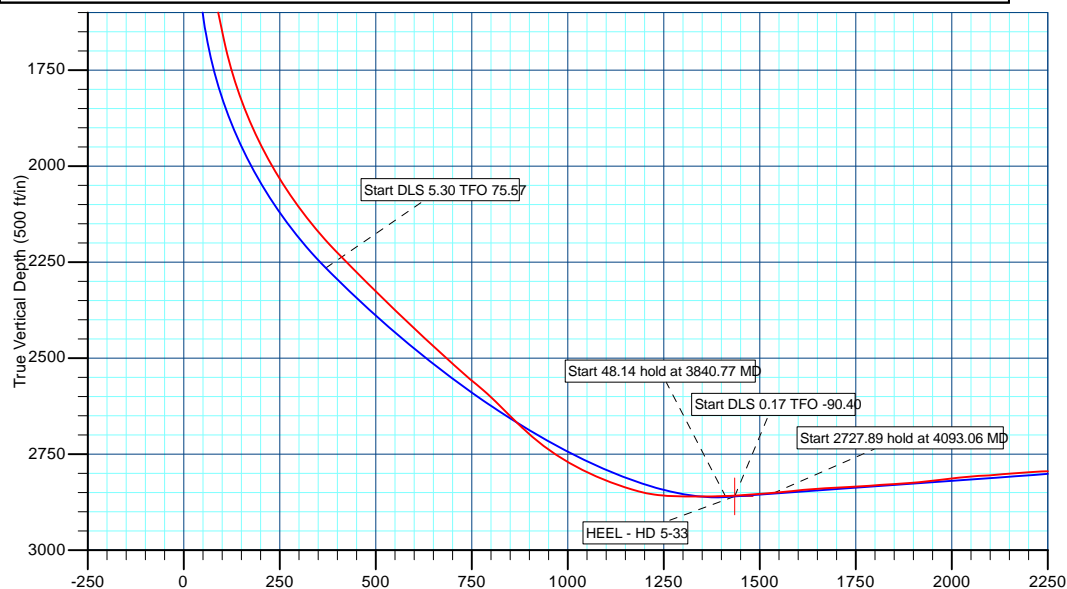
Name	TVD	+N/-S	+E/-W	Latitude	Longitude	Shape
PBHL - HERRING DRAW 5-33	2758.68	-3758.19	-2064.63	40° 20' 7.620 N	107° 30' 46.842 W	Point
HEEL - HD 5-33	2860.00	-1564.70	-121.65	40° 20' 29.297 N	107° 30' 21.751 W	Point

WELL DETAILS: HERRING DRAW 5-33

+N/-S	+E/-W	Northing	Easting	Ground Level: 6800.00	Latitude	Longitude	Slot
0.00	0.00	1375125.13	2441018.89		40° 20' 44.760 N	107° 30' 20.180 W	

SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSeet	Annotation
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	Start Build 1.00
400.00	2.00	150.00	399.96	-3.02	1.75	1.00	150.00	1.81	Start 1095.89 hold at 400.00 MD
1495.89	2.00	150.00	1495.18	-36.14	20.87	0.00	0.00	21.63	Start Build 5.00
2355.89	45.00	150.00	2265.48	-326.21	188.33	5.00	0.00	195.22	Start DLS 5.30 TFO 75.57
3840.77	91.98	221.87	2861.67	-1528.87	-89.54	5.30	75.57	1383.09	Start 48.14 hold at 3840.77 MD
3888.91	91.98	221.87	2860.00	-1564.70	-121.65	0.00	0.00	1429.95	Start DLS 0.17 TFO -90.40
4093.06	91.98	221.52	2852.94	-1717.05	-257.36	0.17	-90.40	1628.83	Start 2727.89 hold at 4093.06 MD
6820.94	91.98	221.52	2758.68	-3758.19	-2064.63	0.00	0.00	4287.97	TD at 6820.94



Survey: WFT Surveys (HERRING DRAW 5-33/HERRING DRAW 5-33)

Created By: MATT MAYDEW

Date: 6:41, April 01 2013



SHELL E&P

MOFFAT COUNTY, CO

HERRING DRAW 5-33

HERRING DRAW 5-33

HERRING DRAW 5-33

Survey: WFT Surveys

Standard Survey Report

01 April, 2013



Weatherford®



Company:	SHELL E&P	Local Co-ordinate Reference:	Well HERRING DRAW 5-33
Project:	MOFFAT COUNTY, CO	TVD Reference:	KB @ 6815.00ft (SAVANNA 650)
Site:	HERRING DRAW 5-33	MD Reference:	KB @ 6815.00ft (SAVANNA 650)
Well:	HERRING DRAW 5-33	North Reference:	True
Wellbore:	HERRING DRAW 5-33	Survey Calculation Method:	Minimum Curvature
Design:	HERRING DRAW 5-33	Database:	EDM 5000.1 Single User Db

Project	MOFFAT 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		HERRING DRAW 5-33			
Site Position:		Northing:	1,375,125.13 usft	Latitude:	40° 20' 44.760 N
From:	Lat/Long	Easting:	2,441,018.89 usft	Longitude:	107° 30' 20.180 W
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.30 °

Well	HERRING DRAW 5-33					
Well Position	+N/-S	0.00 ft	Northing:	1,375,125.13 usft	Latitude:	40° 20' 44.760 N
	+E/-W	0.00 ft	Easting:	2,441,018.89 usft	Longitude:	107° 30' 20.180 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	6,800.00 ft

Wellbore	HERRING DRAW 5-33				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2012	3/19/2013	10.02	66.45	52,505

Design		HERRING DRAW 5-33		
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	160.53

Survey Program	Date	4/1/2013			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
183.00	6,570.00	WFT Surveys (HERRING DRAW 5-33)	MWD	MWD - Standard	

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	
183.00	0.45	223.50	183.00	-0.52	-0.49	0.33	0.25	0.25	0.00	
244.00	0.97	184.98	243.99	-1.21	-0.70	0.91	1.11	0.85	-63.15	
305.00	1.94	126.59	304.98	-2.34	0.08	2.23	2.71	1.59	-95.72	
367.00	1.81	180.23	366.95	-3.94	0.92	4.02	2.73	-0.21	86.52	
428.00	2.36	185.89	427.91	-6.16	0.79	6.07	0.96	0.90	9.28	
489.00	2.70	172.12	488.85	-8.83	0.85	8.61	1.14	0.56	-22.57	
550.00	3.31	158.99	549.76	-11.90	1.68	11.78	1.50	1.00	-21.52	
611.00	3.50	161.27	610.66	-15.30	2.91	15.40	0.38	0.31	3.74	
645.00	3.64	161.91	644.59	-17.31	3.58	17.52	0.43	0.41	1.88	
793.00	3.34	156.40	792.32	-25.73	6.76	26.51	0.30	-0.20	-3.72	
855.00	2.68	146.48	854.23	-28.59	8.29	29.72	1.35	-1.06	-16.00	
916.00	2.83	160.66	915.16	-31.20	9.57	32.61	1.14	0.25	23.25	



Company:	SHELL E&P	Local Co-ordinate Reference:	Well HERRING DRAW 5-33
Project:	MOFFAT COUNTY, CO	TVD Reference:	KB @ 6815.00ft (SAVANNA 650)
Site:	HERRING DRAW 5-33	MD Reference:	KB @ 6815.00ft (SAVANNA 650)
Well:	HERRING DRAW 5-33	North Reference:	True
Wellbore:	HERRING DRAW 5-33	Survey Calculation Method:	Minimum Curvature
Design:	HERRING DRAW 5-33	Database:	EDM 5000.1 Single User Db

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)	
978.00	2.71	152.60	977.09	-33.95	10.76	35.59	0.66	-0.19	-13.00	
1,041.00	2.50	143.06	1,040.02	-36.37	12.27	38.38	0.76	-0.33	-15.14	
1,107.00	2.68	156.10	1,105.96	-38.93	13.76	41.29	0.93	0.27	19.76	
1,170.00	3.26	170.45	1,168.87	-42.04	14.65	44.52	1.49	0.92	22.78	
1,233.00	3.53	155.47	1,231.76	-45.57	15.75	48.22	1.47	0.43	-23.78	
1,296.00	3.35	152.29	1,294.65	-48.97	17.41	51.97	0.42	-0.29	-5.05	
1,359.00	3.17	158.99	1,357.55	-52.22	18.90	55.54	0.67	-0.29	10.63	
1,425.00	5.55	157.05	1,423.35	-56.87	20.79	60.55	3.61	3.61	-2.94	
1,486.00	8.73	158.29	1,483.87	-63.89	23.66	68.12	5.22	5.21	2.03	
1,551.00	11.11	156.88	1,547.90	-74.23	27.94	79.30	3.68	3.66	-2.17	
1,614.00	11.81	157.05	1,609.64	-85.75	32.84	91.79	1.11	1.11	0.27	
1,677.00	12.16	159.52	1,671.27	-97.90	37.67	104.86	0.99	0.56	3.92	
1,740.00	15.07	158.64	1,732.49	-111.75	42.98	119.68	4.63	4.62	-1.40	
1,803.00	18.25	155.64	1,792.84	-128.37	50.03	137.70	5.23	5.05	-4.76	
1,866.00	21.86	155.11	1,852.01	-148.00	59.04	159.22	5.74	5.73	-0.84	
1,929.00	25.03	154.94	1,909.80	-170.72	69.63	184.16	5.03	5.03	-0.27	
1,993.00	27.59	154.06	1,967.17	-196.31	81.85	212.37	4.05	4.00	-1.38	
2,056.00	31.20	152.29	2,022.05	-223.89	95.82	243.02	5.89	5.73	-2.81	
2,119.00	34.66	149.99	2,074.92	-253.86	112.37	276.80	5.84	5.49	-3.65	
2,182.00	38.40	149.58	2,125.53	-286.25	131.25	313.63	5.95	5.94	-0.65	
2,245.00	41.29	149.16	2,173.90	-320.98	151.81	353.23	4.61	4.59	-0.67	
2,307.00	43.74	149.60	2,219.60	-357.04	173.15	394.34	3.98	3.95	0.71	
2,372.00	45.24	151.11	2,265.96	-396.63	195.67	439.17	2.82	2.31	2.32	
2,435.00	45.59	154.33	2,310.19	-436.50	216.23	483.61	3.68	0.56	5.11	
2,498.00	45.70	159.34	2,354.25	-477.88	233.94	528.54	5.69	0.17	7.95	
2,561.00	46.81	165.51	2,397.83	-521.24	247.64	573.98	7.29	1.76	9.79	
2,626.00	47.37	170.30	2,442.10	-567.76	257.60	621.16	5.46	0.86	7.37	
2,689.00	48.30	174.81	2,484.41	-614.05	263.64	666.81	5.51	1.48	7.16	
2,749.00	49.96	179.35	2,523.68	-659.34	265.93	710.27	6.35	2.77	7.57	
2,843.00	52.09	182.55	2,582.81	-732.38	264.68	778.72	3.48	2.27	3.40	
2,875.00	48.65	181.81	2,603.21	-757.01	263.74	801.63	10.90	-10.75	-2.31	
2,907.00	47.02	182.61	2,624.69	-780.71	262.83	823.67	5.42	-5.09	2.50	
2,938.00	48.37	187.33	2,645.57	-803.53	260.84	844.52	12.07	4.35	15.23	
2,970.00	50.58	192.08	2,666.36	-827.49	256.72	865.74	13.23	6.91	14.84	
3,033.00	55.52	198.48	2,704.25	-875.98	243.38	907.00	11.28	7.84	10.16	
3,096.00	62.21	203.38	2,736.82	-926.26	224.06	947.97	12.53	10.62	7.78	
3,159.00	68.27	208.83	2,763.21	-977.56	198.85	987.93	12.42	9.62	8.65	
3,223.00	71.61	212.64	2,785.16	-1,029.20	168.12	1,026.37	7.65	5.22	5.95	
3,286.00	75.09	214.67	2,803.21	-1,079.42	134.67	1,062.57	6.33	5.52	3.22	
3,349.00	78.21	216.24	2,817.76	-1,129.34	99.12	1,097.78	5.51	4.95	2.49	
3,412.00	78.83	216.10	2,830.30	-1,179.18	62.68	1,132.62	1.01	0.98	-0.22	
3,475.00	79.70	216.30	2,842.03	-1,229.13	26.12	1,167.53	1.42	1.38	0.32	
3,507.00	81.91	216.88	2,847.15	-1,254.49	7.29	1,185.16	7.13	6.91	1.81	
3,539.00	83.20	217.66	2,851.29	-1,279.74	-11.92	1,202.56	4.70	4.03	2.44	
3,602.00	86.85	217.93	2,856.76	-1,329.33	-50.38	1,236.49	5.81	5.79	0.43	
3,665.00	88.70	216.85	2,859.20	-1,379.35	-88.60	1,270.90	3.40	2.94	-1.71	
3,728.00	89.08	216.65	2,860.42	-1,429.81	-126.29	1,305.92	0.68	0.60	-0.32	
3,792.00	90.06	216.66	2,860.90	-1,481.16	-164.50	1,341.58	1.53	1.53	0.02	
HEEL - HD 5-33										
3,833.12	90.50	216.95	2,860.70	-1,514.08	-189.13	1,364.41	1.29	1.08	0.70	
3,855.00	90.74	217.10	2,860.46	-1,531.55	-202.30	1,376.49	1.29	1.08	0.70	
3,918.00	91.30	217.64	2,859.34	-1,581.61	-240.54	1,410.94	1.23	0.89	0.86	
3,981.00	91.85	218.01	2,857.61	-1,631.35	-279.16	1,444.96	1.05	0.87	0.59	
4,044.00	92.16	218.08	2,855.40	-1,680.94	-317.96	1,478.77	0.50	0.49	0.11	



Company:	SHELL E&P	Local Co-ordinate Reference:	Well HERRING DRAW 5-33
Project:	MOFFAT COUNTY, CO	TVD Reference:	KB @ 6815.00ft (SAVANNA 650)
Site:	HERRING DRAW 5-33	MD Reference:	KB @ 6815.00ft (SAVANNA 650)
Well:	HERRING DRAW 5-33	North Reference:	True
Wellbore:	HERRING DRAW 5-33	Survey Calculation Method:	Minimum Curvature
Design:	HERRING DRAW 5-33	Database:	EDM 5000.1 Single User Db

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)
4,107.00	92.29	216.74	2,852.96	-1,730.94	-356.20	1,513.16	2.14	0.21	-2.13
4,171.00	93.02	216.59	2,849.99	-1,782.22	-394.38	1,548.78	1.16	1.14	-0.23
4,234.00	93.64	215.37	2,846.33	-1,833.11	-431.33	1,584.45	2.17	0.98	-1.94
4,297.00	93.39	213.76	2,842.47	-1,884.89	-467.00	1,621.37	2.58	-0.40	-2.56
4,360.00	91.54	213.24	2,839.76	-1,937.38	-501.74	1,659.27	3.05	-2.94	-0.83
4,424.00	91.79	212.33	2,837.90	-1,991.16	-536.38	1,698.43	1.47	0.39	-1.42
4,487.00	92.16	211.46	2,835.73	-2,044.61	-569.65	1,737.74	1.50	0.59	-1.38
4,550.00	92.96	211.41	2,832.92	-2,098.31	-602.47	1,777.42	1.27	1.27	-0.08
4,611.00	91.85	213.85	2,830.36	-2,149.64	-635.33	1,814.85	4.39	-1.82	4.00
4,671.00	92.65	214.06	2,828.00	-2,199.37	-668.82	1,850.57	1.38	1.33	0.35
4,733.00	91.91	216.32	2,825.53	-2,249.99	-704.51	1,886.40	3.83	-1.19	3.65
4,796.00	93.08	216.30	2,822.79	-2,300.71	-741.78	1,921.79	1.86	1.86	-0.03
4,857.00	94.20	216.19	2,818.92	-2,349.81	-777.78	1,956.08	1.84	1.84	-0.18
4,918.00	94.99	215.25	2,814.03	-2,399.17	-813.28	1,990.79	2.01	1.30	-1.54
4,979.00	92.28	214.37	2,810.17	-2,449.15	-848.02	2,026.32	4.67	-4.44	-1.44
5,040.00	91.60	214.61	2,808.10	-2,499.40	-882.55	2,062.19	1.18	-1.11	0.39
5,101.00	92.84	215.12	2,805.74	-2,549.41	-917.39	2,097.72	2.20	2.03	0.84
5,163.00	93.15	215.55	2,802.50	-2,599.92	-953.20	2,133.40	0.85	0.50	0.69
5,224.00	92.04	216.92	2,799.74	-2,649.07	-989.22	2,167.74	2.89	-1.82	2.25
5,285.00	92.59	217.77	2,797.27	-2,697.52	-1,026.19	2,201.09	1.66	0.90	1.39
5,347.00	90.74	218.31	2,795.47	-2,746.33	-1,064.38	2,234.38	3.11	-2.98	0.87
5,410.00	91.18	219.09	2,794.42	-2,795.49	-1,103.76	2,267.59	1.42	0.70	1.24
5,469.00	91.36	219.06	2,793.11	-2,841.28	-1,140.94	2,298.37	0.31	0.31	-0.05
5,530.00	91.48	218.84	2,791.60	-2,888.71	-1,179.28	2,330.30	0.41	0.20	-0.36
5,592.00	90.06	219.74	2,790.76	-2,936.69	-1,218.53	2,362.45	2.71	-2.29	1.45
5,653.00	90.74	218.97	2,790.34	-2,983.85	-1,257.21	2,394.02	1.68	1.11	-1.26
5,715.00	91.36	217.64	2,789.20	-3,032.49	-1,295.64	2,427.07	2.37	1.00	-2.15
5,775.00	91.42	216.88	2,787.75	-3,080.23	-1,331.95	2,459.97	1.27	0.10	-1.27
5,836.00	91.60	214.70	2,786.14	-3,129.69	-1,367.61	2,494.72	3.58	0.30	-3.57
5,897.00	91.79	214.44	2,784.33	-3,179.90	-1,402.21	2,530.52	0.53	0.31	-0.43
5,958.00	91.05	215.01	2,782.82	-3,230.02	-1,436.94	2,566.19	1.53	-1.21	0.93
6,018.00	90.62	217.17	2,781.95	-3,278.50	-1,472.28	2,600.11	3.67	-0.72	3.60
6,079.00	90.92	215.86	2,781.13	-3,327.52	-1,508.57	2,634.23	2.20	0.49	-2.15
6,140.00	91.42	217.09	2,779.88	-3,376.56	-1,544.83	2,668.38	2.18	0.82	2.02
6,201.00	91.48	216.54	2,778.34	-3,425.38	-1,581.37	2,702.22	0.91	0.10	-0.90
6,261.00	91.79	215.57	2,776.63	-3,473.86	-1,616.67	2,736.17	1.70	0.52	-1.62
6,321.00	91.91	214.85	2,774.69	-3,522.86	-1,651.25	2,770.83	1.22	0.20	-1.20
6,382.00	91.97	214.36	2,772.62	-3,573.04	-1,685.87	2,806.60	0.81	0.10	-0.80
6,443.00	92.22	213.70	2,770.39	-3,623.56	-1,719.98	2,842.85	1.16	0.41	-1.08
LAST SVY									
6,504.00	92.28	213.15	2,768.00	-3,674.43	-1,753.56	2,879.62	0.91	0.10	-0.90
PROJ SVY - PBHL - HERRING DRAW 5-33									
6,570.00	92.28	213.15	2,765.37	-3,729.65	-1,789.62	2,919.66	0.00	0.00	0.00

Survey Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
6,504.00	2,768.00	-3,674.43	-1,753.56	LAST SVY
6,570.00	2,765.37	-3,729.65	-1,789.62	PROJ SVY



Company:	SHELL E&P	Local Co-ordinate Reference:	Well HERRING DRAW 5-33
Project:	MOFFAT COUNTY, CO	TVD Reference:	KB @ 6815.00ft (SAVANNA 650)
Site:	HERRING DRAW 5-33	MD Reference:	KB @ 6815.00ft (SAVANNA 650)
Well:	HERRING DRAW 5-33	North Reference:	True
Wellbore:	HERRING DRAW 5-33	Survey Calculation Method:	Minimum Curvature
Design:	HERRING DRAW 5-33	Database:	EDM 5000.1 Single User Db

Checked By: _____ Approved By: _____ Date: _____