



COG Operating LLC

Eddy County, NM (NAD-27 2015)

Dodd Federal Unit #930H

API #: 30-015-43782

SHL: 100' FNL, 1070' FEL, Sec 22, T17S, R29E, Unit A

PP: 330' FNL, 889' FEL, Sec 22, T17S, R29E, Unit A

BHL: 231' FSL, 981' FEL, Sec 22, T17S, R29E, Unit P

Design: BHL: 220' FSL, 976' FEL, Sec 22, T17S, R29E, Unit P

Standard Survey Report

06 March, 2017

**NM OIL CONSERVATION
ARTESIA DISTRICT**

JUN 08 2017

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TDS
Survey Report



Company: COG Operating LLC
Project: Eddy County, NM (NAD-27 2015)
Site: Dodd Federal Unit #930H
Well: SHL: 100' FNL, 1070' FEL, Sec 22, T17S, R29E, Unit A
Wellbore: BHL: 220' FSL, 976' FEL, Sec 22, T17S, R29E, Unit P
Design: BHL: 220' FSL, 976' FEL, Sec 22, T17S, R29E, Unit P

Local Co-ordinate Reference: Well SHL: 100' FNL, 1070' FEL, Sec 22, T17S, R29E, Unit A
TVD Reference: KB @ 3587.00usft (Silver Oak #3)
MD Reference: KB @ 3587.00usft (Silver Oak #3)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Project Eddy County, NM (NAD-27 2015)

Map System: US State Plane 1927 (Exact solution)
Geo Datum: NAD 1927 (NADCON CONUS)
Map Zone: New Mexico East 3001

System Datum: Mean Sea Level

Site Dodd Federal Unit #930H

Site Position: **Map** **Northing:** 664,659.50 usft **Latitude:** 32° 49' 36.951 N
From: **Easting:** 584,875.80 usft **Longitude:** 104° 3' 25.300 W
Position Uncertainty: 0.00 usft **Slot Radius:** 13.20 in **Grid Convergence:** 0.15 °

Well SHL: 100' FNL, 1070' FEL, Sec 22, T17S, R29E, Unit A

Well Position **+N/-S** 0.00 usft **Northing:** 664,659.50 usft **Latitude:** 32° 49' 36.951 N
+E/-W 0.00 usft **Easting:** 584,875.80 usft **Longitude:** 104° 3' 25.300 W
Position Uncertainty 0.00 usft **Wellhead Elevation:** 0.00 usft **Ground Level:** 3,569.00 usft

Wellbore BHL: 220' FSL, 976' FEL, Sec 22, T17S, R29E, Unit P

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	11/13/2015	7.40	60.56	48,407

Design BHL: 220' FSL, 976' FEL, Sec 22, T17S, R29E, Unit P

Audit Notes:

Version: 1.0 **Phase:** ACTUAL **Tie On Depth:** 0.00

Vertical Section:

Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
0.00	0.00	0.00	178.72

Survey Program **Date** 3/6/2017

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
25.00	830.00	VES Gyro #1 (BHL: 220' FSL, 976' FEL, S	VES-ISCWSA-GYRO-3	Biaxial Semi-Cont. Gyro
830.00	9,430.00	TDS MWD #2 (BHL: 220' FSL, 976' FEL, S	MWD	MWD - Standard

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	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	0.11	75.96	25.00	0.01	0.02	-0.01	0.44	0.44	0.00
50.00	0.06	16.99	50.00	0.02	0.05	-0.02	0.38	-0.20	-235.88
75.00	0.17	315.00	75.00	0.06	0.03	-0.06	0.61	0.44	-247.96
100.00	0.31	303.62	100.00	0.13	-0.05	-0.13	0.59	0.56	-45.52
125.00	0.30	263.43	125.00	0.16	-0.18	-0.16	0.84	-0.04	-160.76
150.00	0.32	252.70	150.00	0.13	-0.31	-0.14	0.25	0.08	-42.92



TDS
Survey Report



Company: COG Operating LLC

Local Co-ordinate Reference: Well SHL: 100' FNL, 1070' FEL, Sec 22, T17S, R29E, Unit A

Project: Eddy County, NM (NAD-27 2015)

TVD Reference: KB @ 3587.00usft (Silver Oak #3)

Site: Dodd Federal Unit #930H

MD Reference: KB @ 3587.00usft (Silver Oak #3)

Well: SHL: 100' FNL, 1070' FEL, Sec 22, T17S, R29E, Unit A

North Reference: Grid

Wellbore: BHL: 220' FSL, 976' FEL, Sec 22, T17S, R29E, Unit P

Survey Calculation Method: Minimum Curvature

Design: BHL: 220' FSL, 976' FEL, Sec 22, T17S, R29E, Unit P

Database: EDM 5000.1 Single User Db

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
175.00	0.35	247.70	175.00	0.08	-0.44	-0.09	0.17	0.12	-20.00
200.00	0.38	230.84	200.00	0.00	-0.58	-0.01	0.44	0.12	-67.44
225.00	0.25	239.96	225.00	-0.08	-0.69	0.07	0.56	-0.52	36.48
250.00	0.23	243.27	250.00	-0.13	-0.78	0.11	0.10	-0.08	13.24
275.00	0.26	268.21	275.00	-0.16	-0.88	0.14	0.44	0.12	99.76
300.00	0.31	273.48	300.00	-0.15	-1.01	0.13	0.23	0.20	21.08
325.00	0.33	264.06	325.00	-0.16	-1.15	0.13	0.22	0.08	-37.68
350.00	0.27	250.02	350.00	-0.19	-1.28	0.16	0.38	-0.24	-56.16
375.00	0.26	220.91	375.00	-0.25	-1.37	0.22	0.53	-0.04	-116.44
400.00	0.18	203.75	400.00	-0.33	-1.42	0.30	0.41	-0.32	-68.64
425.00	0.12	173.37	425.00	-0.39	-1.43	0.36	0.39	-0.24	-121.52
450.00	0.14	172.45	450.00	-0.45	-1.43	0.41	0.08	0.08	-3.68
475.00	0.02	123.07	475.00	-0.48	-1.42	0.45	0.51	-0.48	-197.52
500.00	0.10	74.15	500.00	-0.47	-1.39	0.44	0.35	0.32	-195.68
525.00	0.24	51.07	525.00	-0.44	-1.33	0.41	0.61	0.56	-92.32
550.00	0.34	50.64	550.00	-0.36	-1.23	0.33	0.40	0.40	-1.72
575.00	0.42	41.51	574.99	-0.24	-1.12	0.21	0.40	0.32	-36.52
600.00	0.46	37.47	599.99	-0.09	-0.99	0.07	0.20	0.16	-16.16
625.00	0.46	39.45	624.99	0.07	-0.87	-0.08	0.06	0.00	7.92
650.00	0.52	43.48	649.99	0.23	-0.73	-0.24	0.28	0.24	16.12
675.00	0.48	40.82	674.99	0.39	-0.58	-0.40	0.18	-0.16	-10.64
700.00	0.60	48.64	699.99	0.55	-0.41	-0.56	0.56	0.48	31.28
725.00	0.47	60.94	724.99	0.69	-0.23	-0.69	0.69	-0.52	49.20
750.00	0.45	80.58	749.99	0.75	-0.04	-0.76	0.63	-0.08	78.56
775.00	0.38	87.23	774.99	0.77	0.14	-0.77	0.34	-0.28	26.60
800.00	0.31	99.08	799.99	0.77	0.29	-0.76	0.40	-0.28	47.40
830.00	0.27	93.37	829.99	0.75	0.44	-0.74	0.16	-0.13	-19.03
Tie-In to VES Gyro									
902.00	0.30	84.70	901.99	0.76	0.80	-0.74	0.07	0.04	-12.04
First TDS MWD Survey									
997.00	0.30	123.20	996.98	0.65	1.25	-0.62	0.21	0.00	40.53
1,092.00	2.20	75.20	1,091.96	0.98	3.22	-0.90	2.12	2.00	-50.53
1,187.00	3.30	88.10	1,186.85	1.53	7.72	-1.36	1.32	1.16	13.58
1,281.00	3.10	88.10	1,280.70	1.71	12.96	-1.42	0.21	-0.21	0.00
1,376.00	3.00	86.80	1,375.57	1.93	18.01	-1.53	0.13	-0.11	-1.37
1,471.00	2.70	86.50	1,470.45	2.20	22.73	-1.70	0.32	-0.32	-0.32
1,566.00	3.80	90.70	1,565.30	2.30	28.11	-1.67	1.18	1.16	4.42
1,661.00	4.00	92.30	1,660.08	2.13	34.57	-1.36	0.24	0.21	1.68
1,755.00	3.60	96.40	1,753.87	1.67	40.78	-0.76	0.51	-0.43	4.36
1,850.00	3.40	95.70	1,848.69	1.06	46.54	-0.02	0.22	-0.21	-0.74
1,945.00	3.00	97.60	1,943.54	0.45	51.81	0.71	0.44	-0.42	2.00



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Local Co-ordinate Reference: Well SHL: 100' FNL, 1070' FEL, Sec 22, T17S, R29E, Unit A
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Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
2,040.00	4.30	90.80	2,038.35	0.07	57.84	1.22	1.44	1.37	-7.16
2,135.00	4.10	91.30	2,133.09	-0.06	64.79	1.50	0.21	-0.21	0.53
2,230.00	4.00	92.70	2,227.86	-0.29	71.50	1.89	0.15	-0.11	1.47
2,325.00	3.90	92.90	2,322.63	-0.61	78.04	2.35	0.11	-0.11	0.21
2,419.00	3.80	93.70	2,416.42	-0.97	84.34	2.85	0.12	-0.11	0.85
2,514.00	4.00	91.80	2,511.20	-1.28	90.79	3.31	0.25	0.21	-2.00
2,609.00	3.70	94.30	2,605.98	-1.61	97.16	3.78	0.36	-0.32	2.63
2,704.00	4.00	95.00	2,700.77	-2.13	103.52	4.44	0.32	0.32	0.74
2,799.00	4.00	95.00	2,795.54	-2.71	110.12	5.17	0.00	0.00	0.00
2,893.00	4.00	98.50	2,889.31	-3.48	116.63	6.08	0.26	0.00	3.72
2,988.00	4.30	101.20	2,984.06	-4.66	123.40	7.42	0.38	0.32	2.84
3,083.00	3.60	89.40	3,078.84	-5.32	129.87	8.22	1.13	-0.74	-12.42
3,178.00	3.80	87.10	3,173.64	-5.13	136.00	8.17	0.26	0.21	-2.42
3,273.00	3.80	90.10	3,268.43	-4.98	142.29	8.15	0.21	0.00	3.16
3,367.00	4.00	90.70	3,362.21	-5.02	148.68	8.34	0.22	0.21	0.64
3,462.00	4.30	92.10	3,456.96	-5.19	155.56	8.67	0.33	0.32	1.47
3,557.00	4.40	92.00	3,551.69	-5.45	162.76	9.08	0.11	0.11	-0.11
3,652.00	3.30	81.80	3,646.47	-5.19	169.11	8.96	1.36	-1.16	-10.74
3,746.00	3.10	81.20	3,740.33	-4.41	174.30	8.30	0.22	-0.21	-0.64
3,841.00	2.70	52.20	3,835.21	-2.65	178.60	6.64	1.58	-0.42	-30.53
3,936.00	2.00	17.30	3,930.13	0.31	180.86	3.73	1.64	-0.74	-36.74
4,031.00	0.40	352.70	4,025.11	2.22	181.31	1.83	1.73	-1.68	-25.89
4,063.00	0.40	350.30	4,057.11	2.44	181.28	1.61	0.05	0.00	-7.50
4,095.00	0.10	324.80	4,089.11	2.57	181.25	1.48	0.98	-0.94	-79.69
4,126.00	1.30	173.50	4,120.11	2.24	181.27	1.81	4.48	3.87	-488.06
4,158.00	3.80	172.10	4,152.07	0.83	181.46	3.22	7.81	7.81	-4.38
4,190.00	6.90	174.20	4,183.93	-2.13	181.80	6.19	9.71	9.69	6.56
4,221.00	10.40	176.80	4,214.57	-6.78	182.14	10.84	11.36	11.29	8.39
4,253.00	14.00	178.20	4,245.85	-13.53	182.43	17.60	11.29	11.25	4.38
4,285.00	17.70	177.80	4,276.62	-22.27	182.73	26.34	11.57	11.56	-1.25
4,316.00	21.60	177.40	4,305.81	-32.68	183.17	36.76	12.59	12.58	-1.29
4,348.00	25.50	177.70	4,335.14	-45.45	183.72	49.54	12.19	12.19	0.94
4,379.00	29.50	179.60	4,362.63	-59.76	184.04	63.85	13.21	12.90	6.13
4,411.00	33.60	181.80	4,389.90	-76.49	183.82	80.58	13.31	12.81	6.88
4,443.00	37.20	182.20	4,415.98	-95.01	183.17	99.08	11.27	11.25	1.25
4,474.00	39.70	181.10	4,440.25	-114.28	182.62	118.33	8.36	8.06	-3.55
4,506.00	42.20	180.20	4,464.42	-135.25	182.38	139.29	8.03	7.81	-2.81
4,537.00	45.00	180.20	4,486.87	-156.63	182.31	160.66	9.03	9.03	0.00
4,569.00	45.80	180.60	4,509.34	-179.41	182.15	183.43	2.65	2.50	1.25
4,601.00	46.10	180.50	4,531.59	-202.41	181.93	206.42	0.96	0.94	-0.31
4,632.00	46.50	180.50	4,553.00	-224.82	181.73	228.82	1.29	1.29	0.00



TDS
Survey Report



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Site: Dodd Federal Unit #930H
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Design: BHL: 220' FSL, 976' FEL, Sec 22, T17S, R29E, Unit P

Local Co-ordinate Reference: Well SHL: 100' FNL, 1070' FEL, Sec 22, T17S, R29E, Unit A
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Survey Calculation Method: Minimum Curvature
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Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,638.86	46.61	180.37	4,557.72	-229.80	181.69	233.80	2.08	1.56	-1.89
As-Drilled PP									
4,664.00	47.00	179.90	4,574.93	-248.13	181.65	252.12	2.08	1.56	-1.87
4,695.00	47.30	179.90	4,596.01	-270.85	181.69	274.85	0.97	0.97	0.00
4,727.00	47.70	180.00	4,617.63	-294.45	181.71	298.43	1.27	1.25	0.31
4,759.00	48.40	179.70	4,639.02	-318.25	181.77	322.23	2.30	2.19	-0.94
4,790.00	50.50	179.80	4,659.18	-341.80	181.88	345.78	6.78	6.77	0.32
4,822.00	54.20	179.90	4,678.72	-367.13	181.94	371.10	11.57	11.56	0.31
4,853.00	58.10	179.90	4,695.98	-392.87	181.99	396.84	12.58	12.58	0.00
4,885.00	61.50	179.90	4,712.08	-420.53	182.03	424.49	10.63	10.63	0.00
4,916.00	64.20	179.90	4,726.22	-448.11	182.08	452.06	8.71	8.71	0.00
4,948.00	66.10	180.10	4,739.67	-477.14	182.08	481.09	5.96	5.94	0.63
4,980.00	68.60	180.30	4,751.99	-506.67	181.98	510.61	7.83	7.81	0.63
5,011.00	71.30	180.20	4,762.62	-535.79	181.85	539.72	8.71	8.71	-0.32
5,043.00	74.70	179.30	4,771.97	-566.39	181.99	570.31	10.96	10.63	-2.81
5,074.00	77.10	178.60	4,779.52	-596.45	182.54	600.37	8.05	7.74	-2.26
5,106.00	79.40	178.60	4,786.04	-627.76	183.31	631.70	7.19	7.19	0.00
5,138.00	82.70	179.20	4,791.02	-659.36	183.91	663.31	10.48	10.31	1.88
5,169.00	86.50	179.80	4,793.94	-690.22	184.18	694.16	12.41	12.26	1.94
5,201.00	88.70	179.90	4,795.28	-722.19	184.26	726.12	6.88	6.88	0.31
5,268.00	89.80	180.60	4,796.15	-789.18	183.97	793.09	1.95	1.64	1.04
5,363.00	89.40	181.50	4,796.82	-884.16	182.23	888.01	1.04	-0.42	0.95
5,457.00	89.40	180.00	4,797.80	-978.15	181.00	981.94	1.60	0.00	-1.60
5,552.00	89.90	180.60	4,798.38	-1,073.14	180.50	1,076.91	0.82	0.53	0.63
5,647.00	90.10	181.10	4,798.38	-1,168.13	179.09	1,171.84	0.57	0.21	0.53
5,742.00	89.00	179.00	4,799.13	-1,263.12	179.01	1,266.80	2.50	-1.16	-2.21
5,837.00	89.40	179.80	4,800.45	-1,358.11	180.01	1,361.79	0.94	0.42	0.84
5,932.00	89.50	180.60	4,801.36	-1,453.10	179.67	1,456.75	0.85	0.11	0.84
6,027.00	89.80	179.90	4,801.94	-1,548.10	179.26	1,551.71	0.80	0.32	-0.74
6,122.00	89.50	180.20	4,802.53	-1,643.09	179.18	1,646.69	0.45	-0.32	0.32
6,217.00	89.30	178.30	4,803.52	-1,738.08	180.42	1,741.67	2.01	-0.21	-2.00
6,279.00	89.10	178.40	4,804.39	-1,800.05	182.20	1,803.67	0.36	-0.32	0.16
6,343.00	89.20	178.60	4,805.34	-1,864.02	183.88	1,867.66	0.35	0.16	0.31
6,438.00	89.20	179.20	4,806.66	-1,958.99	185.70	1,962.65	0.63	0.00	0.63
6,532.00	88.90	179.20	4,808.22	-2,052.97	187.02	2,056.63	0.32	-0.32	0.00
6,627.00	90.20	179.60	4,808.97	-2,147.96	188.01	2,151.62	1.43	1.37	0.42
6,722.00	90.00	179.80	4,808.80	-2,242.95	188.51	2,246.61	0.30	-0.21	0.21
6,817.00	89.50	179.90	4,809.21	-2,337.95	188.76	2,341.59	0.54	-0.53	0.11
6,911.00	90.40	179.30	4,809.30	-2,431.95	189.41	2,435.57	1.15	0.96	-0.64
7,006.00	90.20	179.70	4,808.80	-2,526.94	190.24	2,530.56	0.47	-0.21	0.42
7,101.00	90.00	179.90	4,808.63	-2,621.94	190.57	2,625.55	0.30	-0.21	0.21



TDS
Survey Report



Company: COG Operating LLC

Local Co-ordinate Reference: Well SHL: 100' FNL, 1070' FEL, Sec 22, T17S, R29E, Unit A

Project: Eddy County, NM (NAD-27 2015)

TVD Reference: KB @ 3587.00usft (Silver Oak #3)

Site: Dodd Federal Unit #930H

MD Reference: KB @ 3587.00usft (Silver Oak #3)

Well: SHL: 100' FNL, 1070' FEL, Sec 22, T17S, R29E, Unit A

North Reference: Grid

Wellbore: BHL: 220' FSL, 976' FEL, Sec 22, T17S, R29E, Unit P

Survey Calculation Method: Minimum Curvature

Design: BHL: 220' FSL, 976' FEL, Sec 22, T17S, R29E, Unit P

Database: EDM 5000.1 Single User Db

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
7,196.00	90.80	179.20	4,807.97	-2,716.94	191.32	2,720.53	1.12	0.84	-0.74
7,291.00	90.90	179.80	4,806.56	-2,811.92	192.15	2,815.51	0.64	0.11	0.63
7,386.00	90.30	179.80	4,805.57	-2,906.92	192.48	2,910.49	0.63	-0.63	0.00
7,481.00	89.90	180.20	4,805.40	-3,001.92	192.48	3,005.47	0.60	-0.42	0.42
7,575.00	90.00	180.90	4,805.48	-3,095.91	191.58	3,099.42	0.75	0.11	0.74
7,670.00	90.50	179.60	4,805.07	-3,190.91	191.16	3,194.38	1.47	0.53	-1.37
7,765.00	90.30	179.40	4,804.40	-3,285.90	191.99	3,289.37	0.30	-0.21	-0.21
7,860.00	90.30	179.90	4,803.91	-3,380.90	192.57	3,384.36	0.53	0.00	0.53
7,955.00	90.40	180.30	4,803.33	-3,475.90	192.41	3,479.33	0.43	0.11	0.42
8,049.00	90.50	180.80	4,802.59	-3,569.89	191.50	3,573.27	0.54	0.11	0.53
8,144.00	89.50	181.90	4,802.59	-3,664.86	189.27	3,668.17	1.56	-1.05	1.16
8,239.00	89.80	182.60	4,803.17	-3,759.78	185.54	3,762.99	0.80	0.32	0.74
8,334.00	89.50	182.90	4,803.75	-3,854.67	180.98	3,857.75	0.45	-0.32	0.32
8,429.00	89.90	183.60	4,804.25	-3,949.52	175.59	3,952.45	0.85	0.42	0.74
8,524.00	89.60	184.10	4,804.66	-4,044.30	169.21	4,047.07	0.61	-0.32	0.53
8,618.00	89.40	184.30	4,805.48	-4,138.04	162.33	4,140.64	0.30	-0.21	0.21
8,713.00	90.50	184.10	4,805.56	-4,232.79	155.37	4,235.20	1.18	1.16	-0.21
8,808.00	90.60	185.00	4,804.65	-4,327.48	147.84	4,329.71	0.95	0.11	0.95
8,903.00	90.10	185.10	4,804.07	-4,422.11	139.47	4,424.12	0.54	-0.53	0.11
8,998.00	91.20	184.60	4,802.99	-4,516.76	131.44	4,518.57	1.27	1.16	-0.53
9,093.00	91.60	182.80	4,800.67	-4,611.53	125.31	4,613.18	1.94	0.42	-1.89
9,188.00	91.30	183.00	4,798.27	-4,706.38	120.51	4,707.90	0.38	-0.32	0.21
9,283.00	91.60	183.20	4,795.87	-4,801.21	115.37	4,802.59	0.38	0.32	0.21
9,375.00	91.90	184.00	4,793.06	-4,892.99	109.60	4,894.21	0.93	0.33	0.87
Last TDS MWD Survey									
9,430.00	91.90	184.00	4,791.23	-4,947.82	105.77	4,948.95	0.00	0.00	0.00
Projection to Bit/TD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		
		+N/-S (usft)	+E/-W (usft)	Comment
830.00	829.99	0.75	0.44	Tie-In to VES Gyro
902.00	901.99	0.76	0.80	First TDS MWD Survey
4,638.86	4,557.72	-229.80	181.69	As-Drilled PP
9,375.00	4,793.06	-4,892.99	109.60	Last TDS MWD Survey
9,430.00	4,791.23	-4,947.82	105.77	Projection to Bit/TD

Checked By: _____ Approved By: _____ Date: _____